A Bibliometric Analysis of Blockchain Applications in E-Commerce: Trends and Research Directions

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Abstract—Blockchain technology has emerged as a transformative force within the e-commerce industry, offering significant potential to address longstanding issues such as data security, transaction transparency, and customer trust. Despite its growing relevance, the academic exploration of blockchain applications in e-commerce remains fragmented and lacks a cohesive research agenda. This study conducts a comprehensive bibliometric analysis to map the intellectual landscape of blockchain applications in e-commerce, identifying influential publications, key authors, prominent journals, and major thematic trends. Using data extracted from the Scopus database between 2014 and 2024, the study employs bibliometric tools such as VOSviewer and Biblioshiny for performance analysis and science mapping. The analysis reveals a steady increase in research interest, with dominant themes including trust, smart contracts, supply chain management, and secure payments. Furthermore, the findings indicate that most research is concentrated in technologically advanced countries, and collaborations among scholars remain limited. By interpreting these patterns, the study uncovers critical gaps in the literature and proposes future research directions focusing on consumer behavior, regulatory frameworks, cross-border challenges, and integration with emerging technologies like AI and IoT. The results contribute to a clearer understanding of the evolution of blockchain research in e-commerce and provide a foundation for academics and practitioners to develop more secure, efficient, and user-centric digital commerce systems.

Keywords—*Blockchain; e-commerce; bibliometric analysis; smart contracts; digital transformation*

I. INTRODUCTION

The Fourth Industrial Revolution (4IR) is transforming the globe and altering how people interact with each other, their jobs, and their personal lives. The 4IR is a series of shifts in the creation, exchange, and distribution of economic, political, and social value that have been synchronized to occur globally in the digital sphere and impact both businesses and livelihoods [1]. According to the literature, because e-commerce platforms record and process every transaction that takes place on them, they must deal with enormous volumes of sensitive data, including banking information, personal information, and customer preferences [2]. Errors, fraud, and forgeries may arise because current e-commerce systems calculate and store customer data on a centralized cloud server [3]. Security is an issue because so few e-commerce companies have implemented blockchain [4].

It is suggested that e-commerce difficulties are complex, with some requiring the attention of the company in addition to individuals. Limited credit card adoption, a high percentage of technological illiteracy, worries about logistics, internet access and use, bandwidth prices, a lack of ICT infrastructure, trust, and security are some of the individual problems [5]. As blockchain technology has developed, more researchers have focused on leveraging it to boost the trust of e-commerce platforms [6]. The literature [7] claims that while artificial intelligence may be used to improve the search engine, recommendation system, and transaction monitoring of e-commerce platforms, blockchain technology may improve the security, data transparency, and trust of these platforms. The blockchain-based "decentralized authentication" model, which is the new authentication technology proposed in the paper [2], can significantly increase the security and credibility of e-commerce platforms for luxury brands. The use of blockchain technology in e-commerce platforms is the main topic of the study, which focuses on enhancing supply chain management, boosting trust, optimizing data management, and enhancing security [8]. A framework for trade facilitation for blockchain-based e-commerce platforms was developed in the literature with the goals of protecting consumer privacy, streamlining transaction procedures, and enhancing data management [9]. A smart contract for managing e-commerce that can consistently capture and validate transaction records and automatically execute e-commerce transactions is constructed using blockchain technology in the literature [10]. To solve the present data security issues in e-commerce platforms, a novel blockchain-based data encryption technique is offered [11]. By combining the distributed, tamper-evident, and decentralized characteristics of blockchain, this technique improves the data security of e-commerce platforms [12].

Logistics, a lack of qualified workers to develop e-commerce platforms, weak internet security, insufficient legal frameworks, misalignment between business, IT, and operational units, stakeholder engagement, a lack of funding and top management support, and the costs of advertising and payment gateways are some of the organizational challenges [13]. The ability to trace an item's origins through contract identification, data exchange, and system protection is considered an aspect of security [14]. The security issue in e-commerce is said to be resolved by using blockchain technology [14]. Blockchain technology is predicted to drastically alter a variety of corporate applications and processes, with substantial ramifications for e-commerce [15]. The use of blockchain has been the subject of numerous studies, including the following: e-commerce, tourism and hospitality, operations management, supply chain, and agriculture [16].

Smart contracts that enable supply chain automation, record management, payment applications, traceability support, and other business interactions are made possible by blockchain, a decentralized, distributed directory [17]. By using blockchain track and trace capabilities, a blockchain-based e-commerce strategy will ensure authenticity [12]. Additionally, the decentralized and encrypted core technology of blockchain enables track and trace capabilities [18]. This technology creates a distributed database that is inaccessible to unauthorized users by encrypting and storing data in a chain of back-linked information blocks, ensuring data integrity and accountability.

When analyzing blockchain technology, three factors need to be considered: technical, business, and legal. Blockchain technology's technological component is a database that keeps an entirely transparent distributed ledger. A peer-to-peer network for trading assets, value, and transactions makes up the business component. Finally, the legal component replaces previously trusted entities by validating transactions [12]. Blockchain technology's main benefits include the decentralized and transparent storage of transaction information, the database's operation by a network of computers known as nodes, which eliminates a single point of failure, real-time access to information, and the elimination of the need for middlemen to complete transactions, which lowers transaction costs [19]. Blockchain could improve e-commerce in addition to security [12]. First, by eliminating the need for middlemen, blockchain transactions on a single network enable faster speeds and lower costs [20]. Second, blockchain improves supply chain management by storing and recording product information. This enables the tracking of every product's life cycle, including who made it, what resources were utilized, where it came from, where it was stored, who bought it, and who completed the transaction [21]. Lastly, because each transaction is recorded on a shared ledger and cannot be altered, blockchain technology encourages trust and transparency in payments [12].

The primary research topics in the area of blockchain in e-commerce are mapped out with the use of the bibliometric technique. Important topics like the evolution of e-commerce and its uses in the Industry 4.0 era have been the subject of studies [22]. By identifying regions that have been thoroughly investigated and those that need more inquiry, this can help direct future studies. As was already indicated, the second limitation is that, despite the topic's ongoing and growing development, no study publication has been deemed sufficiently thorough. By examining the references, one can learn about the most referenced papers, prestigious publications, and the general influence of this field's study. This can aid in comprehending the importance and scope of different investigations. A number of methodological experts have stressed the necessity of a systematic review procedure to arrive at more impartial conclusions in literature reviews [23]. Future research can examine each theme group in greater detail and on a wider scale, thanks to bibliometric analysis. The increase of short films in e-commerce will be examined in this study by examining publications that were indexed in the

Scopus database between 2014 and 2024. Identifying significant study clusters and important issues in this area, examining the connections between research topics, and influencing blockchain research in short-term commerce are the three main goals. This work attempts to contribute to the growth of this subject by offering a thorough and current review of the present research environment on blockchain in e-commerce through a mix of three methods: keyword co-occurrence, co-citation analysis, and bibliographic coupling.

This is how the rest of the study is organized: In Section II, the research gap is identified and the associated literature is reviewed. The suggested methodological architecture is shown in Section III. The experimental setup and evaluation findings are covered in Section IV. A discussion of the results and their implications is given in Section V. The work is finally concluded in Section VI, which also offers recommendations for further research.

II. Literature Review

A. E-Commerce

The term "e-commerce" describes online buying and selling. E-commerce, however, encompasses more than just monetary exchanges between customers and companies. It also includes non-monetary exchanges between the company and its customers [24]. The current literature on e-commerce has been categorized and arranged systematically by previous review studies. In one of the first review papers on e-commerce, the field into three areas: applications, technical issues, and implementation and support [25]. Themes like reference architectures, recommendation systems, online consumer behavior research, and e-commerce in specific geographic locations [26].

Previous scholarly studies have extensively examined the development of e-commerce. The industry has undergone a substantial digital transition, according to Kauffman et al. [27], who emphasize how information technology has changed e-commerce by creating value based on business networks. In a similar vein, Schulze et al. [28] present a framework that looks at the extent of e-business adoption and how it affects firm performance. According to this framework, organizational characteristics like competitor and customer orientation, organizational learning capacity, and top management support, as well as competitive conditions like normative pressures and customer power, serve as important antecedents of adoption and success. Their results also show that the degree of technological and market uncertainty affects the relationship between adoption intensity and performance.

B. Blockchain and E-Commerce

The Internet required several decades to evolve from a communication-oriented network serving mainly academic and military organizations into a technological infrastructure capable of supporting commercial activities [29]. Nevertheless, shortly after the emergence of the World Wide Web, the number of commercial websites increased dramatically, and e-commerce rapidly gained recognition as a global business model [25].

According to modern businesses, the internet has proven to be useful for improving marketing strategies. It approaches in a number of situations, such as conducting marketing research, offering customer service and experiences, distributing products, and resolving problems [30]. Modern firms are able to produce new products and services, boost market transparency, and operate more effectively and efficiently because of the inherent value of internet marketing [31]. Over the past decade, e-commerce has grown rapidly and emerged as a major industry [25]. Due to a number of recent technological advancements, online shopping has become one of the most popular consumer pastimes. Among these is blockchain technology [32]. A blockchain is a kind of peer-to-peer, decentralized database that is spread throughout every node in the network of trustless blockchains. A blockchain is a collection of blocks, as the name suggests. Each block contains specific features to maintain the integrity of the entire blockchain. To preserve this integrity, the blockchain uses robust cryptography [33].

"A fully distributed system designed to cryptographically record and preserve a consistent, immutable, and linear log of transactions among network participants", is a generic description of this technology [34]. This definition reflects the growing ubiquity of cloud-connected digital devices, growing cloud storage infrastructures, and sophisticated data analytics, all of which demonstrate how resilient blockchain is to technical advancements in the digital age [35]. Furthermore, a variety of cutting-edge financial instruments can be developed thanks to blockchain's highly flexible and programmable character, especially in the fields of payment and transaction systems [36].

E-commerce is the practice of purchasing and selling goods and services via the Internet [25], utilizing electronic communication and information processing technology in business dealings [37]. This digital environment enables consumers to interact, share opinions, and compare experiences online, thereby expanding their choices and facilitating rapid evaluations of products and services [38]. In this context, blockchain technology offers highly secure transaction services by eliminating intermediaries and protecting buyers' financial information, as all activities are cryptographically secured and transaction records among verified participants are permanently maintained [39].

Blockchain represents a set of technologies that influences e-commerce by addressing challenges related to organizational structure, quality assurance, customer trust, regulatory compliance, and technological efficiency. It relies on various consensus mechanisms for validation and creates unprecedented technological possibilities for digital commerce [40]. Based on these characteristics, blockchain systems can be categorized into three main types: permissionless blockchains, where all nodes are allowed to read, submit, and validate transactions; public permissioned blockchains, in which transactions are publicly visible but only authorized nodes may write or validate them; and private permissioned blockchains, where access to viewing, submitting, and processing transactions is restricted to approved participants [12].

III. METHODOLOGY

A. Bibliometric Analysis

According to [41], bibliometrics is a research methodology that has grown in popularity as a means of comprehending scholarly literature as electronic versions have become more widely available. The term "bibliometrics" refers to a broad category of methods that differ in their nature and purpose, including co-word analysis, citation analysis, bibliographic coupling analysis, and co-citation assessment [42, 43]. This method is widely used in information science and libraries and is thought to be a crucial instrument for analysis, planning, and assessment. Through content analysis or citation analysis, it frequently offers quantitative insights that are useful for evaluating the significance, applicability, and evolution of scholarly publications. The use of statistical analysis in the creation of bibliographies is the primary characteristic that distinguishes bibliometrics. In order to conduct a more effective literature review, this study employs the scientific mapping approach, which is a general procedure of analyzing and visualizing domains [44].

The literature search and analysis in this study are conducted using the bibliometric evaluation method that Donthu et al. [45] provided. There are four primary steps in it: Step 1: Outlining the bibliometric study's goals and parameters. Step 2: Choosing the assessment method. Step 3: Gathering information for bibliometric evaluation. Conducting the bibliometric analysis and summarizing the results is step four.

B. Data Collection

The study's data collection phase can be carried out using a variety of information sources or by gaining access to reliable academic databases like Web of Science, Scopus, and Google Scholar [46]. SCOPUS's output data information is used in this study due to its excellent coverage, thoroughness, and quick data updates. Similar documents can occasionally be found on Google Scholar or the Web of Science [41]. We have extracted a total of 1.132 (samples/documents) in the scope of "Article title, Abstract, Keywords" with the search keyword "Blockchain" AND in the scope of "All fields" with the search keyword "e-commerce" OR "electronic commerce" OR "online shopping" OR "digital marketplace". Articles from the last ten years, from 2014 to 2024, are included in the research time frame. This makes the essay more objective with current data and assesses the general overview of the blockchain topic, which helps to best direct the research. The real procedure for doing bibliographic analysis is shown in Fig. 1. In order to gather data for the final analysis, this method involves filtering processes.

C. Data Analysis Procedure

Graphs facilitate conclusion-making, decision-making, and prediction by making information easy to comprehend and assess. Using VOSviewer, a free tool for creating and displaying bibliometric analysis, we may create various networks based on keywords, citations, publishing sources, authors, and common citations [47]. In this study, bibliometric analysis is conducted using the software "VOSViewer", which contains facilities for graphical depiction of multidimensional data.
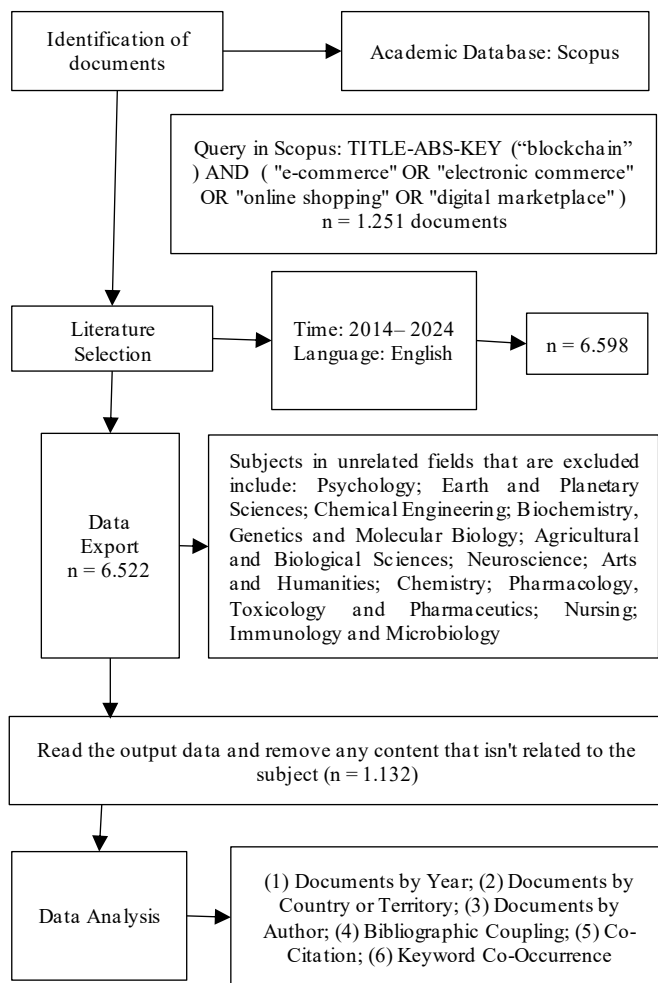
Identification of documents → Academic Database: Scopus

Query in Scopus: TITLE-ABS-KEY ("blockchain") AND ("e-commerce" OR "electronic commerce" OR "online shopping" OR "digital marketplace") n = 1.251 documents

Literature Selection → Time: 2014– 2024 Language: English → n = 6.598

Data Export n = 6.522 → Subjects in unrelated fields that are excluded include: Psychology; Earth and Planetary Sciences; Chemical Engineering; Biochemistry, Genetics and Molecular Biology; Agricultural and Biological Sciences; Neuroscience; Arts and Humanities; Chemistry; Pharmacology, Toxicology and Pharmaceutics; Nursing; Immunology and Microbiology

Read the output data and remove any content that isn't related to the subject (n = 1.132)

Data Analysis → (1) Documents by Year; (2) Documents by Country or Territory; (3) Documents by Author; (4) Bibliographic Coupling; (5) Co-Citation; (6) Keyword Co-Occurrence

Fig. 1. The actual process of conducting bibliographic analysis.

IV. RESULTS

A. Bibliometric Analysis

Blockchain technology began in 1991 when Haber and Stornetta came up with the concept of a cryptography-secured digital ledger system [48]. Their approach laid the groundwork for what would eventually be known as Blockchain by enabling transparent and unchangeable tracking of document modifications. Although preliminary research started in 2014, blockchain has gained popularity among scholars worldwide since the end of 2016, when e-commerce took off. Statistics on the quantity of publications by year are displayed in Fig. 2. The statistical findings allow for a three-stage analysis of the evolution of blockchain research:

Stage 1 (2014–2015): There was just one publication annually, and the number of investigations stayed low. This suggests that at the time, blockchain technology in e-commerce was still in its infancy.

Stage 2 (2016–2017): Blockchain research gained traction starting in 2016, as seen by a notable spike in publications, particularly in 2018. This expansion might be related to the fact that a lot of e-commerce companies started looking into how blockchain could improve supply chain management, transaction transparency, and efficiency, as well as product

information verification. For blockchain technology to progressively infiltrate the e-commerce industry in the ensuing years, this was a critical first step.

Stage 3 (2018–2024): There were roughly 48 studies in 2018 compared to over 264 in 2024, and there are no indications that this number will be declining very soon. This suggests that the scientific community is paying more and more attention to blockchain as a "hot" study topic.
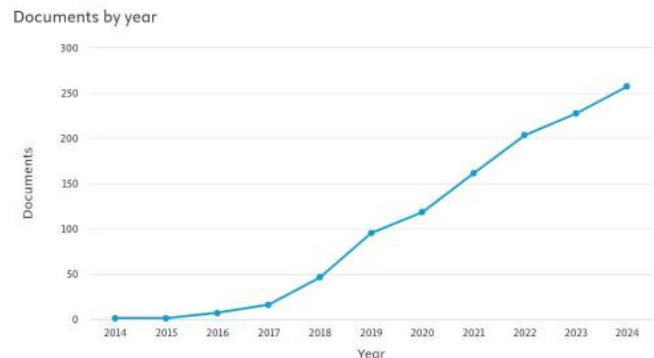

Fig. 2. Number of publications published by year from the Scopus database.

B. Analysis of Documents by Country or Territory

Based on statistical data from 2014 to 2024, Fig. 3 displays 1,168 research publications about blockchain technology that have been published globally. When compared to other nations, China dominates with 348 publications. This outcome is indicative of China's robust investment approach in blockchain research and implementation, specifically in the domains of digital payments, supply chains, and e-commerce [49]. With 216 articles, India comes in second, indicating the swift expansion of its innovation ecosystem and blockchain-based solutions catering to the local digital commerce industry [50].
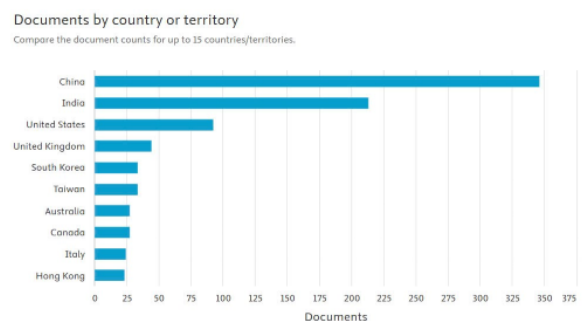

Fig. 3. Documents by country or territory. Source: From the Scopus database.

With 94 publications, the US comes in third. Despite being a global leader in the development of blockchain technology, there aren't many studies that are especially about e-commerce. This could be the result of a wider field of research or disciplinary fragmentation. With publishing numbers ranging from 27 to 45, other industrialized nations like the United Kingdom, South Korea, Taiwan, Australia, and Canada also have some interest in this subject. All things considered, Asia is becoming a center for blockchain research in the e-commerce space, which has enormous opportunities for the

creation of distributed technology-based digital business models.

C. Analysis of Documents by Author

A concentration of research within a small group of scientists is indicated by the fact that some writers have more publications than others. Close scientific collaboration and a quick expansion of the field's knowledge may result from this. Numerous people contribute to the study of blockchain and e-commerce, despite the presence of a few well-known authors. This demonstrates a wide range of interest in the subject and the possibility of many viewpoints and approaches. This study examines the author's publication count, highlighting the noteworthy contributions of a select few academics while also demonstrating the diversity of the blockchain and e-commerce research team. Finding top subject matter experts and research cooperation opportunities for upcoming publications can be facilitated by this information. Some authors with at least four publications, with notable research articles on blockchain and e-commerce are depicted in Fig. 4.

The development and improvement of blockchain systems in e-commerce is the main focus of the research of the five most prolific authors in this subject, as Table I demonstrates.

To enhance supply chain management effectiveness, security, and dependability, these studies have helped to build and improve traceability models in blockchain-based e-commerce. Studies on blockchain systems in e-commerce were made possible by the work of Ferrer-Gomila and Hinarejos [51]. Other researchers might combine blockchain, IoT, and AI to improve real-time traceability systems, broaden applicability in different e-commerce domains, and assess usefulness using real-world deployment models.
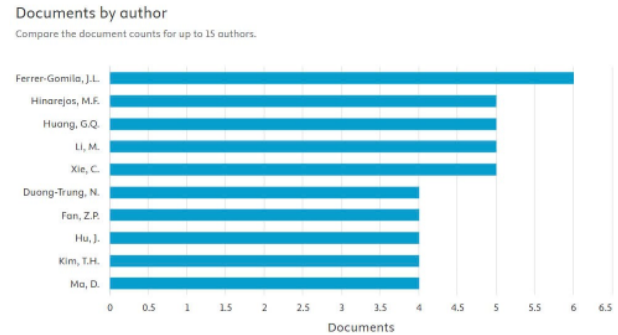

Fig. 4. Number of publications by author.

TABLE I. CORE RESEARCH AUTHORS ON BLOCKCHAIN

Authors		Title	General findings from the articles	No. of
Ferrer-Gomila, J.L.	Ferrer-Gomila and Hinarejos	"A Hard-Timeliness Blockchain-Based Contract Signing Protocol"	- Applying blockchain in electronic contract signing to replace trusted third parties (TTP), thereby enhancing fairness, timeliness, and non-repudiation in transactions. - Using the BC-Optimistic model, which activates blockchain only in cases of dishonest behavior, helps reduce costs and increase efficiency. - Applying blockchain in multi-party or multi-supplier contexts to meet the need for "all-or-nothing" contract agreements. - Proposing a blockchain-based reward points system shared among multiple merchants, ensuring security and transferability. - Addressing the limitations of traditional solutions while affirming the technological and economic feasibility of blockchain in practical e-commerce scenarios.	6
	Hinarejos et al.	"Enforcing Fairness With Blockchain Support: Proposals for Multi-Two-Party Contract Signing"		
	Hinarejos et al.	"A Secure Solution for a Blockchain-Based Consortium Promotional Scheme"		
	Ferrer-Gomila and Hinarejos	"A multi-party contract signing solution based on blockchain"		
	Ferrer-Gomila, and Hinarejos	"A 2020 perspective on "A fair contract signing protocol with blockchain support""		
	Ferrer-Gomila et al.	"A fair contract signing protocol with blockchain support"		
Hinarejos, M.F.	Ferrer-Gomila and Hinarejos	"A Hard-Timeliness Blockchain-Based Contract Signing Protocol"	- Applying blockchain in electronic contract signing to replace trusted third parties (TTP), thereby enhancing fairness, timeliness, and non-repudiation in transactions. - Using the BC-Optimistic model, which activates blockchain only in cases of dishonest behavior, helps reduce costs and increase efficiency. - Applying blockchain in multi-party or multi-supplier contexts to meet the need for "all-or-nothing" contract agreements. - Proposing a blockchain-based reward points system shared among multiple merchants, ensuring security and transferability. - Addressing the limitations of traditional solutions while affirming the technological and economic feasibility of blockchain in practical e-commerce scenarios.	5
	Hinarejos et al.	"Enforcing Fairness With Blockchain Support: Proposals for Multi-Two-Party Contract Signing"		
	Hinarejos et al.	"A Secure Solution for a Blockchain-Based Consortium Promotional Scheme"		
	Ferrer-Gomila and Hinarejos	"A multi-party contract signing solution based on blockchain"		
	Ferrer-Gomila and Hinarejos	"A 2020 perspective on "A fair contract signing protocol with blockchain support""		
Huang, G.Q.	Rachana et al.	"Blockchain-enabled digital assets tokenization for cyber-physical traceability in E-commerce logistics financing"	- Proposing a tokenization system to enable asset traceability and transparent data sharing within the supply chain. - Developing a platform integrating IoT and	5
	Rachana et al.	"Log-flock: A blockchain-enabled platform for digital		

		asset valuation and risk assessment in E-commerce logistics financing"	blockchain to support pricing and financial risk management in e-commerce logistics.
	Li et al.	"Blockchain-enabled logistics finance execution platform for capital-constrained E-commerce retail"	- Designing a smart contract system to help small businesses gain easier access to financing through the supply chain.
	Li et al.	"Blockchain-enabled workflow operating system for logistics resources sharing in E-commerce logistics real estate service"	- Building a system that allows efficient sharing of logistics resources among parties via blockchain.
	Li and Huang	"Blockchain-enabled workflow management system for fine-grained resource sharing in E-commerce logistics"	- Introducing a lean resource-sharing model based on blockchain to enhance logistics efficiency.
Li, M.	Rachana et al.	"Blockchain-enabled digital assets tokenization for cyber-physical traceability in E-commerce logistics financing"	- Using blockchain to tokenize digital assets, enhancing traceability and transparency in financial logistics for e-commerce.
	Li et al.	"Toward resilient cloud warehousing via a blockchain-enabled auction approach"	- Applying blockchain and auction mechanisms to flexibly share cloud-based warehousing resources.
	Li et al.	"Blockchain-enabled logistics finance execution platform for capital-constrained E-commerce retail"	- Developing a blockchain platform to provide financial support for underfunded e-commerce businesses in the logistics sector.
	Li et al.	"Blockchain-enabled workflow operating system for logistics resources sharing in E-commerce logistics real estate service"	- Creating a blockchain-based operating system for sharing real estate resources in logistics. 5
	Li and Huang	"Blockchain-enabled workflow management system for fine-grained resource sharing in E-commerce logistics"	- Implementing a detailed, real-time logistics resource-sharing system powered by blockchain.
Xie, C.	Xie and Luo	"Solution Design of Traceability System for E-commerce Agricultural Product Quality and Safety Based on Blockchain"	- Applying blockchain technology to build traceability systems that ensure the quality and safety of agricultural products in e-commerce.
	Xie and Xiao	"Traceability of agricultural product quality and safety based on blockchain – taking fresh e-commerce as an example"	- Enhancing transparency, reliability, and supply chain management efficiency in agriculture through digital systems capable of verifying product origins.
	Luo and Xie	"Traceability System Construction of Agricultural Products Cross-Border E-commerce Logistics from the Perspective of Blockchain Technology"	- Emphasizing blockchain as a promising technology to improve quality, safety, and traceability in the electronic agricultural supply chain. 5
	Xie and Xiao	"Research on decision support system of E-commerce agricultural products based on blockchain"	
	Xie and He	"Design of traceability system for quality and safety of agricultural products in e-commerce based on blockchain technology."	

D. Bibliographic Coupling

The concept that two published studies with comparable references are most likely about the same topic is the foundation of a scientific mapping technique known as bibliographic coupling [52]. This study's data analysis based on common keywords used by authors in clusters did not include keywords that were also used as "search terms" (which will be looked at separately in the keyword co-occurrence analysis method below). This is because the purpose of these keywords is to serve as a helpful evaluation tool to uncover the content [53]. Fig. 5 shows the four main research clusters that were found, and they are as follows:

1) Data sharing, fraud detection, and security: This cluster focuses on using blockchain technology to improve security, identify fraud, and facilitate safe data exchange in digital systems. [54, 55] are important studies.

2) Supply chain and logistics management: The focus of this cluster is on using blockchain technology to increase supply chain and logistics management's efficiency, traceability, and transparency. The [56, 57] are notable studies.

3) Digital rights management and the sharing economy: This cluster investigates the use of blockchain technology in digital rights management, the sharing economy, and the creation of legal frameworks via smart contracts. The [58, 59] are important studies.

4) Management of business processes and manufacturing: This cluster focuses on using blockchain technology to manage manufacturing and business processes to improve industrial operations' dependability, efficiency, and transparency. The [60, 61] are significant studies.

The analysis's findings demonstrate the variety of blockchain-related e-commerce study areas. Numerous facets of blockchain technology have been examined in studies, such as supply chain and logistics management, digital rights management, fraud detection, data security, and safe data exchange, as well as applications in business process management and production. Each cluster highlights the growth and adaptability of blockchain technology across several e-commerce-related areas, reflecting a unique study strategy. With an emphasis on combining blockchain with other technologies like IoT, AI, and smart contracts, the research trend indicates a move away from theoretical studies and toward workable solutions. Furthermore, topics including operational efficiency, privacy, openness, and sustainability are increasingly taking center stage in current research. This suggests that blockchain is evolving into a fundamental platform for reimagining digital business models rather than just a technology that facilitates transactions.
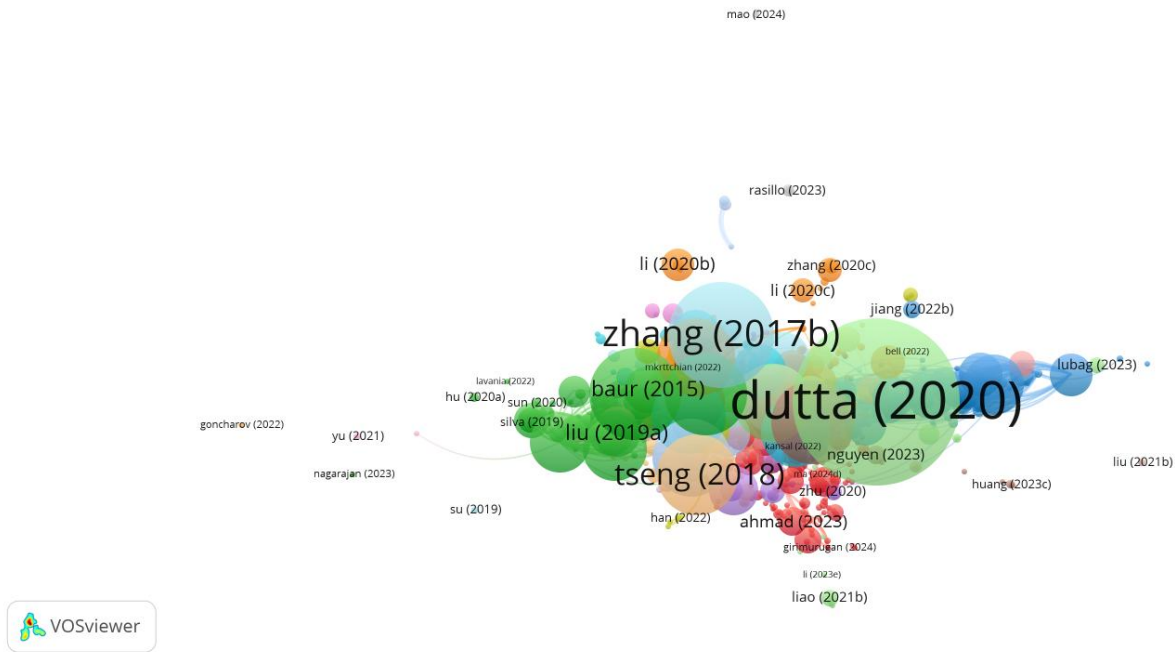
Fig. 5. Bibliographic coupling analysis results from VOSviewer.

E. Co-Citation

Co-citation analysis can be regarded as a technique to gauge the coherence between publications, since it concentrates on the frequency with which other documents quote two documents together [62, 63]. Co-citation analysis of author data is the main topic of this research. Finding out whose works are mentioned in the same article and the evolution of the research community may be done through author co-citation analysis [64]. As seen in Fig. 6, the co-citation analysis results reveal four unique clusters.

The green cluster reflects the growing interest in applying blockchain technology in fields such as e-commerce, digital markets, and energy trading. Studies in this cluster show that blockchain is not only a technology that supports financial transactions but also holds great potential for enhancing transparency, security, and efficiency across various sectors. The diversity of applications mentioned—from European research markets to peer-to-peer energy trading—demonstrates blockchain's scalability and flexibility in addressing both current and future challenges [65, 66].
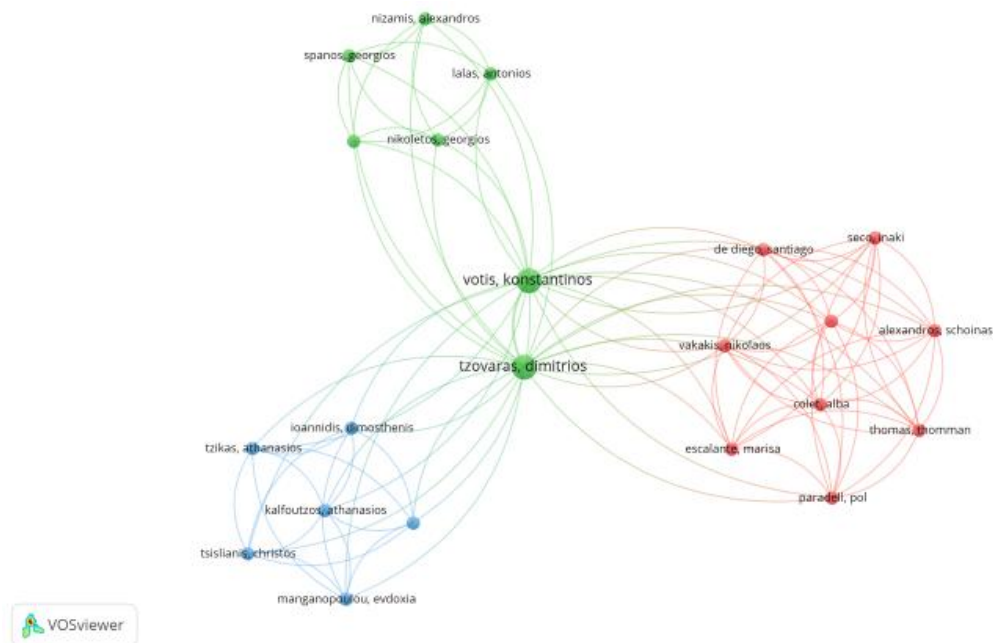

Fig. 6. Co-citation analysis results on VOSviewer.

The red cluster reflects the increasing interest in applying blockchain technology in areas such as supply chains, personal data management, and consumer behavior. Studies in this cluster indicate that blockchain is not merely a tool for financial transactions but also possesses significant potential in improving transparency, security, and efficiency across a range of industries. The variety of applications discussed, from coffee supply chains to consent management in IoT, illustrates the scalability and adaptability of blockchain in tackling present and future issues [67, 68].

The blue cluster reflects the interest in applying blockchain technology in distributed systems, e-commerce, and personal data management. Research in this cluster reveals that blockchain is more than just a financial transaction tool; it also has considerable potential to enhance transparency, security, and efficiency in numerous areas. The range of applications discussed—from distributed marketplaces to consent management in IoT—demonstrates blockchain's scalability and flexibility in solving current and future challenges [69, 70].

F. Keyword Co-Occurrence

Keyword co-occurrence analysis (i.e., two keywords appearing in a text) can better expose the structure of research subjects in a field, who also claimed that it helps explain research themes. In support of the aforementioned viewpoint, keywords are a distilled version of the crucial information that researchers include in an article. This approach reveals the structure and knowledge components of a scientific area by examining the connections between terms in a document. As a crucial literary component, keywords can offer a succinct synopsis of the main ideas and points of an article. To reaffirm the study topic's high level of focus, we increased the frequency of keyword recurrence in a publication to at least five times. The 331 research papers yielded 5.625 keywords in total. Following data processing, the analysis included 89 standardized keywords. The 15 keywords with the highest frequency of occurrence in the analysis of short movies in e-commerce are listed in Table II.

TABLE II.   FREQUENCY OF CO-OCCURRENCE OF KEYWORDS

Rank	Keywords	Frequency
1	Blockchain	771
2	Electronic commerce	446
3	Block-chain	438
4	e- commerces	209
5	e-commerce	203
6	smart contract	146
7	Blockchain technology	120
8	Supply chains	115
9	sale	95
10	Supply chain management	75
11	Decentralised	70
12	Cryptography	67
13	smart contracts	66
14	Internet of Things	65
15	Digital storage	57

The keyword clusters are closely interconnected, illustrating the multi-dimensional nature of blockchain applications in e-commerce, as visualized in Fig. 7. The central node "blockchain" connects prominently with several major clusters such as "smart contract" (blue), "blockchain technology" (red), "e-commerce" (green), and "data privacy" (yellow-purple), highlighting the comprehensive integration of blockchain with digital commerce systems. For instance, the blue cluster centers on "smart contract" and "e-commerce", indicating a strong focus on how blockchain automates and secures online transactions through decentralized mechanisms. It also includes terms like "decentralised", "Ethereum", and "cybersecurity", reflecting technological infrastructure and security considerations. The red cluster, comprising "blockchain technology", "supply chain management", "trust", and "fintech", focuses on the technological adoption of blockchain in business processes. This cluster emphasizes the operational efficiency and trust-enhancing capabilities of blockchain, especially in logistics and finance. The green cluster is closely linked to commerce-specific contexts, with keywords such as "supply chains", "commerce platforms", "traceability", and "agricultural products". This cluster showcases practical applications of blockchain in improving transparency, efficiency, and traceability in cross-border and product-based e-commerce. The yellow-purple cluster, though smaller, includes emerging terms like "data privacy", "authentication", and "digital storage", suggesting a new direction in research that deals with ethical and regulatory dimensions of blockchain. This reflects increasing scholarly attention on consumer protection and secure data handling—topics previously underexplored in blockchain-related e-commerce studies. Notably, this cluster may represent a future research avenue that intersects blockchain technology with digital rights, authentication mechanisms, and personalized privacy models. These insights help reinforce the technological and business-oriented clusters while laying the groundwork for ethical and user-centered innovations in blockchain adoption.

Cluster 1 (Red): "Technology Adoption and Trust in Blockchain"

Top keywords: blockchain technology, cryptocurrency, trust, decentralization, consensus algorithms, fintech, technology adoption, innovation. This cluster centers on the technological and institutional factors influencing the adoption of blockchain. It reflects a research focus on how trust, decentralization, and technological infrastructure affect the integration of blockchain into systems like fintech and e-commerce. The presence of keywords such as consensus algorithms and electronic money suggests technical considerations, while trust, innovation, and technology adoption point toward models evaluating user and organizational readiness. Research in this cluster aims to understand how blockchain can disrupt or enhance existing financial and technological ecosystems.

Cluster 2 (Green): "Blockchain Applications in E-Commerce and Supply Chains"

Top keywords: e-commerce, supply chains, commerce platforms, traceability, cross-border, agricultural products, competition, marketing. This cluster focuses on the practical

application of blockchain in commerce and logistics. The integration of e-commerce and supply chain terms indicates that researchers are investigating how blockchain enhances transparency, efficiency, and traceability in global and cross-border trade. Topics like agricultural products and traceability suggest their role in product origin tracking, while marketing and commerce platforms reflect business-side optimization. This cluster highlights blockchain's potential in improving trust and reducing friction in traditional supply chains and e-commerce transactions.

Cluster 3 (Blue): "Smart Contracts and Security Infrastructure"

Top keywords: smart contracts, e-commerce, decentralised, Ethereum, network security, cryptography, cybersecurity, data privacy. The blue cluster highlights the intersection of blockchain with security and automation technologies. It centers on how smart contracts and cryptographic protocols are leveraged in decentralized systems to secure e-commerce activities. Keywords such as network security, data privacy,

and cybersecurity point to a strong focus on data protection and secure transaction environments. Ethereum and decentralised suggest research interest in public blockchain infrastructures. This cluster explores both the opportunities and challenges of using smart contracts in secure digital commerce ecosystems.

Cluster 4 (Yellow-Purple): "Privacy, Authentication, and Digital Infrastructure"

Top keywords: data privacy, authentication, privacy protection, digital storage, data sharing, smart city. This smaller but significant cluster highlights emerging concerns around ethical and legal aspects of blockchain deployment. The focus is on how to protect users' identities and personal information in digital transactions. Terms like authentication and privacy protection imply mechanisms to validate users securely, while smart city and data sharing suggest research into blockchain's role in broader digital infrastructure. This cluster represents a growing interest in governance, digital rights, and regulatory frameworks supporting responsible blockchain use.
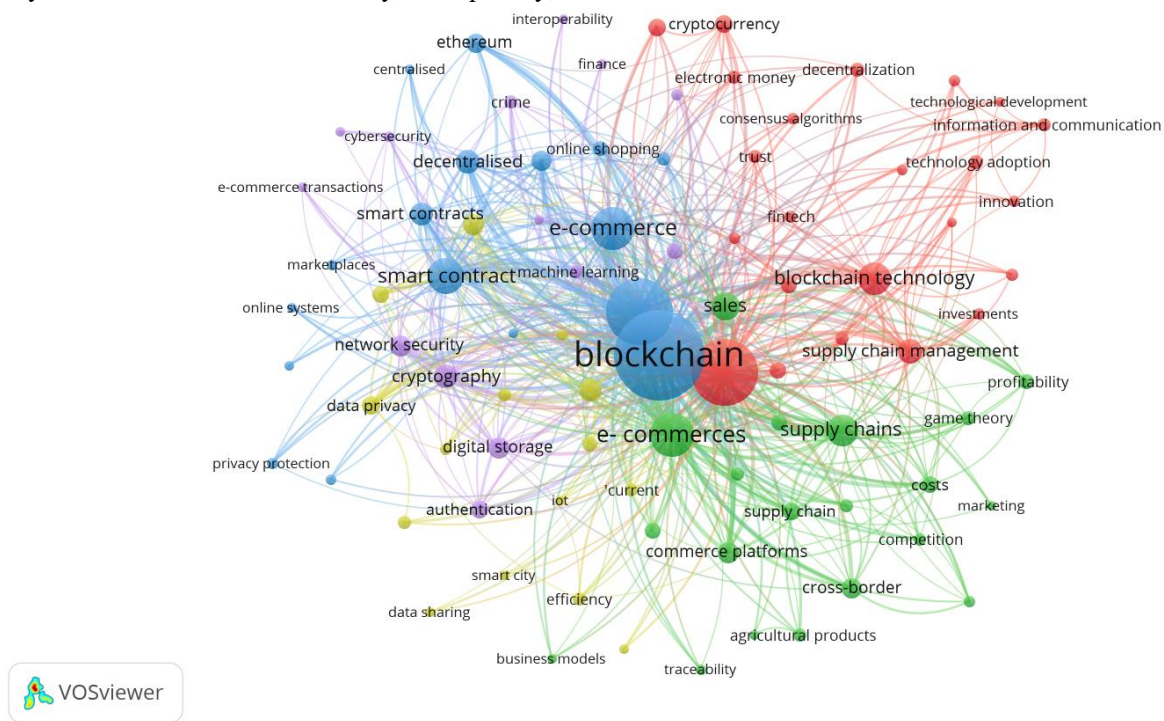

Fig. 7. Keyword co-occurrence analysis results from VOSviewer.

V. DISCUSSION

A. Discussion of Research Results

The growth, thematic progression, and interrelationships of blockchain applications in e-commerce were examined in this study using bibliometric analysis. This discussion offers thorough answers to the three previously stated research questions based on the study's primary findings:

RQ1: What are the primary thematic clusters and research topics in the field?

Keyword co-occurrence analysis and bibliographic coupling revealed several prominent thematic clusters

representing core research areas in blockchain-enabled e-commerce. The co-occurrence network showed strong connections among terms such as "blockchain", "e-commerce", "smart contracts", and "supply chain management", reflecting the close integration between blockchain technology and various business processes in digital commerce.

Four primary clusters were identified: Cluster 1: Technology Adoption and Trust. This cluster highlights the role of trust, decentralization, and technological infrastructure in blockchain adoption, especially in fintech and e-commerce. Keywords like "cryptocurrency", "consensus algorithms", and "innovation" suggest that researchers are focused on the factors

that enable or hinder blockchain integration. Cluster 2: Blockchain in E-Commerce and Supply Chains. This practical application cluster focuses on traceability, transparency, and efficiency in supply chains. Studies emphasize blockchain's role in improving logistics, especially for cross-border trade and product authenticity. Cluster 3: Smart Contracts and Security Infrastructure, this cluster centers on the application of smart contracts to automate e-commerce transactions. It includes concerns about data privacy, cybersecurity, and decentralization, particularly on platforms like Ethereum. Cluster 4: Privacy, Authentication, and Digital Infrastructure, though smaller, this emerging cluster reveals growing interest in ethical, legal, and data governance aspects. Keywords such as "data privacy", "authentication", and "smart city" indicate a shift towards secure identity verification and infrastructure planning. These clusters underscore that blockchain is no longer treated solely as a technical solution. Instead, it is now studied as an enabler of transparency, trust, and efficiency across the digital commerce ecosystem.

RQ2: What are the relationships between different research topics in this field?

Co-citation analysis was used to identify intellectual linkages across the field. The results revealed four distinct clusters of research thought: Cluster A: Blockchain for Digital Markets and Energy, which reflects blockchain's application beyond finance—e.g., in peer-to-peer energy trading and digital commerce platforms. Cluster B: Supply Chains and Personal Data Management focuses on product traceability and consumer data control, suggesting blockchain's utility in both logistics and consumer rights. Cluster C: Distributed Systems and Consent Management emphasizes the relevance of blockchain in managing decentralized systems and data permissions, notably in IoT and digital marketplaces.

These clusters are not isolated. For instance, blockchain solutions for secure transactions (Cluster C) often draw on the trust frameworks explored in Cluster A, and are operationalized through supply chain models in Cluster B. This interdependence shows that researchers are integrating knowledge across domains, forming a multi-dimensional understanding of blockchain's potential in e-commerce.

RQ3: How has research on blockchain in e-commerce evolved?

The analysis of publication trends from 2014 to 2024 indicates three distinct phases: Initial Phase (2014–2015): Very limited research activity, suggesting that blockchain was still an emerging concept in the context of e-commerce. Growth Phase (2016–2017): A surge in research occurred as interest in blockchain's applications—especially in logistics and data security—increased. This coincided with broader interest in fintech and the rise of platforms like Ethereum. Mature Phase (2018–2024): There was exponential growth in publications, particularly in 2023–2024. The increasing complexity and diversity of topics—ranging from supply chain finance to privacy regulations—reflect blockchain's transition from exploratory concept to implementation phase.

The continuous upward trend in publication volume suggests that blockchain remains a dynamic and strategic area

of academic and industrial focus, with expanding applications in secure payment systems, contract automation e-commerce platforms.

B. Research Limitation and Future Research

This study has several limitations: First, the bibliometric approach was employed to analyze and explore the development trends of blockchain technology, specifically within the broader e-commerce field. While this quantitative analysis provides valuable insights based on existing published literature, qualitative methods such as interviews or case studies would further deepen the understanding of blockchain's practical applications and challenges in e-commerce.

Second, the data collection was limited to publications up to 2024, and more recent studies were not included, which may affect the comprehensiveness, given the fast-evolving nature of blockchain technology. Additionally, the study relied mainly on the SCOPUS database, excluding other academic databases and non-English publications, which could provide a more diverse and representative dataset.

Despite the promising potential of blockchain to address key issues in e-commerce—such as enhancing transaction security, ensuring data transparency, and improving payment processes—the technology's large-scale implementation remains limited. Many blockchain applications in e-commerce are still at the pilot or experimental stage. Technical challenges, such as high computational requirements due to blockchain's inherent transparency and immutability, hinder its wider adoption.

Blockchain has been extensively studied in finance and various industries, including agriculture and emerging technologies like the Internet of Things and big data. Future research should focus on increasing interdisciplinary collaboration to explore blockchain's integration into diverse e-commerce scenarios. Moreover, developing new technological advancements to overcome current blockchain limitations will be essential for its successful, large-scale deployment in e-commerce.

VI. CONCLUSION

By examining relevant literature on blockchain-supported e-commerce, this study seeks to examine the current state of blockchain technology implementation in e-commerce. First, the technological aspects of blockchain can successfully solve the issues that e-commerce platforms confront, according to the literature research and bibliometric analysis. Second, the Scopus database was used to gather pertinent literature, and bibliometric analysis was used to look at the trends in e-commerce and blockchain development. We note that there has been a recent surge in blockchain research, with major research hotspots in recent years mostly concentrating on the Internet of Things, supply chains, smart communities, cloud computing, aviation, the chemical industry, and other domains. We also concentrate on examining research patterns related to blockchain technology in e-commerce. It is also noted that blockchain technology plays a significant role in dividing up the e-commerce supply chain process in order to facilitate the growth of creative management practices. Additionally, we discover that blockchain can assist e-commerce in resolving

several of its current issues, including traceability, product information authenticity, logistics, goods distribution efficiency, and consumer information safety. In order to better explore possible innovation opportunities, the specialized functions of the blockchain-supported e-commerce industry have been examined and highlighted through the promotion of applications in production chains, distribution networks, and shopping processes. Additionally, this work offers a number of theoretical understandings and applications. Through creative management practices, blockchain technology can help e-commerce adopt flexible management and allocate resources effectively.

REFERENCES

[1] O. A. Ojubanire, H. Sebti, and S. Berbain, "Towards developing a national framework for industry 4.0 in African emerging economies," African Journal of Science Technology Innovation and Development, vol. 15, no. 4, pp. 496–513, 2022, doi: 10.1080/20421338.2022.2129347.

[2] G. Li, Z.-P. Fan, and X.-Y. Wu, "The choice strategy of authentication technology for luxury E-Commerce platforms in the blockchain era," IEEE Transactions on Engineering Management, vol. 70, no. 3, pp. 1239–1252, 2021, doi: 10.1109/tem.2021.3076606.

[3] Z. Zhou, M. Wang, C.-N. Yang, Z. Fu, X. Sun, and Q. M. J. Wu, "Blockchain-based decentralized reputation system in E-commerce environment," Future Generation Computer Systems, vol. 124, pp. 155–167, 2021, doi: 10.1016/j.future.2021.05.035.

[4] P. Jain, R. Kr. Singh, R. Mishra, and N. P. Rana, "Emerging dimensions of blockchain application in tourism and hospitality sector: a systematic literature review," Journal of Hospitality Marketing & Management, vol. 32, no. 4, pp. 454–476, 2023, doi: 10.1080/19368623.2023.2184440.

[5] M. Mkansi, "E-business adoption costs and strategies for retail micro businesses," Electronic Commerce Research, vol. 22, no. 4, pp. 1153–1193, 2021, doi: 10.1007/s10660-020-09448-7.

[6] X. Su, Y. Liu, and C. Choi, "A Blockchain-Based P2P transaction method and sensitive data encoding for E-Commerce transactions," IEEE Consumer Electronics Magazine, vol. 9, no. 4, pp. 56–66, 2020, doi: 10.1109/mce.2020.2969198.

[7] J. Singh et al., "A Systematic review of blockchain, AI, and cloud integration for secure digital ecosystems," ˜the œInternational Journal of Networked and Distributed Computing, vol. 13, no. 2, 2025, doi: 10.1007/s44227-025-00072-1.

[8] O. Ali, A. Jaradat, A. Kulakli, and A. Abuhalimeh, "A comparative study: Blockchain Technology Utilization Benefits, challenges and Functionalities," IEEE Access, vol. 9, pp. 12730–12749, 2021, doi: 10.1109/access.2021.3050241.

[9] S. Mazumdar, R. J. Kauffmann, T. Jensen, R. R. Mukkamala, and J. Damsgaard, "Developing blockchain-based transparent e-commerce solutions for Danish SMEs to promote sustainable design products," Blockchain Research and Applications, p. 100330, 2025, doi: 10.1016/j.bcra.2025.100330.

[10] M. D. Turjo, M. M. Khan, M. Kaur, and A. Zaguia, "Smart supply chain management using the blockchain and smart contract," Scientific Programming, vol. 2021, pp. 1–12, 2021, doi: 10.1155/2021/6092792.

[11] M. Hasnain, I. Ghani, D. Smith, A. Daud, and S. R. Jeong, "Cybersecurity challenges in blockchain-based social media networks: A comprehensive review," Blockchain Research and Applications, vol. 6, no. 3, p. 100290, 2025, doi: 10.1016/j.bcra.2025.100290.

[12] H. Treiblmaier and C. Sillaber, "The impact of blockchain on e-commerce: A framework for salient research topics," Electronic Commerce Research and Applications, vol. 48, p. 101054, 2021, doi: 10.1016/j.elerap.2021.101054.

[13] F. Almeida and E. Okon, "Impact of digitalization on SMEs performance: the mediating role of IoT," Digital Transformation and Society, vol. 4, no. 4, pp. 407–422, 2025, doi: 10.1108/dts-11-2024-0240.

[14] X. Shi, S. Yao, and S. Luo, "Innovative platform operations with the use of technologies in the blockchain era," International Journal of Production Research, vol. 61, no. 11, pp. 3651–3669, 2021, doi: 10.1080/00207543.2021.1953182.

[15] A. D. Kocabas, E. Calik, and B. Cetinguc, "Examining cryptocurrency usage by technology acceptance model in the Turkish context," African Journal of Science Technology Innovation and Development, vol. 16, no. 5, pp. 630–640, 2024, doi: 10.1080/20421338.2024.2364436.

[16] K. Govindan, P. Jain, R. Kr. Singh, and R. Mishra, "Blockchain technology as a strategic weapon to bring procurement 4.0 truly alive: Literature review and future research agenda," Transportation Research Part E Logistics and Transportation Review, vol. 181, p. 103352, 2023, doi: 10.1016/j.tre.2023.103352.

[17] M. Javaid, A. Haleem, R. P. Singh, S. Khan, and R. Suman, "Blockchain technology applications for Industry 4.0: A literature-based review," Blockchain Research and Applications, vol. 2, no. 4, p. 100027, 2021, doi: 10.1016/j.bcra.2021.100027.

[18] N. Kumar, K. Kumar, A. Aeron, and F. Verre, "Blockchain technology in supply chain management: Innovations, applications, and challenges," Telematics and Informatics Reports, vol. 18, p. 100204, 2025, doi: 10.1016/j.teler.2025.100204.

[19] M. Gholami, A. Ghaffari, N. Derakhshanfard, N. iBRAHIMOĞLU, and A. A. P. Kazem, "Blockchain integration in IoT: applications, opportunities, and challenges," Computers, Materials & Continua/Computers, Materials & Continua (Print), vol. 83, no. 2, pp. 1561–1605, 2025, doi: 10.32604/cmc.2025.063304.

[20] R. Mavilia and R. Pisani, "Blockchain and catching-up in developing countries: The case of financial inclusion in Africa," African Journal of Science Technology Innovation and Development, vol. 12, no. 2, pp. 151–163, 2019, doi: 10.1080/20421338.2019.1624009.

[21] S. Alam et al., "Blockchain-based Initiatives: Current state and challenges," Computer Networks, vol. 198, p. 108395, 2021, doi: 10.1016/j.comnet.2021.108395.

[22] Y. Yuan and Q. Wang, "Characteristics, hotspots, and prospects of short video research: A review of papers published in China from 2012 to 2022," Heliyon, vol. 10, no. 3, p. e24885, 2024, doi: 10.1016/j.heliyon.2024.e24885.

[23] T. Pölkki, O. Kanste, M. Kääriäinen, S. Elo, and H. Kyngäs, "The methodological quality of systematic reviews published in high-impact nursing journals: a review of the literature," Journal of Clinical Nursing, vol. 23, no. 3–4, pp. 315–332, Mar. 2013, doi: 10.1111/jocn.12132.

[24] M. Bao, S. Latif, D. Bao, Z. Latif, and J. Lu, "Overcoming e-commerce barriers in developing markets: A review of data-driven strategies for sustainable growth," Sustainable Futures, vol. 10, p. 101408, Oct. 2025, doi: 10.1016/j.sftr.2025.101408

[25] S. Gupta, Pooja. S. Kushwaha, U. Badhera, P. Chatterjee, and E. D. R. S. Gonzalez, "Identification of benefits, challenges, and pathways in E-commerce industries: An integrated two-phase decision-making model," Sustainable Operations and Computers, vol. 4, pp. 200–218, Jan. 2023, doi: 10.1016/j.susoc.2023.08.005.

[26] J. Yin, X. Qiu, and Y. Wang, "The Impact of AI-Personalized Recommendations on Clicking Intentions: Evidence from Chinese E-Commerce," Journal of Theoretical and Applied Electronic Commerce Research, vol. 20, no. 1, p. 21, Feb. 2025, doi: 10.3390/jtaer20010021.

[27] R. J. Kauffman, T. Li, and E. Van Heck, "Business Network-Based value creation in Electronic Commerce," International Journal of Electronic Commerce, vol. 15, no. 1, pp. 113–144, Oct. 2010, doi: 10.2753/jec1086-4415150105.

[28] A. Schulze, J. D. Townsend, and M. B. Talay, "Completing the market orientation matrix: The impact of proactive competitor orientation on innovation and firm performance," Industrial Marketing Management, vol. 103, pp. 198–214, Apr. 2022, doi: 10.1016/j.indmarman.2022.03.013.

[29] A. Razaque, S. Hariri, A. M. Alajlan, and J. Yoo, "A comprehensive review of cybersecurity vulnerabilities, threats, and solutions for the Internet of Things at the network-cum-application layer," Computer Science Review, vol. 58, p. 100789, Jul. 2025, doi: 10.1016/j.cosrev.2025.100789.

[30] B. Rizvanović, A. Zutshi, A. Grilo, and T. Nodehi, "Linking the potentials of extended digital marketing impact and start-up growth: Developing a macro-dynamic framework of start-up growth drivers supported by digital marketing," Technological Forecasting and Social Change, vol. 186, p. 122128, Nov. 2022, doi: 10.1016/j.techfore.2022.122128.

[31] C. Treichler, "Consulting Industry and Market Trends: A Two-Sided View," in Contributions to management science, 2018, pp. 253–272. doi: 10.1007/978-3-319-95999-3_12.

[32] H. Albayati, S. K. Kim, and J. J. Rho, "Accepting financial transactions using blockchain technology and cryptocurrency: A customer perspective approach," Technology in Society, vol. 62, p. 101320, Jul. 2020, doi: 10.1016/j.techsoc.2020.101320.

[33] K. Christidis and M. Devetsikiotis, "Blockchains and smart contracts for the internet of things," IEEE Access, vol. 4, pp. 2292–2303, Jan. 2016, doi: 10.1109/access.2016.2566339.

[34] M. Risius and K. Spohrer, "A blockchain research framework," Business & Information Systems Engineering, vol. 59, no. 6, pp. 385–409, Dec. 2017, doi: 10.1007/s12599-017-0506-0.

[35] T. Alladi, V. Chamola, R. M. Parizi, and K.-K. R. Choo, "Blockchain Applications for Industry 4.0 and Industrial IoT: A review," IEEE Access, vol. 7, pp. 176935–176951, Jan. 2019, doi: 10.1109/access.2019.2956748.

[36] H. Taherdoost, "Blockchain: a catalyst in fintech future revolution," Future Technology, vol. 2, no. 2, pp. 25–31, Nov. 2022, doi: 10.55670/fpll.futech.2.2.3.

[37] S. Shorman, M. Allaymoun, and O. Hamid, "DEVELOPING THE E-COMMERCE MODEL A CONSUMER TO CONSUMER USING BLOCKCHAIN NETWORK TECHNIQUE," International Journal of Managing Information Technology, vol. 11, no. 02, pp. 55–64, May 2019, doi: 10.5121/ijmit.2019.11204.

[38] H. S. Yoon and L. G. Occeña, "Influencing factors of trust in consumer-to-consumer electronic commerce with gender and age," International Journal of Information Management, vol. 35, no. 3, pp. 352–363, Mar. 2015, doi: 10.1016/j.ijinfomgt.2015.02.003.

[39] M. Javaid, A. Haleem, R. P. Singh, R. Suman, and S. Khan, "A review of Blockchain Technology applications for financial services," BenchCouncil Transactions on Benchmarks Standards and Evaluations, vol. 2, no. 3, p. 100073, Jul. 2022, doi: 10.1016/j.tbench.2022.100073.

[40] M. Smits and J. Hulstijn, "Blockchain applications and institutional trust," Frontiers in Blockchain, vol. 3, Mar. 2020, doi: 10.3389/fbloc.2020.00005.

[41] A. S. Krymskaya, "The Bibliometrics of Bibliometrics as a new area of research," Scientific and Technical Information Processing, vol. 50, no. 4, pp. 286–291, Dec. 2023, doi: 10.3103/s0147688223040147.

[42] X. Y. Leung, J. Sun, and B. Bai, "Bibliometrics of social media research: A co-citation and co-word analysis," International Journal of Hospitality Management, vol. 66, pp. 35–45, Jul. 2017, doi: 10.1016/j.ijhm.2017.06.012.

[43] A. Klarin, "How to conduct a bibliometric content analysis: Guidelines and contributions of content co-occurrence or co-word literature reviews," International Journal of Consumer Studies, vol. 48, no. 2, Mar. 2024, doi: 10.1111/ijcs.13031.

[44] C. Chen, "Science Mapping: A Systematic Review of the literature," Journal of Data and Information Science, vol. 2, no. 2, pp. 1–40, Mar. 2017, doi: 10.1515/jdis-2017-0006.

[45] N. Donthu, S. Kumar, D. Mukherjee, N. Pandey, and W. M. Lim, "How to conduct a bibliometric analysis: An overview and guidelines," Journal of Business Research, vol. 133, pp. 285–296, May 2021, doi: 10.1016/j.jbusres.2021.04.070.

[46] L. Legito and N. E. Andriani, "Emerging Technologies and Marketing Strategy: A Bibliometric review of Digital Marketing and innovation," The Eastasouth Journal of Information System and Computer Science, vol. 1, no. 01, pp. 13–24, Aug. 2023, doi: 10.58812/esiscs.v1i01.130.

[47] Q. Liu, N. L. Ali, and H. Y. Lee, "Applying VOSviewer in a bibliometric review on English language teacher education research: an analysis of narratives, networks and numbers," Cogent Education, vol. 12, no. 1, Jan. 2025, doi: 10.1080/2331186x.2025.2449728.

[48] S. Haber and W. S. Stornetta, "How to time-stamp a digital document," Journal of Cryptology, vol. 3, no. 2, pp. 99–111, Jan. 1991, doi: 10.1007/bf00196791.

[49] C. Le, R. Zheng, T. Lu, and Y. Chen, "User Real Comments Incentive Mechanism Based on Blockchain in E-Commerce Transactions—A Tripartite Evolutionary Game Analysis," Entropy, vol. 26, no. 12, p. 1005, Nov. 2024, doi: 10.3390/e26121005.

[50] A. Singh, K. Ramachandran, S. H. Krishna, C. Nayak, K. Anusha, P. B. Acharjee & S. Srivastava, "A novel and secured bitcoin method for identification of counterfeit goods in logistics supply management within online shopping," International Journal of Information Technology, vol. 16, no. 8, pp. 5371–5377, Aug. 2024, doi: 10.1007/s41870-024-02021-7.

[51] J.-L. Ferrer-Gomila and M. F. Hinarejos, "A Hard-Timeliness Blockchain-Based contract signing protocol," Computers, vol. 12, no. 12, p. 246, Nov. 2023, doi: 10.3390/computers12120246.

[52] R.-L. Liu and C.-K. Hsu, "Improving Bibliographic Coupling with Category-Based Cocitation," Applied Sciences, vol. 9, no. 23, p. 5176, Nov. 2019, doi: 10.3390/app9235176.

[53] A. Bengoa, A. Maseda, T. Iturralde, and G. Aparicio, "A bibliometric review of the technology transfer literature," The Journal of Technology Transfer, vol. 46, no. 5, pp. 1514–1550, Jan. 2020, doi: 10.1007/s10961-019-09774-5.

[54] H. Vranken, "Sustainability of bitcoin and blockchains," Current Opinion in Environmental Sustainability, vol. 28, pp. 1–9, May 2017, doi: 10.1016/j.cosust.2017.04.011.

[55] Y. Cai and D. Zhu, "Fraud detections for online businesses: a perspective from blockchain technology," Financial Innovation, vol. 2, no. 1, Dec. 2016, doi: 10.1186/s40854-016-0039-4.

[56] Y. Liu, D. Ma, J. Hu, and Z. Zhang, "Sales mode selection of fresh food supply chain based on blockchain technology under different channel competition," Computers & Industrial Engineering, vol. 162, p. 107730, Oct. 2021, doi: 10.1016/j.cie.2021.107730.

[57] B. Niu, Z. Mu, B. Cao, and J. Gao, "Should multinational firms implement blockchain to provide quality verification?," Transportation Research Part E Logistics and Transportation Review, vol. 145, p. 102121, Nov. 2020, doi: 10.1016/j.tre.2020.102121.

[58] S. Abramova and R. Böhme, "Perceived benefit and risk as multidimensional determinants of Bitcoin use: a Quantitative Exploratory study," International Conference on Information Systems, pp. 1–20, Jan. 2016, doi: 10.17705/4icis.00001.

[59] P. De Filippi, M. Mannan, and W. Reijers, "Blockchain as a confidence machine: The problem of trust & challenges of governance," Technology in Society, vol. 62, p. 101284, Jun. 2020, doi: 10.1016/j.techsoc.2020.101284.

[60] M. Li, S. Shao, Q. Ye, G. Xu, and G. Q. Huang, "Blockchain-enabled logistics finance execution platform for capital-constrained E-commerce retail," Robotics and Computer-Integrated Manufacturing, vol. 65, p. 101962, Apr. 2020, doi: 10.1016/j.rcim.2020.101962.

[61] X. Li, D. Wang, and M. Li, "Convenience analysis of sustainable E-agriculture based on blockchain technology," Journal of Cleaner Production, vol. 271, p. 122503, Jun. 2020, doi: 10.1016/j.jclepro.2020.122503.

[62] A. Gupta, S. Gupta, M. Bisht, P. Hooda, and M. Salik, "Document Co-citation Analysis using Concept Lattice," Engineering Technology & Applied Science Research, vol. 13, no. 5, pp. 11837–11842, Oct. 2023, doi: 10.48084/etasr.6201.

[63] N. Mustafee, K. Katsaliaki, and P. Fishwick, "Exploring the modelling and simulation knowledge base through journal co-citation analysis," Scientometrics, vol. 98, no. 3, pp. 2145–2159, Oct. 2013, doi: 10.1007/s11192-013-1136-z.

[64] X. Zhao, J. Zuo, G. Wu, and C. Huang, "A bibliometric review of green building research 2000–2016," Architectural Science Review, vol. 62, no. 1, pp. 74–88, Jun. 2018, doi: 10.1080/00038628.2018.1485548.

[65] G. Nikoletos et al., "Digital marketplaces in European research landscape: A systematic literature review," Open Research Europe, vol. 4, p. 223, Oct. 2024, doi: 10.12688/openreseurope.18657.1.

[66] D. P. Sakas, N. T. Giannakopoulos, D. P. Reklitis, and T. K. Dasaklis, "The effects of cryptocurrency trading websites on airlines'

advertisement campaigns," Journal of Theoretical and Applied Electronic Commerce Research, vol. 16, no. 7, pp. 3099–3119, Nov. 2021, doi: 10.3390/jtaer16070169.

[67] A. O. Tashtemirovich and M. E. Balbaa, "The Role of Blockchain in Supply Chain Transparency for E-Commerce," in Lecture notes in computer science, 2024, pp. 365–376. doi: 10.1007/978-3-031-60994-7_31.

[68] K. Rantos, G. Drosatos, K. Demertzis, C. Ilioudis, and A. Papanikolaou, "Blockchain-based consents management for personal data processing in the IoT ecosystem," Proceedings of the 15th International Joint Conference on e-Business and Telecommunications, pp. 572–577, Jan. 2018, doi: 10.5220/0006911005720577.

[69] A. Theodouli et al., "Towards a secure and transparent Blockchain-Based system for e-Commerce deliveries," in Lecture notes in computer science, 2024, pp. 113–125. doi: 10.1007/978-3-031-52947-4_9.

[70] E. Kapassa, M. Touloupos, D. Kyriazis, and M. Themistocleous, "A smart distributed marketplace," in Lecture notes in business information processing, 2020, pp. 458–468. doi: 10.1007/978-3-030-44322-1_34.