Mapping The Landscape Of Blockchain Technology In The IT Sector: A Bibliometric And Content Analysis

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ABSTRACT
The study aims to explore the combination of SLR, Bibliometric Analysis and Content Analysis on the current scenario of blockchain technology in IT sector recognising the predominant theories used by the researchers. Further, the study also aims to identify the key facilitators and inhibtors for adoption blockchain technology. The study uses VoS viewer, TCCM approach and content analysis. This research meticulously analyses 238 articles published fron 2016-2024. The selected articles are sourced from prominent journals in widely recognised database 'Scopus'. Further, the results depicts influential fac (0 and inhibitors() that directly impact the adoption of this technology. the results depicts that TOE theory and UTAT theory is widely used in the literature. Whereas, innovation theory and game theory are yet to be explored in detail. This study pioneers a unified framework for blockchain technology as proposed model. This study marks a pivotal contribution, bridging theoretical advancements with practical strategies for the effective implementation of blockchain technology. Policymakers and industry professionals may benefit much from this research in order to better grasp and handle the main obstacles preventing blockchain acceptance. It also enables companies to create plans for properly using blockchain technologies for competitiveness and innovation. This research uncovers overlooked areas and proposes discerning research directions to advance the understanding and implementation of blockchain technology in different industries.

1. INTRODUCTION

Blockchain technology (BT) has emerged as a significant disruptive force, reshaping conventional business model frameworks into more innovative, digitalised, and sophisticated platform architectures (Chin et al., 2022). As an advanced form of distributed ledger technology, BT allows the central organisation to achieve the highest level of transparency and openness necessary for collaborative innovation among various parties simultaneously by encrypting intricate transactions that cross organisational boundaries (Zhang et. al., 2024). In the current scenario, it is embraced in several fields including finance, health, supply chains, manufacturing, and electronic buying (Zhang &Li, 2024; Niesya & Sayeed, 2024). The research survey conducted by IDC indicates that the expenditure on digital transformation will exceed USD 4 trillion in the fiscal year 2027 as a result of the robust business interest in this disruptive technology. The primary strength of blockchain technology is its distributed nature, which utilises distributed ledgers to provide secure and unalterable transaction records.

Although blockchain technology is used to revolutionise sectors including finance, healthcare, and transportation (Lindman et al., 2020; Saberi et al., 2019), several obstacles, including scalability, energy consumption, and regulatory issues, prevent the acceptance of blockchain technology (Song et al., 2021; Garg et al., 2021). For example, the proof-of-work consensus mechanism of blockchain can be quite energy-intensive and so cause problems regarding its environmental friendliness (Song et al., 2021). Furthermore, more difficult is the lack of standardisation and integration issues concerning legacy systems in the financial and healthcare sectors (Zhang et al., 2022). In addition to this, Data privacy laws, including GDPR (General Data Protection Regulation) and HIPAA (Health Insurance Portability and Accountability Act), also present a challenge with

respect to blockchain because of their transparency, which occasionally runs counter to legal criteria.

However, blockchain technology is meant to improve governance, streamline operations, and increase efficiency through simplicity. It has been included in artificial intelligence systems for the preservation of data integrity in machine learning models (Salah et al., 2019b). It offers tamper-proof transaction records, helping to improve the security and integrity of IoT systems. 5G technology can support open and safe identity management and billing systems (Chaer et al., 2019). Blockchain allows all the members of a company network to share the same transactional data and business rules across their nodes, unlike other software development systems. This capacity can lower information asymmetry and conflicts among business partners, so enhancing governance (Khan et. al.,2023). Blockchain technology helps with many uses, but it is still hampered with different issues (scalability, security, complexity) especially in smaller businesses where the high cost of implementation and lack of technological knowledge may prevent its adoption (Garg et al., 2021). This draws attention to a crucial knowledge vacuum: knowing the obstacles businesses encounter and the technical fixes needed to make blockchain adoption more scalable and realistic.

In recent years, there has been a surge in academic interest in blockchain technology, especially concerning Financial Artificial Intelligence (FAI) and sustainable finance (Tiwari et al., 2023). Most of such research, meanwhile, concentrate on particular sectors or technologies without offering a whole picture of blockchain's wider uses throughout sectors. Thus, the present work intends to perform a thorough bibliometric analysis of blockchain technology in the information technology sector in order to address important research questions concerning publication trends, major contributors, and future directions in sustainable finance and organisational performance. With this study, we hope to identify some new trends and gaps in blockchain research that will highlight areas requiring more investigation to improve blockchain acceptance and use. Performance analysis and science mapping approaches will be used in this paper to offer a comprehensive knowledge of the present situation of blockchain research and its future possibilities in finance, supply chain management, and IoT among other sectors (Donthu et al., 2021).

This study aims to provides important new perspectives on how companies might get beyond obstacles to implementing blockchain technology to improve sustainability, openness, and governance. It will look at the advantages and drawbacks as well as offer a road map for next studies tackling legal and technical obstacles.

Thus, the present study aims to perform bibliometric analysis of blockchain technology in Information technology sector which encompasses the following research questions:

1. Examining the current scenario of research on blockchain technology in IT sector
2. Identifying the aspects of TCCM- characteristics, methodologies, theories, and contexts used.
3. Exploring the inhibitors and facilitators of blockchain technology in IT sector
4. Identifying the significant implications pertinent for researchers in this study area

The article is structured as follows: The first section provides an introduction, offering a brief overview of the implementation of blockchain technology in the IT sector. Section 2 describes the approach used to investigate and improve the evaluated body of research for this project. The data is examined in the section that follows; sections 3 and 4 respectively concentrate on the bibliometric analysis and content analysis. Providing a quantitative knowledge of the field, the bibliometric approach is used to evaluate the development, trends, and main research areas concerning blockchain in the IT industry.

Moreover, the content analysis offers a qualitative study of the literary themes and trends. The results of the present study are presented in Section 5 together with a summary of the data analysis insights. Further section 6 and 7 includes the discussion and implications respectively. Lastly, the proposed model and future direction for the researchers are given.

2. METHODOLOGY

This study primarily focuses on performing a systematic review of the current literature available in the predominant database i.e. "Scopus" within blockchain technology. According to Thome et. al. (2016), this approach was criticised on the basis that SLR in some cases said to be biased and not objective. Therefore, this project will supplement this approach with a bibliometric analysis to mitigate this possibility. Bibliometric analysis is a consistent and reliable method used to assess and examine a wide landscape of literature. Bibliometric analysis aims to show the current state of an established or emerging area of research and to investigate the relationship among journal references (Donthu et al., 2021). Bibliometric research used a newer version, Similarities – (VOS) viewer was developed to help bibliometric map making and visualisation. Additionally, the content analysis is conducted based on the co-occurrence of terms to get a comprehensive understanding of the most influential papers and to further investigate the facilitators and barriers to the application of blockchain technology. This paper employs bibliometric analysis method in the literature to find influential and specialised books in the field (Mukherjee et al., 2022). In order to find research gaps and outline possible future directions for research studies in respect of blockchain technology, the paper also identifies theories, methods, contexts, traits, and indicators found in the literature.

2.1. Assembling

For the bibliometric analysis, the Scopus database was initially utilized to explore studies related to blockchain technology within the IT sector, with data collection extended up to December 2024. The selected keywords for this study included "blockchain technology AND IT sector" and "Blockchain Technology OR IT Sector." The dataset comprises a variety of document types, such as journal articles, conference proceedings, and conference papers, primarily in the fields of computer science, business management, and accounting.

2.2. Arranging

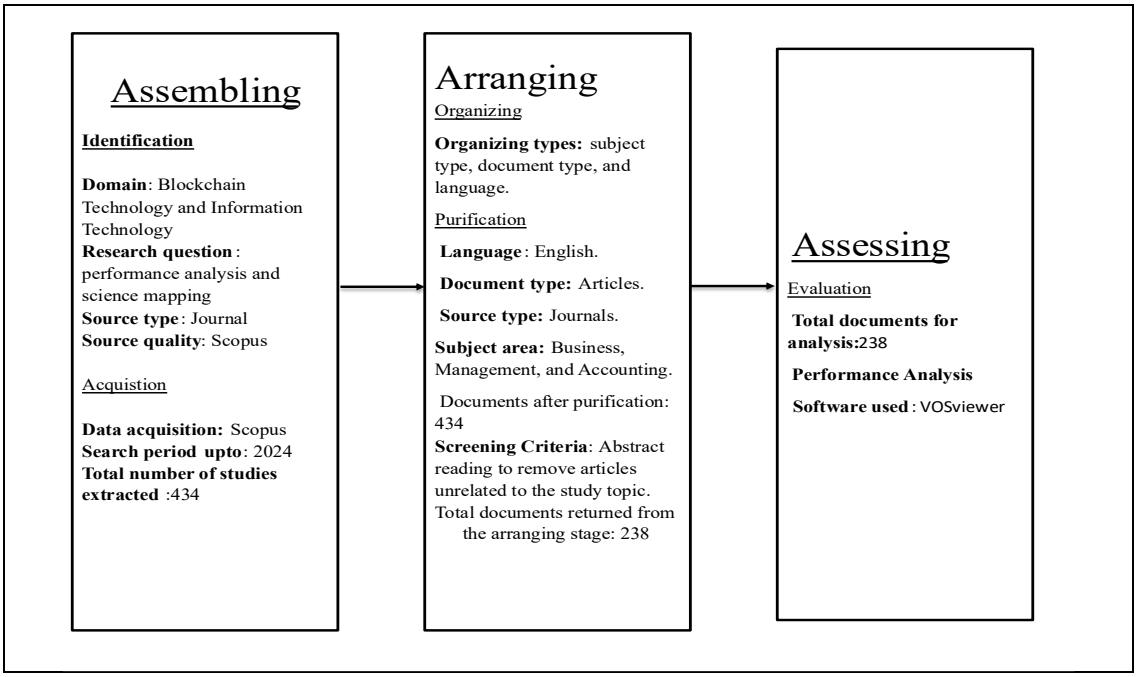
The initial search strategy yielded a total of 434 articles. Following the methodology outlined by Paul et al. (2021), we applied specific filters to establish our inclusion and exclusion criteria. Paul et al. (2021) recommended that we consider four key parameters for selecting research articles for further analysis: First, articles must be published in peer-reviewed journals; second, they should be written in English; third, we focused on full-text journal articles, review articles, and early access publications; and finally, articles needed to fall within the disciplines of Business, Management & Accounting, and Computer Science. All the papers which were non-English articles, non-peer-reviewed publications, and various other formats such as book chapters, book reviews, editorials, extended abstracts, conference proceedings, discussions, and news articles were deleted. After applying these criteria, we identified 238 studies on blockchain technology as potentially relevant, which proceeded to the screening phase.

2.3. Assessing

We conducted a bibliometric analysis of 238 papers to assess the finalised outcomes. This type of study can reveal current trends and future research directions (Li et al., 2017).

Even though there are different types of the software are available for bibliometric analysis VOS Viewer has been recognized by Cobo et al. (2011) and Feng et al. (2017) for its user-friendly graphical interface, which facilitates the creation of bibliometric mappings. Consequently, we selected VOS Viewer version 1.6.15 for our analysis.

Figure 3.1. Bibliometric Analysis



Source: (Donthu et. al.,2021)

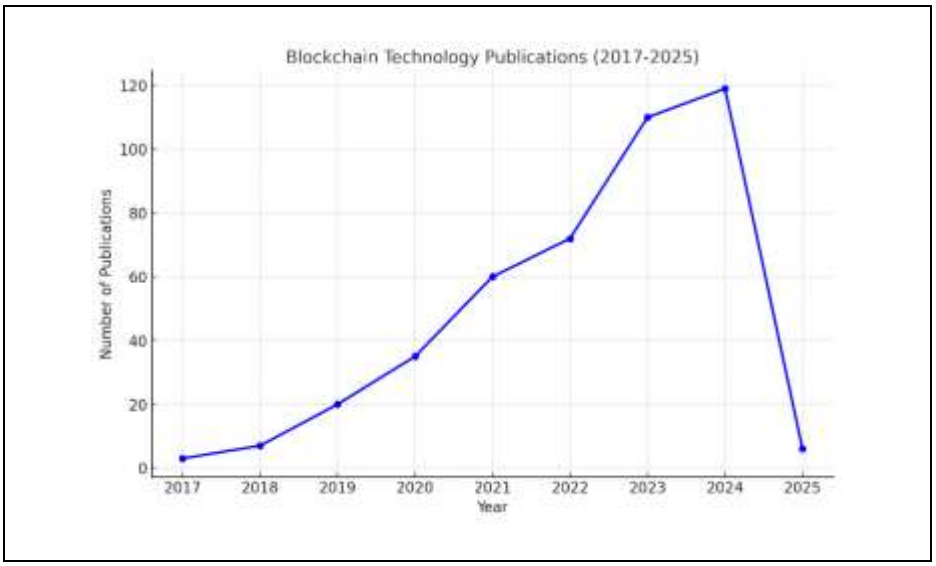
3. BIBLIOMETRIC ANALYSIS

This snippet provides an overview of the current state of blockchain technology in the IT sector, incorporating both quantitative and qualitative research. It includes descriptive statistics on the chronological distribution of publications i.e. the journals in which these articles are published, the types of articles being preferred, geographic distribution of the articles, and the co-occurrence of keywords used in these research papers. This analysis offers insights into the trends, patterns, and global focus areas related to blockchain technology in the IT field.

3.1 Performance Analysis

This analysis aims to provide the researchers with the background of blockchain technology in IT sector. The study focuses on specifying the top authors, journals, countries, and research institutions contributing to the publications. Figure 2 depicts that the number of publications was few from 2016 to 2018, but the use of blockchain technology in the IT sector has grown rapidly from 2018 to 2024. The publication graph from 2016 to 2024 shows that the implementation of blockchain technology is still in the developing stage, as in 2024, we saw the highest number of publications, with 119 articles related to blockchain technology in the IT sector.

Figure 3.2. Publication Trend of Blockchain Technology



Source: Scopus

3.2. All Impactful Journals

Table 1 depicts top 10 journals contributing in the area of blockchain technology. The journal namely "IEEE Access" and "Sustainability" published 16 and 13 articles respectively and further shows significant academic influence with citations 496 and 479 respectively. On the contrary, Sensors Journal published only 6 documents in the field of blockchain technology to the existing literature with citation score of 120. Similarly, the Mathematics Journal and Applied Science published only 3 documents each with citations :60 and 46 respectively (Table 1).

Table 1: Most Impactful Journals

Source Title	Publisher	No. of articles	Category	Citations
Ieee Access	IEEE	16	NA	496
Sustainability	MDPI	13	NA	479
Sensors	MDPI	6	NA	120
Technological Forecasting and Social Change	Elsevier	4	A	258
Journal of Cleaner Production	Elsevier	3	A	268
Computers and Industrial Engineering	Elsevier	3	A	143
Future Interest	MDPI	3	NA	113
Security and Communication Networks	Wiley	3	NA	91
Mathematics	MDPI	3	NA	60
Applied sciences	MDPI	3	NA	46

Source: VoS Viewer

3.3 Article Performance Analysis

Table 2 depicts the top most cited documents in the context of blockchain technology in IT sector, with the citation count ranking from 425 to 56. The document entitled "Blockchain technology: a solution to address the challenges faced by the international travellers " written by Dubey et.al. (2022) encompasses the highest citation count i.e. 425. Most of the articles are published in the journals related to the field of computer science. Therefore, it can be inferred that implementation of blockchain technology in IT sector of different industries is important. In addition to it "Journal of Business Research" has the highest citation score in terms of its ranking in ABDC ranked journals.

Table 2: Citation Analysis

Author (Year)	**Article Title**	**Citations**	**Journal**	**Category**
Dubey et al.(2022)	Blockchain technology: a solution to address the challenges faced by the international travellers	425	OPSEARCH	C
Yaqoob et.al. (2022)	Blockchain for healthcare data management: opportunities, challenges, and future recommendations	241	Neural Computing and Applications	-
Garg et al (2021)	Measuring the perceived benefits of implementing blockchain technology in the banking sector	194	Technological Forecasting and Social Change	A
Mosteanu and Faccia (2020)	Digital systems and new challenges of financial management – fintech, XBRL, blockchain and cryptocurrencies		Quality - Access to Success	-
Wan et al.(2020)	Blockchain-Enabled Information Sharing within a Supply Chain: A Systematic Literature Review	117	IEEE Access	-
Omor et al.(2022)	Blockchain-based Supply Chain Traceability for COVID-19 personal protective equipment	109	Computers and Industrial Engineering	-

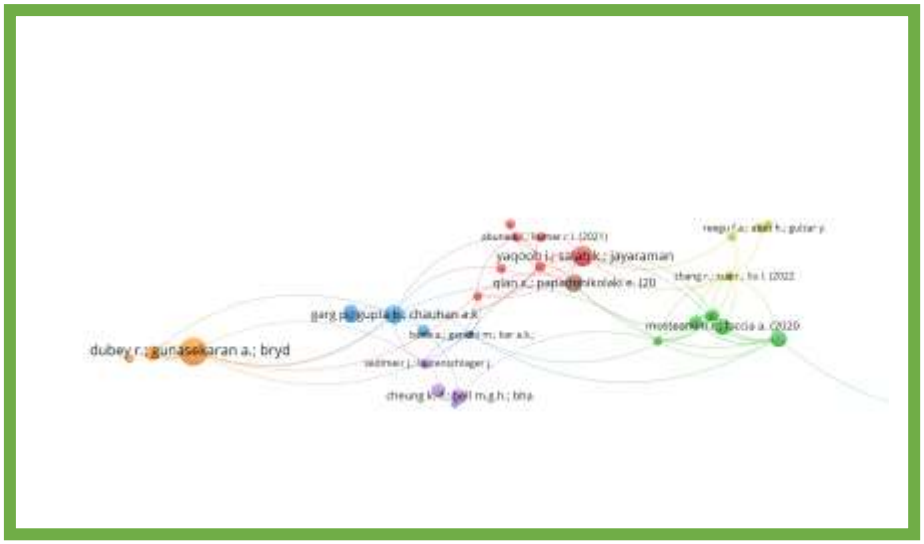
Behl et al. (2022)	Role of big data analytics capabilities to improve sustainable competitive advantage of MSME service firms during COVID-19 – A multi-theoretical approach	105	Journal of Business Research	A
Kumar, (2020)	Evaluating the impact of blockchain models for secure and trustworthy electronic healthcare records	104	IEEE Access	-
Sedlmeir et.al.(2022)	The transparency challenge of blockchain in organizations	59	Electronic Markets	A
Veeramakali et al. (2021)	An intelligent internet of things-based secure healthcare framework using blockchain technology with an optimal deep learning model	56	Journal of Supercomputing	-

Source: VoS Viewer

3.4. Bibliographic coupling

In science mapping, bibliographic coupling is a potent method used to find strong links between two papers citing the same references. This implies that the publications most certainly have similar content. Unlike co-citation analysis, which tracks how often two publications are cited together, bibliographic coupling groups publications that share common citations, so helping to highlight emerging or niche research that might not yet be generally known. Business academics who wish to investigate a broad spectrum of subjects and remain current on the most recent advancements will especially find this approach helpful. Researchers can efficiently record the present trends and themes in a field of study by means of bibliographic coupling (Donthu et al., 2021). Using a filter to concentrate on papers with at least 40 citations, our study helped us to find seven major clusters by eliminating less important or isolated papers

Figure 3.3: Bibliographic Coupling



Source: VoS Viewer

3.5. Coocurence Analysis

3.5 Co-occurrence of Keywords

Table 3 lists five clusters found by co-occurrence analysis, together providing a thorough framework of the research terrain. Cluster 1 addresses automation, fintech, Industry 4.0, finance, innovation, smart contracts, supply chains, technology adoption, traceability, trust, openness, and decision-making. Cluster 2 revolves around access control, blockchain technology, data privacy, diagnosis, distributed ledger, healthcare, human record management, and sensitive data. Cluster 3 includes keywords such as authentication, cloud computing, cybersecurity, deep learning, digital storage, IoT, network security, and security/privacy. Cluster 4 highlights artificial intelligence, big data, cryptocurrency, digital transformation, digitalization, emerging technologies, and machine learning. Finally, Cluster 5 is a more specialized area, focusing on blockchain, consensus algorithms, decentralization, and scalability. The network derived from these clusters is visually represented in Figure 4, providing insight into the interconnections between these themes.

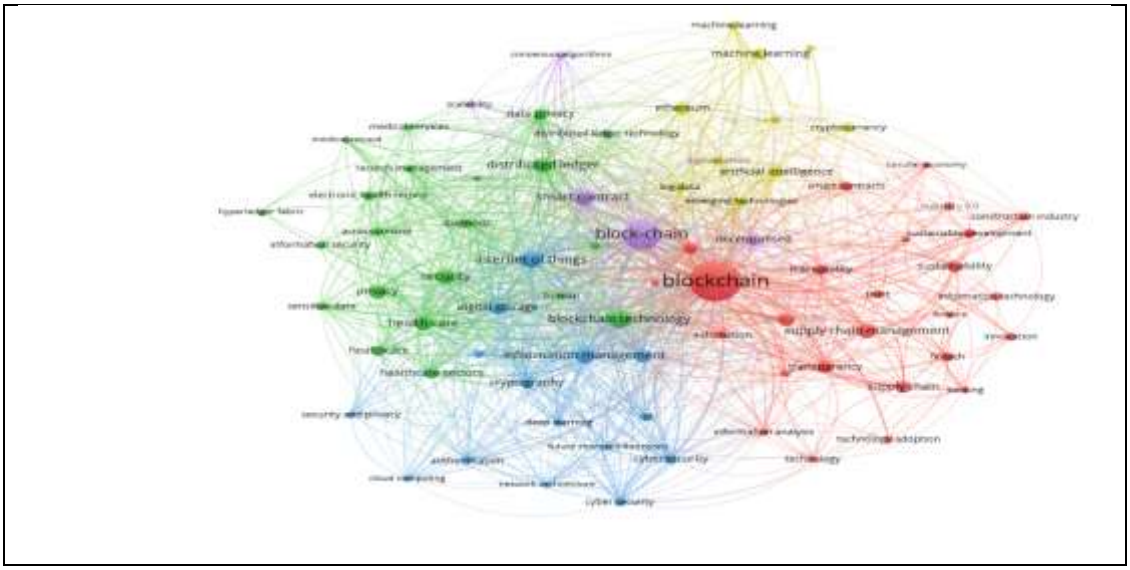
Table 3. Clusters based on co-occurrence of keywords

Number of Clusters	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Keywords	Automation, fintech, industry 4.0, finance, innovation, smart contracts, supply chains,	Access control, blockchain technology, data privacy, diagnosis, distributed ledger,	Authentication, cloud computing, cybersecurity, deep learning, digital storage, Iot, network	Artificial intelligence, big data, cryptocurrency, digital transformation, digitalizatio	Block-chain, consensus alogrithms, decentralized, scalability

	technology, technology adoption, traceability, trust, transparency, supply chains, decision making	health care, human, record management, sensitive data	security, security and privacy	n, emerging technologies, machine learning	

Source: Based on Review of Literature

Figure 3.4: Co-occurrence of all keywords



Source: Authors' Compilation based on bibliometric analysis (VOSviewer)

4. CONTENT ANLAYSIS

The current study performs content analysis on the basis of clusters developed from bibliographic coupling in bibliometric data. The main themes and research trends in the field are investigated by means of content analysis (Donthu et al., 2021). The findings of this study are significant as they allowed for a more in-depth examination of the clusters, resulting in the identification of four separate clusters.

Cluster 1. Application of Blockchain Technology in Important Key Sectors

This cluster depicts how blockchain technology can change operations in several sectors, especially in healthcare and logistics, during the COVID-19 pandemic. This was done by enhancing transparency and traceability which improves operational efficiency. In terms of blockchain in the management of supply chains, it guarantees safe and open exchange of data which eliminates risks of cyberattacks and data manipulations (Cheng et. al., 2021). For instance, during the COVID-19 pandemic, blockchain greatly enhanced the tracking of inventories and the accountability of the supply chains of Personal Protective Equipment (PPE) (Omor et. al., 2021). This helped to solve the critical PPE shortages as well as their prompt distribution. Precision medicine in healthcare could equally benefit from the blockchain technology to securely maintain and share Electronic Health Records

(EHRs) due to the cybersecurity risks diminished by immutable cross-system (Sharma et. al.,2022; Omar et. al.,2022).

Cluster 2. Implementation Challenges and Emerging Business Opportunities

This cluster develops into the existing challenges and enabling factors for adopting blockchain technology among predominant industries such as logistics, transportation, and health care. The research conducted by Batta et. al. (2020) shows that blockchain technology is still at its evolving stage due to the presence of several barriers, namely scalability, technological immaturity, lack of interoperability, resistance to change, regularity uncertainty, management support, and complexity of integrating this technology along with the existing systems. In addition to this, the research initiated by Kumar and Ali (2024) adds to the previous literature by specifying that merging blockchain technology with IoT, Big Data, and Industry 4.0 technologies raises significant security and privacy concerns among users. Further, they also specify that a lack of knowledge and a dearth of ecosystem collaboration lead to the decreased volume of implementation of blockchain technology. However, despite these obstacles, blockchain is still seen as a promising tool for boosting trust among users. The potential of blockchain to enhance trust is a particularly reassuring aspect, as depicted by the research conducted by Queiroz and Wamba (2020). Their work highlights how the features of blockchain technology, such as "cryptography", "smart contracts", and "decentralised database", can effectively induce users to implement it. These enablers are further confirmed by various researchers such as Stockburger (2021), Zhang et. al. (2022), and Reegu et. al. (2023).

Cluster 3. Sustainability and operational efficiency

This section presents insights into the effectiveness of blockchain technology in transforming various sectors, such as banking and construction, to promote sustainability and optimise operational performance. Blockchain technology, as an integral part of the Construction 4.0 framework, addresses environmental challenges by reducing operational inefficiencies in construction projects and lowering carbon emissions (Balasubramanian et al., 2024). Beyond its role in promoting sustainability in construction, blockchain also facilitates process automation, real-time monitoring, and the reduction of inefficiencies, thereby improving logistics performance.

Furthermore, researchers extend the application of blockchain technology to micro, small, and medium-sized enterprises (MSMEs), highlighting that the integration of big data, blockchain, and supply chain coordination enhances decision-making and strengthens competitiveness (Omar et al., 2022; Behl et al., 2022). One of the most significant features of blockchain technology—digital transformation—has fundamentally reshaped the banking industry. Specifically, in the area of financial transactions and reporting, blockchain enables the digitisation of banking operations, enhancing transparency, security, and overall efficiency (Kumari & Devi, 2022).

Cluster 4. Future Prospects

Although blockchain technology has revolutionised various industries such as logistics, construction, and manufacturing, its implementation remains at an evolving stage due to several factors (discussed in Cluster 2). Its full potential remains largely unexplored in quantitative research that could help tailor blockchain solutions to better fit industry-specific contexts (Batta et al., 2020). Batta et al. (2020) highlight that while the IT sector acknowledges blockchain's transformative potential, a detailed analysis of the available data often reveals a more restrained reality. Therefore, there is an immense need for further empirical studies to evaluate the practical significance of blockchain technology across various organisational settings.

Building on this argument, Cheung et al. (2021) fundamentally criticised the overreliance on theoretical frameworks and the lack of sufficient empirical evidence in existing literature. After reviewing the extant literature, it can be concluded that confining blockchain uses just to logistics offers a limited and restrictive viewpoint. Blockchain technology has promising uses in fields such smart contracts, digital identity verification, decentralised finance (DeFi), and safe data sharing across government and healthcare sectors, therefore future projects sholud focus beyond supply chain management (Casino et al., 2019). To conclude, Unlocking blockchain's larger economic and social potential requires multidisciplinary study incorporating both theoretical and empirical methods as technology maturity rises.

5. TCCM ANALYSIS

Although bibliometric tools like VOSviewer have been relatively effective in visualizing the dynamic emergence of the blockchain technology domain from a quantitative perspective by utilizing published works, keywords, and citations, we may run the risk of overlooking important qualitative dimensions of the domain. The structure qualitative review model proposed by Paul and Rosado-Serrano allows for the expansion of consensus on theoretical bases and methods used in different situations (Theory-Context-Characteristics-Methods). This approach categorises studies based on the foundational theories applied in various contexts to explore specific concepts, thereby enhancing the bibliographic review with a more in-depth examination of sophisticated theoretical underpinnings and research methodologies. The integration of TCCM's qualitative taxonomy with quantitative bibliographies yields a nuanced perspective on evolving trends, foundational concepts, and methodologies within this ever-evolving domain. Vos's viewing tools let bibliometric analysis classify regularly occurring terms in the IT blockchain ecosystem and top contributing publications. TCCM analysis is thus in-depth to close the gaps in earlier research and provide new directions for inquiry. This method exposes unrecognized information on less-researched topics. Moreover, very useful for analyzing theoretical models under the prism of specific nations and sectors is Sharma et al. (2020. Moreover, this research clarifies the gaps in the current understanding of blockchain technology in many different IT domains.

5.1. Theoretical Underpinnings

Theoretically, research on the application of blockchain technology in the IT sector over several sectors has progressed much forward. Researchers have lately explored the relevance of several theories in order to offer a comprehensive knowledge of blockchain technology. Table 4 shows how academics have used several theories—including the TOE framework, UTAT theory, and Innovation Theory—to explain the acceptance of blockchain technology in several spheres.

Table 4. Most Repeatedly used Theories

Prominent theory	Articles	Recent Selected References
TOE Theory	5	Singh et al. (2024); Chen et al. (2024); Gazzola et al. (2023); Kshetri, (2023); Battacharya et al. (2022)
UTAT Theory	4	Ennajeh and Najar (2024); Sharma and Choubey (2024); Khan et al.(2023); Miraz et al. (2020)

Innovation Theory	5	Papadonikolaki et al.(2023); Abbate et al.(2023); Jum'a L. (2023); Liu (2022)
Trust Theory	4	Kaniadakis and Foster (2024); Elhag and Alsehri (2023); Tanković and Prodan (2024); Feki and Dudézert (2023)
Game Theory	2	Quin and Hong (2023); Zhou et al.(2023)

Source: Review of Literature

5.1.1. TOE Theory

This framework asserts three principles contexts-technological, organizational and environmental influence the process by which an organization adopts and accepts a new technology.

Technological Barriers

After reviewing the vast literature, it is found that blockchain technology has the potential to revolutionise many sectors such as logistics, construction, and manufacturing. However, there are specific technological barriers that restrict the use of blockchain technology. Challenge 1. Scalability- This challenge arises when proof-of-work consensus methods are used, as blockchain networks may experience inefficiencies and delays when processing large volumes of transactions (Chen et al., 2024; Gazzola et al., 2023). Challenge 2: Privacy Concerns- Privacy concerns in blockchain systems arise because everyone in the public blockchain technology can access confidential information, which is a threat to trust and widespread adoption, particularly in sensitive business contexts (Chen et al., 2024; Bhattacharya et al., 2022). Furthermore, since energy is often the most costly resource, companies may hesitate to fully adopt blockchain technology due to sustainability and environmental concerns associated with energy consumption in networks that rely on energy-intensive consensus mechanisms (Kshetri, 2023). These challenges further lead to barriers namely Technology Immutarity-Technology immaturity causes uncertainty, more dangers, and reduced trust among consumers and companies, therefore slowing blockchain acceptance (Chen et.al., 2024).

Organizational Barriers

Not only technological barriers, but there is presence of organisational barriers that hinders the implementation of blockchain technology in the organisations. These barriers are comprised of factors associated with organisation size, management support, limted employee expertise and resistance of change (Kouhizadeh et.al.,2021; Chen et.al.,2024; Singh et.al., 2024; Gazola et.al.,2023). Challenge1 Resistance to change- The resistance to change and adapt new technology by employees is a significant barrier for integrating the blockchain technology in the organisation (Singh et. al., 2024). Challenge 2 Lack of management support-Lack of management support means absence of devotion and support by management authority with regard to resource allocation and rigid organisation culture. According the study conducted by Chen et.al.(2022) such commitment and organisation cultre restricts the adoption of blockchain technology in the organisations. Furthermore, research by Gazzola et al. (2023) is the direct influence of organisational readiness on blockchain technology acceptance. Finally, Kshetri's (2023) study on organisational obstacles in underdeveloped countries revealed that administrators' lack of institutional support and understanding also impedes the efficient use of blockchain technology. Challenge 3 Limited Employee Expertise -Singh et al. (2024)

lack of trained individuals was a significant barrier to introducing blockchain in procurement.

Environment Barriers

Environmental challenges to blockchain adoption in the IT sector refer to various outside issues businesses must negotiate to appropriately implement blockchain solutions. Significant barriers to the integration of blockchain into procurement processes include legislative ambiguity and the absence of uniform rules (Singh et al., 2024). Further, Chen et al. (2024) also emphasise environmental factors such as market volatility and inadequate supporting infrastructure as barriers to the adoption of blockchain for business process automation in the IT sector. Gazzola et al. (2023) underscore the need of an appropriate external environment, highlighting the challenges of aligning blockchain technology with existing environmental norms and regulations. Kshetri, 2023) observes that the adoption of blockchain in the IT sector is affected by environmental challenges due to insufficient institutional support and inadequate legal frameworks in developing nations, thereby hindering the integration of blockchain technology in supply chains. This is compounded by regulatory compliance demands and external market pressures, as asserted by Battacharya et al. (2022). Addressing these environmental concerns would facilitate the IT sector's efficient integration of blockchain technology.

5.1.2. UTAT Theory

The distinguished scholar "Veenkatsh" originally put forth this hypothesis in 2003. This theory stresses the way the eight TAM model theories should be integrated to provide a better knowledge. Performance expectation, effort expectation, social influence, facilitating conditions, behavioural intention, and use behaviour make up this theory's numerous constructions. Researchers have investigated the element of blockchain technology in other fields as well as to apply the UTAT Theory to general concepts. Ennajeh and Najar (2024) claim that trust mediates inside the UTAT model and emphasises its need for using their creative method. Furthermore, Miraz et al. (2019) evaluated this model on social media channels in order to investigate blockchain acceptance drivers. This study explains that there are some technological, social and contextual dynamics which influences blockchain adoption. On similar grounds, this theory was extended by Khan et al. (2022) who included few factors namely technology readiness and affinity. The findings if this study explains that trust and performance expectancy have mixed impact for adopting blockchain technology in supply chain. To conclude, it can be said that trust and user specific factors are the key indicators of implementing this technology.

5.2. Characteristics (C)

The present study aims to explore how different elements associated with blockchain technology are interrelated. The study specifies different characteristics that are analysed as drivers and outcomes of the blockchain technology. Table 5, mentioned below, gives a brief account of characteristics used in recent studies.

Table 5. Most Repeated Antecedents, Moderators, Mediators, Outcomes of Blockcchain Technology

Characteristics	Constructs	Paper reference
Antecedents	Digital technologies (cloud, BIM, blockchain), industry competence, technology-organization-	Singh et al. (2024); Dewangan and Chandrakar (2024); Ding

	environment (TOE) factors, knowledge management, data privacy, infrastructure, ownership, privacy, trust, fintech adaptation, blockchain integration, supply chain integration, green technology, collaboration and sustainability, governance and compliance, knowledge management practices, transparency, AI, DLT convergence, consensus algorithms, smart contract security, immutability, traceability, transparency, digital transformation, collaboration, data privacy concerns, federated learning, decentralized data storage and organizational readiness	et al. (2025); Kaniadakis and Foster (2024); Zelbest et al.(2023); Chen et al. (2024), Singh et al. (2024); Mor et al. (2024); Kumar and Ali (2024); Bellagarda and Mahfouz (2022); Yaqoob et al. (2021); Khan etal.(2022);
Mediators	trust in technology, knowledge management Practices, smart contracts, blockchain encryption, decentralized ledger technologies, distributed data storage, privacy preservation and interoperability mechanisms.	Ennajeh and Najar (2024); Singh et al. (2024); Abbate et al. (2023); Mukherjee & De (2023); Elyat et al. (2024), Kumar and Ali (2024); Zelbst et al. (2023); Dewangan and Chandrakar (2024); Kumar and Ali (2024) and Dubey et al. (2024)
Moderators	trust in technology, organizational support, technological readiness, government entities and regulations, collaboration and stakeholder engagement and cost and investment considerations, IoT integration	Ennajeh and Najar (2024); Singh et al. (2024); Manzoor et al.(2024); Ding et al. (2025); Mor et al. (2024); Chen et al. (2024); Mohit and Singh. (2023)
Outcomes	enhanced supply chain resilience, visibility, increased technology trust, performance expectancy, enhanced digital competence in AEC projects through integration of blockchain with other technologies, streamlined technology adoption processes in the insurance sector using blockchain, increased patient privacy and secure medical data sharing in healthcare, boosted supply chain performance through integration of AI, Blockchain, and IIoT	Manzoor et al. (2024); Ennajeh and Najar (2024); Chen et al. (2024); Singh et al. (2024).

Source: Review of Literature

5.3 Context (C)

Blockchain technology is considered as the most disruptive technology in various sectors especially logistics, supply chain, healthcare for gaining competitive advantage. Therefore, the investigators have explored these themes in different countries and industries as specified in Table 6A and 6B. According to Table 6A maximum studies have been conducted in India followed by China and United Kingdom. Table 6B depicts that the maximum studies are conducted in the area of supply healthcare followed by supply chain and logistics and construction sector. This analysis highlighted the pitfalls in context to the industries which are yet to be explored. In addition to it, the future research studies should be conducted in underdeveloped economies so that the barriers for implementing blockchain technology can be highlighted.

Table 6A: Context- Countries

Countries	Paper
India	Singh et al. (2024); Sharma and Chobey(2024)
China	Wang et al. (2024); Gu et al.(2024); Xia et al.(2023)
United States	Zelbest et al. (2024); Jauregui et al. (2023)
Italy	Abbate et. al.(2023); Ferraro et al.(2024)

Source: Review of Literature

Table 6B: Context- Industry

Context: Industry	Supporting Studies
Healthcare	Kumar and Ali (2024); Dewangan and Chandrakar (2024)
Supply chain and logistics	Manzoor et al.(2024); Ding et al.(2025)
Construction Industry	Zandee et.al.(2022)
Insurance Sector	Singh et. al. (2024)

Source: Review of Literature

5.4 Methodologies (M)

The head 'Methodologies" provides insights about different types of research methods: Quantitative, conceptual, systematic literature review, case studies, and qualitative studies. According to Table 7A, the survey-based and simulation sampling technique is used by researchers in the field of blockchain technology. Further in Table 7B, the analytical Tools used by researchers are given. After analyzing both these tables, it is inferred that a maximum of studies have used a quantitative research approach, i.e., 25.45%, followed by conceptual studies with 21.82%, and qualitative studies with 18.18%, respectively. Literature reviews are the least preferred research method used by researchers. Hence, it is suggested that researchers should focus on including more SLRs in their studies.

Table 7A: Sampling Techniques

Sampling Technique Used	Types	References
Survey-based and Stimulation	Purposive sampling, convenience sampling and random sampling, simulation- based, purposive case selection	Ennageh and Najar (2024); Elyat et al. (2024); Singh et al.(2024)

Source: Review of Literature

Table 7B: Analytical Tools

Analytical Tool Used	References
Structural equation modelling, questionnaire, mixed methods, surveys and quantitative Analysis, gas consumption nalysis, Inistitutions tic fuzzy TOPPIS model, hybrid, simulation, deep learning and plane approach	Wang et. al. (2024); Ennajeh and Najar (2024); Singh et. al.(2024); Chen et. al.(2024)

Source: Review of Literature

6.DISCUSSION

This snippet specifies the main conclusions drawn from bibliometric analysis and provides insights through content analysis.

The findings of the bibliometric analysis indicate a consistent increase in publications from 2010, with a peak in 2022 reflecting heightened academic interest. India, the UK, and China dominate the research publications, reflecting their leading role in advancing the field. The contribution of the research in countries depends upon funding, expertise, and availability of resources. Vellore Institute of Technology has contributed the most, followed by King Saud University and UNSW Sydney. The contribution of these institutions symbolizes their crucial role in elevating the research focused on blockchain technology in different industries. The top contributors in terms of authors are Godekallu, T.R., Popadonikalaki, E, and Parvaiz, G.S. More than 96% of the research is published in English, emphasizing its worldwide demand for implementation. The analysis of the publication is specified under "Articles," which specifies that it has practical implications in the real world. In the research field, more than 50 % of the research is done in computer science because this technology involves algorithms, cloud computing, network analysis, and many more. The co-word analysis of author keywords and index keywords revealed the occurrence of "internet of things," "smart contracts," "information management," "blockchain," and "smart contract and security" as the most emerging keywords. This means that these keywords are vital for studying the role of blockchain technology in the IT sector. Finally, bibliographic coupling revealed about 8 clusters, which enlightened the findings about blockchain technology in the IT sector of various industries. Based on papers in the clusters, content analysis was done to get detailed insights into the existing literature. Under content analysis, 4 clusters were formed, namely (i) Application of blockchain technology in important key sectors, (ii) Implementation Challenges and Emerging Business Opportunities, (iii) Sustainability and operational efficiency, and (iv)

Future Prospects. These clusters helped to analyze the facilitators and inhibitors for implementing blockchain technology in the IT sector of various industries. Further, the study found that "Journal of Business Research" has shown continuous publication of scholarly work related to blockchain technology. Therefore, this analysis provides the researchers with an opportunity to both engage with and add to cutting-edge research in other related disciplines.

The bibliometric analysis and systematic literature review provide an in-depth analysis of theories used in literature, like the UTAT and TOE frameworks. These theories serve as a structural background for researchers to explore further studies related to blockchain technology. However, there are a few unexplored theories that need to be addressed in the future, such as innovation theory and game theory. Further, the researchers can explore how well blockchain technology is adopted in key sectors, namely logistics, healthcare, supply chains, and the construction sector, in underdeveloped countries. The TOE framework argues that the feature of blockchain technology—that of "decentralised ledger"—helps to enable blockchain technology use. This approach substitutes for any third party's need and reduces reliance on central authority (Qian & Papadonikolaki, 2021). The second enabler is "cryptography," ensuring scalability and immutability, which enhances the trust among users of blockchain technology (Dubey et. al.,2020). This feature means assurance of data safety provided through cryptographic methods like hashing and digital signatures, which symbolizes that once the data is entered, it cannot be changed (Zhang et al., 2022; Reegu et al., 2023).). Another crucial aspect of blockchain's impact is its capacity to automate processes via smart contracts, which simplify transactions and remove the need for intermediaries, thereby cutting costs and boosting efficiency (Sedlmeir et al., 2022). This technology facilitates the benefit of tracability and transparency, which in turn enables the implementation of blockchain technology (Queiroz &Wamba, 2020). Though the adoption of blockchain technology proves to be beneficial for organisations, there remains a significant hindrance to the adoption of blockchain technology in the IT sector. Due to high computational demands, specifically in public networks utilizing energy-intensive consensus mechanisms like proof-of-work (PoW), present a significant challenge for scalability and sustainability (Song et al., 2021). Further, according to Akella et. al. (2023), security still proves to be a technological barrier for implementing blockchain technology. Secondly, there are a few organisational barriers, such as management support, limited employee expertise, and resistance to change, that hinder the adoption of blockchain technology. The research conducted by Wamba et. al. (2020) explains that many businesses lack efficient resource allocation, cross-functional collaboration, and risk management due to decreased management support for implementing blockchain technology. Many companies lack the required technical skills and necessary abilities to adopt blockchain efficiently (Prewett et al., 2020). In addition to organisational challenges, environmental constraints impede the adoption of blockchain technology. These barriers include the regulatory framework, legal compliance, and market immutability. Researchers underline how significantly government policies and laws influence blockchain adoption. Wang et al. (2019) propose that governments should change their legal systems to support blockchain acceptance. Chouki et al. (2020) investigate how organisations adopt blockchain technologies in response to market competition. While organisations may be driven to embrace technology for advantage by competitive pressure, their limited size and resources often restrict these kinds of advantages. Competitive pressure may thus function as a barrier rather than a driver (Chouki et al., 2020). This disparity emphasises the need for more investigation into the influence of surroundings on blockchain applications.

7(A) THEORETICAL IMPLICATIONS

This paper has been concentrated on to use the combinations of bibliometric, SLR (TCCM framework) and content analysis within the topic of the blockchain technology within IT domains. So, it involves a lot of important theoretical implications. The report firstly discovered that the use of blockchain is still a work in progress, as a result of lack of understanding by users and integration complexity, as well as fragmented ecosystem and a scarcity of professional skills.

Secondly, after conducting TCCM analysis, it was found that TOE theory and UTAT theory are predominantly used in the research studies. On the other hand, there are theories like trust theories, game theory, and innovation theory. The usage of a hybrid review of the literature highlights the facilitators and inhibitors responsible for blockchain technology adoption in the IT sector. The results specify that there are three predominant types of barriers (technological barriers, organizational barriers, and environmental barriers) that significantly impact the adoption of blockchain technology. Conversely, specific facilitators such as cryptography, distributed ledger transactions, and smart contracts significantly boost the adoption and utilization of blockchain technology in the IT sector.

7b. PRATICAL IMPLICATIONS

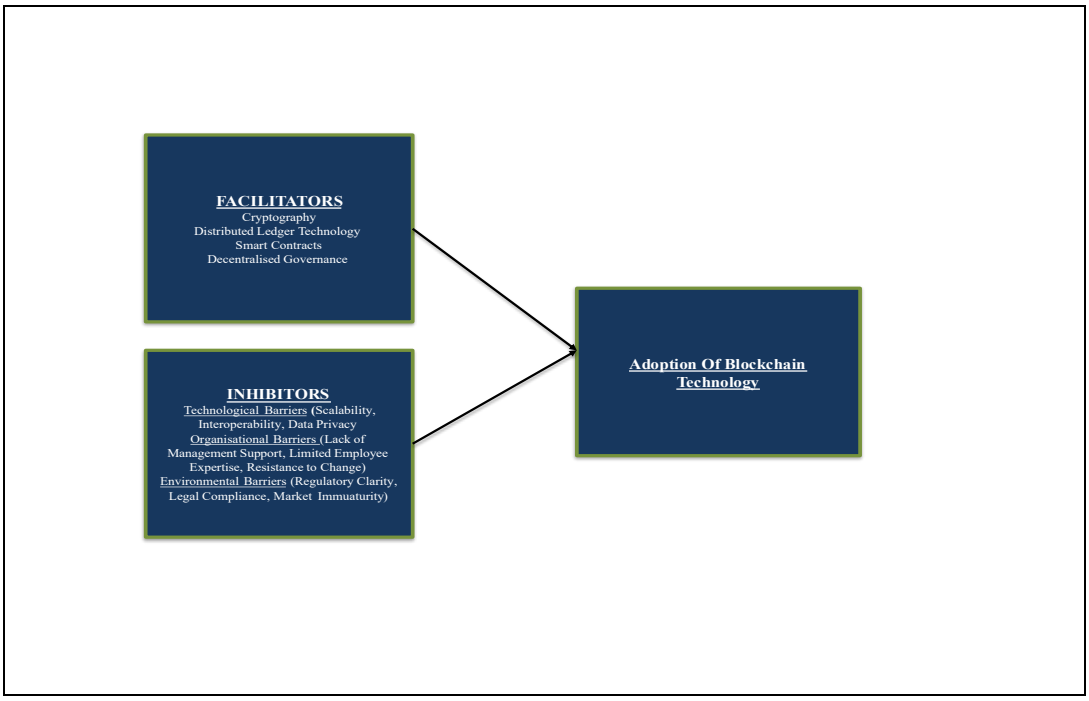
The findings of this study provide valuable guidance for industry practitioners, policymakers, and organizations seeking to enhance blockchain adoption by addressing key technological, organizational, and environmental barriers. The users are advised to follow few steps to facilitate seamless integration. First, the organisation should focus on improving legacy infrastructure through hybrid architects, API gateways, and middleware to reduce operational disruptions during blockchain integration. Second, they should be encouraged to interact with international organisations like OECD Global Blockchain Policy Forum and technical specialists so that the staff members of the corporations have skills and expertise required to mix blockchain technology with current systems. Third, personnel should be driven to participate in international blockchain events like Future Blockchain Summit 2025 (Dubai), DC Blockchain Summit 2025 (Washington, DC), HODL Summit 2025 (Dubai), and ISC2025 (London) to obtain global expertise and build professional networks. Apart from this, the users should focus on using the facilitators to raise the acceptability of blockchain technology thus improving innovation, governance, and corporate performance. The users are recommended to give blockchain implementation top attention in high-impact areas such transaction processing, compliance monitoring, supply chain coordination in order to optimise operational savings.

Further, it is advised to develop intuitive user interfaces, automate workflows, and ensure platform interoperability to reduce employee workload, minimize errors, and accelerate task completion. Lastly, it is essential to utilize cryptography, distributed ledgers, and smart contracts through frameworks like the National Blockchain Framework (MeitY) to improve innovation and corporate governance.

8. PROPOSED MODEL

The proposed model on the basis of SLR, Bibliometric and Content Analysis is given as follows:

Figure 3.5. Proposed Model



9. Future Directions

This research only utilises the Scopus database, despite its extensive coverage of academic literature. Future scholars may use the integration of Web of Science and the Scopus database to get a comprehensive and precise perspective on the subject. Numerous more databases exist in the study domain, such as EBSCO, DOAJ, and JSTOR, which may enhance the outcomes. A further drawback of our research is its exclusive focus on papers authored in English. Research publications in languages other than English should be acknowledged, as they might provide significant insights to the academic discipline; excluding these non-English articles may result in a deficiency of generalisability in the research. Our work concentrates on TOE barriers and UTAT theory, whereas theories such as innovation theory and game theory are inadequately studied and hence need further investigation. Therefore, future scholars are advised to investigate these hypotheses. Moreover, subsequent studies may examine blockchain adoption in developing countries within critical sectors such as supply chains, construction, logistics, and healthcare.

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