



# Unveiling Risks in Decentralized Finance: A Systematic Literature Review

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**Abstract.** The present study aims to map the existing intellectual structure on Decentralized Finance (DeFi) risks. The study utilizes the systematic literature review (SLR) method to identify DeFi risks and the Scopus database to retrieve the pertinent literature. Further, authors select 50 research articles through abstract and title scanning, complete text analysis, and citation chaining to perform content analysis. Using content analysis, the present study identifies 21 DeFi risks segregated into four categories, namely technical, macro-economic, legal and regulatory, and user-centric risks. Additionally, the study provides unique research directions for the future. Hence, the present study contributes to the DeFi literature and has practical implications for DeFi entrepreneurs, individuals, developers, programmers, and policymakers. The study is the first of its kind that consolidates pertinent risks related to DeFi using the SLR method and broadens the knowledge of stakeholders in the DeFi ecosystem.

**Keywords:** Decentralized finance, DeFi, risks, Blockchain, Systematic literature review

## 1 Introduction

The past few years have witnessed substantial growth in blockchain technology-based financial services owing to technological advancements (e.g., artificial intelligence, internet of things) [1] and limitations of legacy financial systems such as intermediaries commission, lack of transparency, interoperability, and efficiency [2]. The revolutionary technological innovations, such as the release of the Bitcoin white paper [3] and the advent of Ethereum in 2014, paved the way for the unprecedented expansion of the blockchain-based decentralized finance (DeFi) ecosystem [4]. DeFi is a nascent field that comprises unlicensed and unregulated financial services and mechanisms that operate through distributed ledger systems outside the purview of traditional financial systems [5]. The DeFi market reached \$13.61 billion in 2022 [6] and is expected to grow at a 46% compounded annual growth rate (CAGR) up to 2030 [7]. Additionally, [8] reports that the value unlocked through DeFi financial models amounts to \$83.3 billion in 2023. DeFi ecosystem addresses the shortcomings of traditional financial systems and empowers the users by providing significant benefits such as better accessibility, transparency, and interoperability [9]. DeFi infrastructure mandates

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minimal involvement of custodians and clearing houses, and all the transactions are managed through self-executed codes called smart contracts run on the blockchain.

Despite the significant benefits DeFi offers, it poses various technical and regulatory challenges for its users and regulators [10]. Forbes reveals that since 2020, cryptos amounting to \$1.68 billion have been stolen due to vulnerabilities of DeFi protocols [11]. Moreover, DeFi platforms lost \$336 million due to malicious and phishing attacks in the first quarter of 2024, raising questions about the security of DeFi platforms [12]. The inherent risks in DeFi protocols impede its mass adoption. These vulnerabilities of the DeFi ecosystem encourage researchers to unravel the risks and challenges of DeFi protocols. Consequently, various researchers in the past have attempted to uncover risks related to DeFi models e.g., [9], [2], [10]. Hence, it becomes imperative to map the literature on DeFi risks from time to time to provide a detailed perspective for better comprehension of prevailing risks. The mapping of literature related to prevailing DeFi risks can guide various stakeholders to devise optimal strategies to address these risks [10]. Astonishingly, there is no systematic review-based study that maps the existing scientific research on DeFi risks. Hence, the present study aims to fill this substantial gap with the corresponding research questions (RQs):

RQ1. What risks impede the adoption of the DeFi ecosystem?

RQ2. What areas can future scholars explore for further development in the DeFi area?

Based on the RQs mentioned above, the primary purposes of the present study are: (1) To identify and categorize the risks prevailing in the DeFi ecosystem that impede its adoption. (2) To suggest avenues for future scholars to conduct further research in the DeFi domain. This study makes significant contributions to literature. First, it details the risks categorized into four distinct areas, that hinder the mass adoption of DeFi models. Then, it outlines unique future research directions, aiming to explore the intricacies of the DeFi ecosystem further. Furthermore, the study has practical implications for a wide range of stakeholders, including individuals, DeFi entrepreneurs, developers, programmers, and policymakers, by comprehensively elaborating on the risks that impede the adoption of the DeFi ecosystem. However, the study carries some limitations. The present study uses only the Scopus database, employs limited keywords for literature search, and includes only English language articles.

The subsequent sections of the article are as follows: Section two provide the theoretical background; section three details the methodology employed to conduct this systematic

review; Section four presents the descriptive analysis; Section five delineates DeFi risks; Section six proposes a future research agenda; Section seven details the implications; and Section eight mentions the conclusion and limitations of the study.

## **2 Theoretical background**

Due to unprecedented growth in the DeFi ecosystem, it poses challenges for regulators and policymakers [13]. Hence, risks arising in DeFi mechanisms have been given considerable attention in recent years. For instance, the World Economic Forum released a white paper highlighting financial, technical, operational, and regulatory risks prevalent in the DeFi ecosystem [14]. Similarly, [2] report that these risks and challenges substantially influence the mass adoption of DeFi as a mainstream financial system. Furthermore, [5] report the issues of concentrated voting rights in DeFi platforms, which raises governance issues in the DeFi ecosystem. DeFi platforms depend on interconnected technologies for efficient operations, and their failure can lead to a contagion effect, which can also spread to traditional financial markets [15]. Additionally, studies have raised concerns over the liquidity problems in the DeFi instrument e.g., [16]. Hence, researchers in the past e.g., [10] highlight the need to identify these DeFi risks from time to time in the ever-changing financial and technological environment so that appropriate strategies can be formulated to address these risks.

## **3 Research methodology**

The review-based studies primarily aim to unravel the current state of research and identify substantial gaps for further development in a particular field of scientific study [10], [17]. Systematic reviews involve identifying and searching keywords on bibliometric databases to retrieve relevant articles and analyses of the retrieved literature [18]. The method ensures the inclusion of reputed interdisciplinary journals and assists in synthesizing literature, confirming the study's objectivity, comprehensibility, and replicability [19]. The present study utilizes the Scopus database to retrieve pertinent literature since Scopus is a widely acceptable bibliometric database in academic studies to conduct systematic reviews [20], [21]. Scopus provides better coverage of scientific studies from multiple disciplines than Web of Science and matches Google Scholar's reach but excludes predatory journals [21]. Additionally, Scopus is updated frequently and has indexed journals from renowned publishers such as Wiley, Sage, Springer, Elsevier, Taylor and Francis, and Emerald [22]. The one-time search was conducted on 03 May 2024 to avoid potential bias arising from frequent

updating of the Scopus database. Furthermore, based on the recommendation of [23] and [18] the present study follows the scanning and curating method:

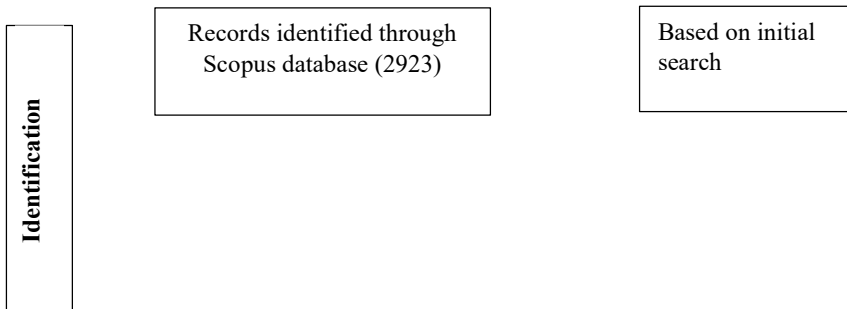
### 3.1 Scanning

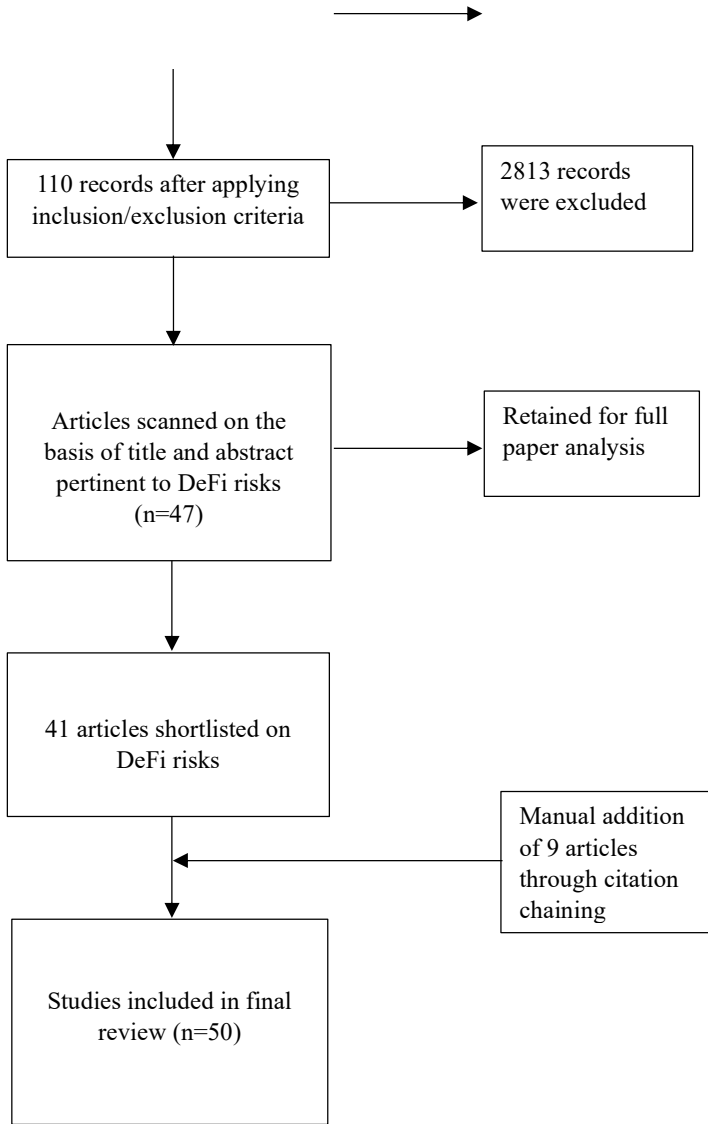
Identifying the relevant keywords to search on bibliometric databases is a major challenge in systematic literature review-based studies [24]. The present study adopts the keywords from similar studies on the topic under investigation e.g., [25], [10]. To prevent the exclusion of relevant articles, authors separate the keywords into two categories following the recommendations of [26].

Group A: "decentrali?ed finance" OR "defi " OR "open finance" AND

Group B: "risks" OR "challenges" OR "issues"

To retrieve the relevant studies for the review, the present study has combined each keyword from Group 1 and Group 2 and ran the search query using Boolean operators. Further, authors have also checked the keywords in the title and abstract to ensure relevant studies are included.





**Figure 1.** Methodology employed in retrieving literature

**Source(s):** Authors' construct

### 3.2 Curating

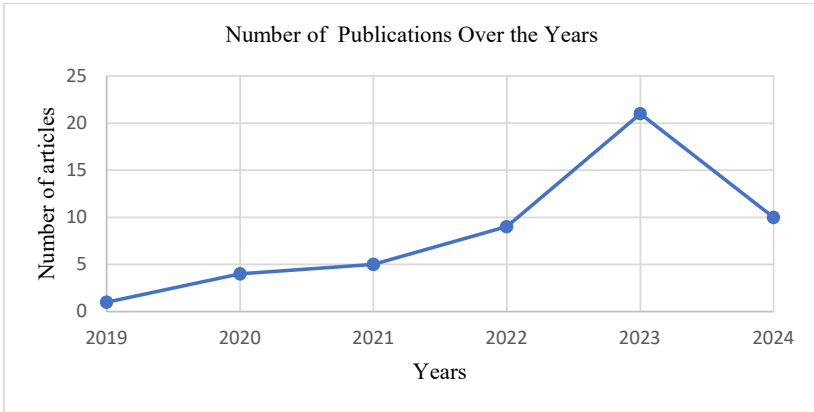
The present study restricts the articles to the business, management and accounting, and economics, econometrics, and finance domains to avoid the inclusion of irrelevant studies. Additionally, the present study applies the inclusion/exclusion criteria as follows: (1) articles that focus on decentralized finance and its synonyms and aspire to study its risks and challenges. (2) peer-reviewed articles, and (3) full-text articles in English. Articles published in languages other than English have been excluded. Moreover, no time limit is defined to ensure the inclusion of all the relevant articles.

The initial keyword search on the Scopus database results in 2923 studies. After applying inclusion/exclusion criteria, the authors assessed the title and abstract of 110 studies and curated 47 articles. Furthermore, these 47 articles have been analyzed by full-text reading, resulting in 41 articles. Additionally, to omit the possibility of exclusion of relevant studies, the present study employs citation chaining, which involves forward and backward referencing. The execution of citation chaining results in the addition of 9 additional articles. Hence, the present study utilizes 50 research studies to conduct the systematic review, as shown in Figure 1.

## **4 Descriptive analysis**

Descriptive analysis assists in understanding the chronological publication trends, most prolific journals, most cited articles contributing to the DeFi discipline, and types of research studies. The chronological trend of published articles reveals that research related to DeFi risks has risen significantly from 2020 and 2021 as shown in the figure 2. The plausible reason for this rise is people's shift towards DeFi instruments during the COVID-19 pandemic [27], which also gave rise to DeFi scams [11]. Hence, researchers start exploring risks related to DeFi. Furthermore, analysis reveals that most studies concerning DeFi risks are empirical, as shown in figure 3.

### **4.1 Number of publications over the years**



**Figure 2.** Number of publications over the years

**Source(s):** Authors’ construct

**Table 1.** Top 5 journals

Journals	Number of articles	H Index
Finance Research Letters	4	101
Resources Policy	3	114
Journal of Financial Crime	2	33
Journal of Financial Regulation	2	14
Journal of Money Laundering Control	2	29

**Source(s):** Authors’ construct

Table 1 reveals that Finance Research Letters is the most contributing journal, with four articles and an H index of 101, followed by Resources Policy, with three articles and an H index of 114. Other influential journals are Journal of Financial Crime, Journal of Financial Regulation, and Journal of Money Laundering Control, with two articles each and an H index of 33,14 and 29, respectively.

**Table 2.** Top 5 most cited articles

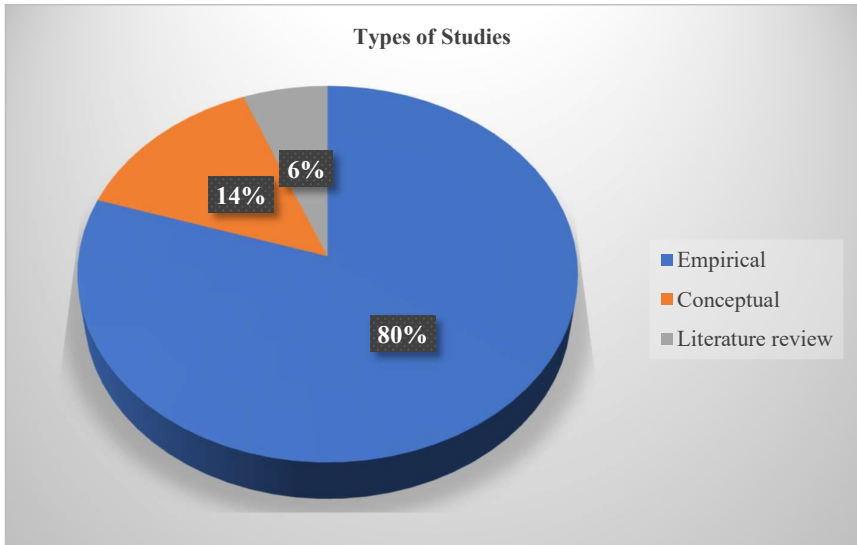
Articles	Total Citations
Chen and Bellavitis (2020) Blockchain disruption and decentralized finance: The rise of decentralized business models	304
Schär (2021) Decentralized finance: on blockchain-and smart contract-based financial markets	174
Karim et al. (2022) Examining the interrelatedness of NFTs, DeFi tokens and cryptocurrencies	165
Zetzsche et al. (2022) Decentralized finance	147

Wang (2020) Volatility spillovers across NFTs news attention and financial markets

67

**Source(s):** Authors' construct

Table 2 shows that [28] is the most cited article, with 304 citations, followed by [29], with 174 citations. Additionally, [4], [30], and [31] are the significant studies with 165, 147, and 67 total citations, respectively.



**Figure 3.** Types of studies

**Source(s):** Authors' construct

## 5 DeFi risks

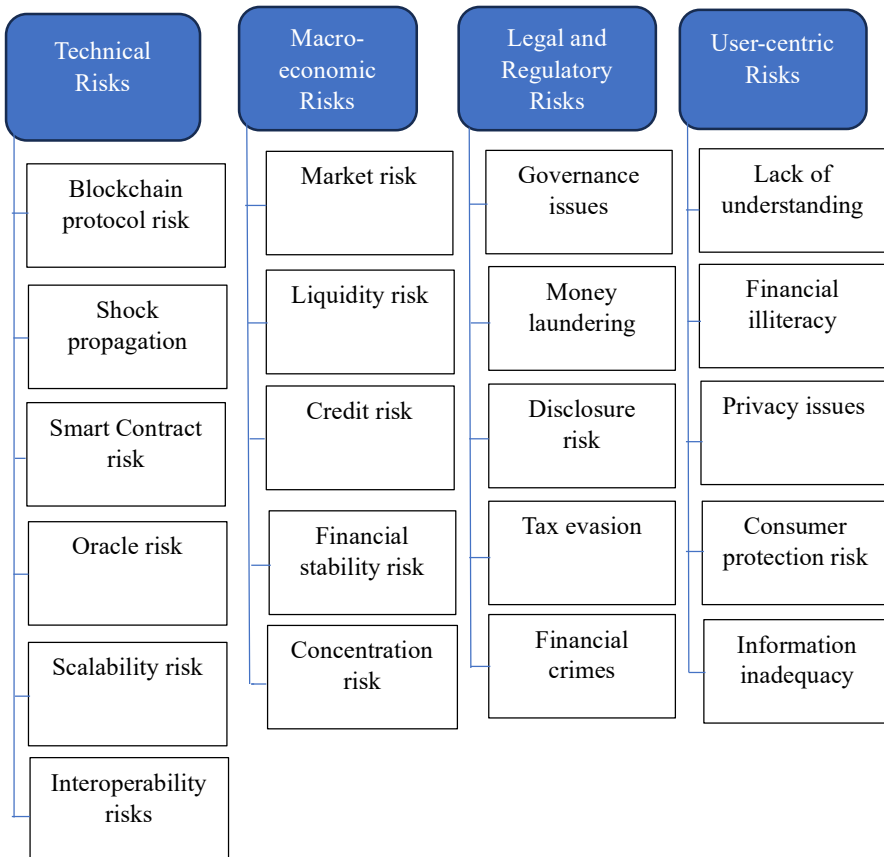
The present study employs the narrative synthesis approach for content analysis illuminated by [32] to unravel the DeFi risks objectively and systematically [18]. The authors read the research articles in detail and identified the risks. Furthermore, a list of critical risks is prepared, which are addressed in the studies. Based on the content analysis, the present study uncovers the 21 DeFi risks, classified into four distinct categories: technical, macro-economic, legal and regulatory, and user-centric risks, as shown in Figure 4.

### 5.1 Technical risks

The convergence of various interconnected technologies is required to carry out transactions and operations in the DeFi ecosystem, which makes it vulnerable to



technical risks [2]. Under this category, the present study identifies six significant risks, namely blockchain protocol risk, shock propagation, smart contract risk, oracle risk, scalability risk, and interoperability risk. The interconnectedness of blockchain protocols, decentralization, and susceptibility to cyber-attacks due to poor infrastructure results in substantial losses for the users [10]. These vulnerabilities in blockchain protocols lead to another technical risk called shock propagation. The blockchain protocols are interconnected, and failure of one protocol may lead to complete system failure, which may not be limited to DeFi markets since the contagion effect of this failure may also reach traditional financial markets [15].



**Figure 4.** DeFi risks

**Source(s):** Authors' construct

The transactions are executed on DeFi platforms using smart contracts. Smart contracts are blockchain-based executable codes that streamline transactions among untrustworthy parties without the involvement of any other third legal party [33]. Researchers observe that smart contracts are vulnerable to parity multi-sig attacks, integer overflow, solidity weaknesses, and reentrancy [34].

Sufficient information is required to execute smart contracts. Third parties, called oracles, supply this information, posing risks in DeFi transactions. These third parties are untrustworthy, and their procedures are not transparent [29]. Additionally, malicious parties may enter into transactions and supply erroneous information, resulting in smart contract failure and connection disruption [2]. Another risk in this category is scalability risk, which refers to the inability of DeFi platforms to scale up their infrastructure with the increasing transaction volume [10]. This increase in transaction volume is supported by the statistical fact that the DeFi market is expected to reach \$231 billion in 2030 [35]. Increases in transaction volumes on the DeFi platform require simultaneous infrastructure development, and failure in doing so results in delays in processing time, transaction delays, and sometimes complete system failure, which pose risks for DeFi users [16]. Moreover, interoperability is vital for the smooth functioning of DeFi platforms. However, scalability risk and lack of infrastructure in the DeFi ecosystem lead to data silos that negatively affect the seamless experience of DeFi users [36].

## **5.2 Macro-economic risks**

To ensure sustained economic development, many countries worldwide require structural reforms that ensure macroeconomic stability in these countries. Within the context of DeFi, they also influence critical macroeconomic indicators favorably. However, DeFi platforms often fail to maintain their peg during financial distress, leading to macroeconomic instability [10]. The present study encounters five prominent risks under this category: market risk, liquidity risk, credit risk, financial stability risk, and concentration risk. The DeFi ecosystem is highly susceptible to steep price decline due to ever-evolving market scenarios, unforeseen circumstances, and irrational and idiosyncratic user behavior [2]. Moreover, market risk in the DeFi ecosystem arises due to a lack of consumer protection mechanisms and the absence of price discovery mechanisms, resulting in wild market swings [36]. Users in the DeFi ecosystem experience losses due to these wild swings, which decrease their trust in DeFi markets [37]. Another feather in the macroeconomic risk category is liquidity risk. Liquidity risk arises when users face difficulties in making successful transactions in DeFi assets due to the non-availability of buyers and sellers [2]. Deposits are made in the form of liquidity pools to execute successful transactions. These liquidity pools ensure liquidity,

which is essential for the smooth functioning of DeFi platforms, and those who provide these deposits earn a transaction fee for each transaction by users [16]. If individuals with a large share of deposits in these liquidity pools withdraw their money, it may lead to severe liquidity crunch in DeFi markets [38].

Another macroeconomic risk that DeFi users encounter is credit risk. Credit risk arises when counterparties fail to comply with their financial obligations [39]. The issues prevailing in DeFi ecosystems, such as under-collateralization due to volatility in digital assets, availability of easy credit, over-leveraged positions, and lack of a sound algorithmic mechanism to determine interest, can substantially escalate credit risk [16]. These vulnerabilities undermine the users' confidence in the DeFi ecosystem. Furthermore, financial stability risks also pose hurdles in the mass adoption of DeFi mechanisms and instruments. If DeFi instruments become the replacements for traditional bank deposits and legacy payment and lending systems, the inherent vulnerabilities in DeFi platforms, such as smart contracts failures, blockchain protocol risks, and liquidity problems, may have a severe impact on users' trust, economic activities, and smooth functioning of the regular financial system [10]. Additionally, the financial stability risk can jeopardize the financial systems of emerging nations more severely [40]. Moreover, the DeFi ecosystem is also vulnerable to concentration risk. Concentration risk arises due to heavy control of some platforms and entities over the entire DeFi ecosystem [16]. Few major blockholders own the majority of cryptocurrencies and tokens on DeFi platforms, which can make the DeFi system inefficient as major blockholders may enforce their control and foist their opinions on the entire DeFi system [33].

### **5.3 Legal and regulatory risks**

DeFi ecosystem offers a wide array of financial services, involves numerous financial activities without the intermediation of legacy financial institutions, and operates in the regulatory grey area. This gives rise to legal and regulatory risks. Insufficient regulatory frameworks and guidelines cause these risks [41]. Under this category, the present study unveils five major risks: governance issues, money laundering, disclosure risk, tax evasion, and financial crimes. The patronage of DeFi formed decentralized autonomous organizations (DAOs) to share voting rights with all the stakeholders involved. However, it still has governance issues, like the dominance of a few players in decision-making [5]. Another major risk arising from the DeFi ecosystem is money laundering and terrorism funding. Given the pseudonymous and decentralized nature of DeFi, it poses severe challenges in front of regulators in the form of money laundering and financing for illicit activities[42]. The anonymous and borderless nature of DeFi makes

it more convenient for fraudsters to utilize DeFi for money laundering-related activities [43]. Another study also reports that \$800bn to \$2tn of decentralized currency has been used for money laundering and illicit funding, and 90% of money laundering operations are still untraced [44].

Since financial transactions on DeFi platforms occur without the involvement of regulatory jurisdiction, they do not disclose all the pertinent information related to their financial operations like traditional financial institutions [2]. This lack of disclosure norms results in information asymmetry and increases disclosure risk, which hampers the users' confidence in adopting DeFi models [45]. The lack of appropriate disclosure norms gives birth to a new risk in DeFi called tax evasion. Since there are no significant regulatory mechanisms, it leads to tax evasion. Furthermore, due to insufficient tax disclosure rules and regulations, entities operating in the DeFi ecosystem do not disclose their income [46]. Consequently, governments fail to collect sufficient income tax from the DeFi entities and individuals, which reduces trust and impedes the mass adoption of the DeFi ecosystem [33]. In addition, the rise in financial crimes and fraud in the DeFi ecosystem is well documented. DeFi users often experience high-profile cyber-attacks, which put their hard-earned money at risk [10]. Increasing cyber-attacks to steal cryptos, tokens and users' funds decrease consumer trust, negatively affecting the adoption of DeFi [47].

#### **5.4 User-centric risks**

The notion of DeFi is in its nascent stage and still unknown to most of the users. Users in the realm of DeFi refer to all the individuals using DeFi services and are interested in using DeFi platforms in the future. User-centric risks encompass DeFi ecosystem vulnerabilities that impede individuals from adopting its services at a larger scale [10]. Based on the literature content analysis, the present study encounters five major user-centric risks: lack of understanding, financial illiteracy, privacy issues, consumer protection risks, and information inadequacy. Involvement in DeFi services requires understanding the functionality of DeFi platforms and financial instruments such as cryptocurrencies, tokens, coins, and NFT. However, due to the infancy of DeFi applications, people lack understanding of these platforms and the risks involved, such as regulatory risks and volatility, which makes them vulnerable to scamsters [48]. This lack of knowledge and fear of getting cheated results in low participation, impeding DeFi adoption [43]. Furthermore, A serious risk arises in the DeFi ecosystem due to financial illiteracy. Programmers with technical backgrounds develop the DeFi platforms and applications and lack of deep financial knowledge, which contradicts traditional financial markets where financial products and services are designed by

experts in the finance domain [2]. Additionally, financial illiteracy among the public also hinders DeFi adoption. A significant gender gap exists in ownership and use of decentralized currencies due to women's lack of financial knowledge [48], resulting in a lower participation rate in DeFi markets.

Another major risk in this category is privacy issues. In this context, privacy entails individuals' right to keep their personal data anonymous to restrict unauthorized access to malicious players. DeFi users do not completely understand how their data is utilized, and subsequent data processing may result in significant privacy issues [40]. These privacy issues shake users' confidence and hamper DeFi adoption. Additionally, consumer protection mechanisms such as deposit protection like traditional banking systems are not enforced in DeFi. For instance, deposits in the United States of America (USA) are insured by the Federal Deposit Insurance Corporation for up to \$250,000 per person per bank [10]. These kinds of facilities are unavailable on DeFi platforms, increasing consumer protection risks and leading to a lower participation rate [40]. The last risk in this category is information inadequacy. DeFi users require tangible information regarding risks involved in DeFi and need to comprehend the information related to the functioning of the DeFi platforms, which is not available in public domain due to a lack of disclosure norms [10]. Due to information asymmetry regarding DeFi operations, consumers become vulnerable to scams [49] that impede its adoption.

## **6 Future research agenda**

DeFi is an emerging area in the realm of finance and technology which leaves space for more detailed exploration in the future. Due to the sudden increase in risks related to DeFi platforms, it has gained the attention of researchers in the last few years; hence, more fascinating insights are expected in the future. The present study highlights risks related to DeFi, which require robust solutions to ensure its mass adoption. Therefore, future scholars can conduct studies to propose viable solutions for prevailing risks in DeFi ecosystems. It is evident from the literature that regulatory disparities exist in legal rules and regulations for the DeFi ecosystem across the countries. First, it is imperative to understand the regulators' viewpoints about DeFi to remove these disparities. Hence, future studies can focus on understanding the regulator's viewpoints on DeFi risks through qualitative methods such as in-depth interviews, focus group discussions, and the Delphi method. Furthermore, money laundering and tax evasion have been a severe concern in DeFi. Hence, researchers can conduct studies to develop appropriate accounting and audit frameworks to deal with money laundering and tax evasion-related issues.

Unfavorable events and extreme volatility in DeFi instruments lead to a decreased participation rate. Therefore, future scholars can conduct studies to explore the possibilities of implementing techniques such as circuit filters in DeFi ecosystems to reduce risk. Additionally, examining the broader socio-economic impacts of DeFi can be an exhilarating area for future research. Researchers can investigate how addressing the DeFi risks can bridge the gap between banked and unbanked populations to promote financial inclusion in society. The present study reveals that a significant gender gap exists in the adoption of the DeFi models. Hence, future researchers can explore challenges faced by women in DeFi adoption. Additionally, researchers can also examine the status of DeFi adoption among marginalized communities and in developing countries. They can explore the specific challenges that these communities and countries face while participating in the DeFi ecosystem.

## 7 Implications

The present study significantly contributes to DeFi literature by unraveling prominent risks prevailing in the DeFi ecosystem, providing readers with a comprehensive perspective. The present study highlights the 21 most prominent risks, segregated into four categories: technical, macroeconomic, legal and regulatory, and user-centric risks. Hence, apart from the theoretical contributions, the study has practical implications for individuals, DeFi entrepreneurs, developers, programmers, and policymakers. A thorough examination of relevant literature assisted the authors in developing seven propositions that can serve as a practical guide to minimizing DeFi risks.

*Proposition 1. Legal and regulatory risks can be minimized through multi-country and stakeholder collaboration in developing regulatory frameworks.*

DeFi ecosystem operates outside the purview of legacy financial and regulatory systems with the help of technologies across the globe, which makes it challenging to regulate. Although regulators in some countries attempt to frame rules and regulations for DeFi platforms, but they are not uniform [42]. Hence, collaboration between multiple stakeholders is essential to frame legal frameworks and minimize regulatory risks. Policymakers worldwide can design the regulatory framework for the DeFi ecosystem with mutual consent [2]. Moreover, other stakeholders, such as DeFi entrepreneurs, developers, and programmers, can also be involved in framing regulatory guidelines.

*Proposition 2. Implementation of resilient fallback mechanisms for data validation and decentralized oracles can alleviate several technical risks.*

Developing an alternative data validation mechanism can significantly enhance oracles' reliability and accuracy. These mechanisms provide an extra stratum of security. Furthermore, decentralized oracles can supply data from several independent sources, which can solve the centralization problem of implementing smart contracts [16]. Additionally, regular internal and external audits can be conducted like traditional financial markets to uncover the potential weaknesses in DeFi platforms.

*Proposition 3. Implementing credit rules, formulation of risk assessment frameworks, and setting capital requirements can mitigate credit risks.*

DeFi platforms can develop appropriate credit risk assessment frameworks and formulate appropriate credit rules to identify the users with a probability of default. For this, AI-based predictive analytics algorithms can be employed [50]. Furthermore, advanced machine learning techniques such as classification and regression trees (CART) can effectively predict the default possibility, which can be used to mitigate credit risk in the DeFi ecosystem [51].

*Proposition 4. Adopting a public-private partnership model to develop anti-money laundering frameworks can minimize the use of DeFi platforms for illicit and fraudulent activities.*

A public-private partnership between DeFi entrepreneurs and government agencies can significantly minimize money laundering and terrorist funding activities through DeFi platforms. DeFi platforms can detect and report large transactions and suspicious financial activities to government agencies for further action. Additionally, policymakers can frame a code of conduct for DeFi platforms under which they have to report suspicious transactions to the appropriate government agencies [46].

*Proposition 5. Regulating and providing security to the deposits and payment mechanisms in DeFi, like bank deposits, can enhance users' trust in the DeFi ecosystem.*

Regulators worldwide advocate the regulation of decentralized currencies, tokens, and coins like bank deposits, which can mitigate the use of DeFi instruments for illicit activities [10]. Furthermore, providing deposit security and insurance to people like

traditional bank deposits can significantly alleviate the fear of losing money on DeFi platforms.

*Proposition 6. Imparting financial literacy and digital financial knowledge among the public and DeFi developers can mitigate several user-centric risks.*

Low financial literacy and lack of knowledge regarding DeFi platforms' functioning significantly lower the DeFi ecosystem participation rate [48]. DeFi companies can create online platforms in collaboration with government agencies to spread awareness about DeFi instruments and mechanisms. For this, gamification strategy can be used to improve user engagement. Furthermore, policymakers can make it mandatory for DeFi developers and programmers to complete some financial certifications to enrich their knowledge in the finance domain [2].

*Proposition 7. Maintaining quality reserve assets and implementing automated market makers (AMMs) can minimize exposure to macroeconomic risks.*

DeFi instruments and markets experience high volatility during crises and unforeseen global events, which results in significant losses for users. Hence, AMMs can be implemented to adjust prices according to the liquidity available in the market, minimizing liquidity risk [52]. Additionally, highly liquid reserves can be maintained to mitigate liquidity risk during uncertain financial times [10].

## **8 Conclusion and limitations**

DeFi is revolutionizing the financial landscape and disseminating financial services through novel technologies. The DeFi ecosystem witnessed remarkable growth and is expected to grow at 46% CAGR till 2030 [7]. In this study, the authors identified 21 risks related to DeFi mechanisms and separated them into four distinct categories, namely technical, macro-economic, legal and regulatory, and user-centric risks. The present study adopts SLR method to retrieve the literature and content analysis to identify DeFi risks. These risks substantially hinder the public's mass adoption of the DeFi ecosystem. These risks need to be addressed to realize DeFi's complete potential. Hence, policymakers, DeFi entrepreneurs, programmers, developers, academicians, and non-governmental organizations must work collaboratively to address the shortcomings in the DeFi ecosystem. The true promise of DeFi, i.e., financial democracy, can be achieved through a collaborative approach among stakeholders [2].



Although the present study has practical implications for various stakeholders, it carries some limitations. First, the study utilizes only the Scopus database for literature search. Although Scopus provides comprehensive coverage of literature, the exclusion of some studies cannot be denied. Hence, researchers can also use other bibliometric databases to search for literature. Second, the keywords used for the literature search may not be comprehensive; other close keywords, such as alternative finance, crowdfunding, and peer-to-peer lending, can be used by future researchers. Third, authors have used research articles published in the English language only, and articles published in other languages have been ignored. Overall, this field is in its nascent stage, and continuous research in the domain can bring fascinating insights for academicians, financial practitioners, and policymakers.

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