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Review

Blockchain-Based New Business Models: A Systematic Review

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Abstract: The role of blockchain in new business model development requires greater focus because the technology is still in its infancy. Thus, there has been little research on the effects of the various blockchain networks (such as public, private, and consortium). This finding prompted a thorough investigation of new blockchain-based business models created between 2012 and 2022 to close this gap. This review's focus is on journals, and duplicate articles have been removed. Works based on interviews, articles in press, non-English articles, reviews, conferences, book chapters, dissertations, and monographs are also not included. Seventy-five papers from the past ten years are included in this evaluation. This study examines the current state of new blockchain-based business models. Additionally, the implications and applications in the related literature have been investigated. These findings highlight numerous open research questions and promising new directions for investigation, which will likely be helpful to academics and professionals. The business strategies built on blockchain are currently on a path with a rapid upward trajectory. Blockchain technology offers businesses numerous chances to modify and develop new company models. By changing the conventional framework, blockchain innovation leads to the development of new methods for developing company models. The supportive potential of blockchain technologies such as NFT and P2E is increasingly being coupled with the development of new corporate projects and the modification of current business models. Since this field of study is still fairly new, researchers will have fresh opportunities to analyze its characteristics.

Keywords: blockchain; business; business models; business development; new business models

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1. Introduction

Blockchain is a disruptive technology that can transform businesses and have a wide range of applications [1–4]. Blockchain is a peer-to-peer transaction ledger system that is trusted, immutable, transparent, permanent, decentralized [5,6], and supported by algorithmic trust and distributed consensus mechanisms. It allows for secure information sharing, the long-term preservation of digital records, and the validation and verification of digital transactions. Numerous industries, including insurance, the supply chain industry, banking, real estate, renewable energy, and healthcare, have initiated blockchain initiatives [7]. Since blockchain is decentralized and eliminates intermediaries, commercial transactions can occur anywhere. Blockchain is an excellent means to (a) prove ownership; (b) trade; (c) establish peer-to-peer trust for real-time transactions; (d) increase dependability; and (e) withstand external attacks [6].

A business model constitutes a company's way of conducting business and the measures it takes to gain a competitive edge and improve its goods and services [8]. Firms digitalize their business models to increase their competitiveness in a world characterized by a fluctuating market, new technology, and diverse client demands [9,10]. Blockchain has changed the way business is conducted [11,12]. Initially used in the banking industry, today, blockchain is employed to transfer digital data across businesses. By altering how participants engage in digital transactions, a blockchain may provide new capabilities for

businesses [13]. When employed in corporate operations, blockchains have far-reaching implications. For instance, transactions may be validated, disintermediation can be facilitated, and the efficiency and trust among members of an organization's ecosystem can be enhanced [14–16]. These advantages may dramatically transform a company's operations. However, the technology is still in its infancy, and research studies have expressed concern regarding the technological obstacles, ethical difficulties, and implementation security hazards with which it is threatened [17–19].

The current amount of research on business model innovation and blockchains is insufficient. Most research has been conducted from a technical standpoint [20–22]. Such studies have provided conceptual models of blockchain-based information systems and discussed the technological architecture that enables value creation. Scholars have examined the technology from a design perspective and concentrated on the various ways in which blockchain may be applied in business processes such as supply chain management [23]. Focusing on technical aspects complicates the determination of the commercial use of an invention. Several studies [24,25] have investigated the impact of blockchains on the development of strategic skills. In addition, they have examined how technology influences the introduction of new activities and how it impacts the governance and structure of current activities [25]. However, the studies have not examined the significance of technological features in developing, delivering, and collecting value across various types of companies [24]. To determine how blockchain technology produces, distributes, and collects value, as well as how technical circumstances may alter business models, an investigation is required.

Aside from the fact that theorists have not paid sufficient attention to how blockchain technology impacts business models, blockchain startups also fail to provide their promised commercial benefits. Companies do not comprehend how blockchain technology may enhance their corporate practices [19]. In addition, it is yet unclear whether business model patterns have performed effectively with this new technology base. Using these issues as a launch point, the following research topics will be the subject of this paper.

Blockchain can significantly contribute to disruptive developments in management and business. The lack of knowledge and comprehension of blockchain technologies prevents academic study and real-world use. To obtain and maintain a competitive edge, business managers must comprehend the potential effects and threats of blockchain applications. Applications based on blockchain seem to have significant prospects for performance enhancement and revenue generation [4]. The three main ways in which blockchain might influence and disrupt business models are through the disintermediation of middlemen, reducing transaction costs, and the authentication of traded commodities [26]. Earlier studies investigated the connections between business models and blockchain [26–30]. Yet, some of them alter the current conventional business models, while others develop a model for a particular industry or simply concentrate on digital transformation in general. A dynamic capabilities framework with blockchain properties and an awareness of business models was conceived in the research conducted by Aydiner [31]. By exploring the technological factors that can affect business models and probing the function of technological advantages in boosting company value, Marikyan et al. [32] presented a conceptual insight into the use of blockchain in organizations with varied value configurations. Lee [33] examined how various business models are used to create a token economy as a result of how blockchain and cryptocurrencies are still developing and interconnected. Chen and Bellavitis [34] evaluated the advantages of decentralized finance, listed current business models, and considered potential drawbacks and restrictions. The state-of-the-art practices are outlined in an article by Viriyasitavat et al. [35] to pinpoint new areas of study, difficulties, and potentially useful applications when incorporating blockchain into the growth of business process management. The purpose of the paper written by Bürer et al. [36] is to identify key topics to be further researched by focusing on applications for blockchain systems. To comprehend the challenges and opportunities precipitated by blockchain in different business operations, Kimani et al. [37] undertook a literature review.

The objective of this paper is to review the current status of the literature on blockchain-based new business models in a way that will help emerging researchers catch up on the development of the field and provide recommendations for improving the caliber of subsequent studies. To be more precise, this study conducts a thorough literature review of earlier research on new business models based on blockchain. In addition, this paper aims to pinpoint knowledge gaps and promising research directions. The specifics of the research questions (RQs) are as follows:

RQ1 : What is the present state of research in this field?

1. RQ2: What implications will blockchain have for new business models?
2. RQ3: What are the applications of blockchain-based business models?
3. RQ4: What new business models based on blockchain will emerge in the coming years?

The structure of this study is as follows: The research methodology used to find, screen, and select the included studies is comprehensively addressed in the second section. The third section examines the literature on blockchain-based new business models, showcasing the most popular papers, examining their applicability, and highlighting some of the most challenging problems in this field. Future developments are discussed as the section comes to a close. The final section of the report discusses the conclusions.

2. Background of the Study

The development of the internet in the 1990s prompted the serious study of company strategies regarding the frameworks of business models [38,39]. The reason for this new interest was that during this period, businesses were prompted to reevaluate their operations due to the impact of market globalization and the introduction of new communication technologies [40]. This shift hastened the hunt for novel organizational structures, thereby paving the way for the replacement of traditional business models with e-commerce-based ones that maximally exploit the possibilities provided by the Internet Age [41]. In this view, the business models were initially classified as methods for reforming company operations in association with environmental analyses, as stated in the study by Simmons et al. [42]. Given the frequency with which new opportunities and challenges appear in the market, it is clear that business models are crucial for determining how organizational structures can be optimally shaped [43,44].

2.1. Business Models

A business model is a conceptual instrument that aids strategic decision making and directs managers through the implementation process. It emphasizes a system-level, comprehensive explanation of how organizations operate [45,46]. Chesbrough [47] found that all companies operating in a competitive setting have a business model, regardless of what it has been termed.

The conventional business model is centralized and consists of shareholders or owners, an organization, its staff, and its customers. In this approach, the company profits by selling things or services. It expects consumers to buy their services or products at a certain price after they have been produced. The rate will have been determined so that it addresses crucial details such as wages and any other expenses required by the company to deliver the goods or services. Companies that adopt this model use centralized models, which vary by industry but often include franchisees, retailers, distributors, and manufacturers. During the last two decades, studies on business models have increased [46] and taken varied directions [48], with many academics and managers focusing on innovation in business models [42]. This focus on new business models is a direct response to increased competitiveness and the ongoing changes in consumer and market needs [21]. In this regard, market success in recent years has not been reflected in the launch of new services or products on their own but rather in the reinvention of business models [48].

2.2. How Does Blockchain Transform Business Models?

A new type of business strategy needs to be created due to changing consumer standards, needs, technologies, and laws. Additionally, not all components incorporated in the current models are compatible with the various available technologies and blockchain characteristics. Model-based methods help people comprehend general business strategies by directing them toward relevant elements that have an impact on how people conduct business across a range of industries. One of the traits of business-model-based thinking is the ability to recognize and address operational problems. The way in which values are produced and captured for consumers determines business logic, and there are various models for various reasons [49]. Business models are theoretical viewpoints that outline the structure of corporate operations to capture values and demonstrate how these values can be turned into profits [50]. A business model uses a system-level perspective to describe how businesses operate. There are established techniques for defining business strategies for organizations. Digital tools, on the other hand, are changing the current practices governing business structures into new kinds of strategies. Blockchain will disrupt established business strategies as well as value streams that are collected and produced [29].

Osterwalder and Pigneur presented the well-known traditional business model CANVAS, which has nine principles and incorporates the idea of straightforward, pertinent, and comprehensible methods of describing businesses' features [51]. When building a model with factors, the firm level of the business idea is taken into account and the query "what of doing business" is posed [52]. These nine components—cost structures; key partnerships, activities, and resources; income streams; customer relationships; channels; value offerings; and customer groups—analyze capacities for effectiveness and value for stakeholders [29,53]. This model is deficient in that it does not include data and confidence as components of its worth [53].

The literature on business models lacks a collection of universal elements that specify how the models ought to be. Therefore, the St. Gallen Business model navigator created the questions required to be able to describe a business model. To understand the value of a business, the model poses the following questions: "Who is the customer?" "why is the business model financially viable?" "How to build and disseminate the value proposition?", and "What is offered to the target customer?" [53,54]. The value design model, one of the other models that have been proposed, consists of extracts, exchanges, nodes, and value drivers that work together equally. The ecosystem is the primary force behind the value design approach, which uses building blocks to create an integrated view to find values [53]. The business DNA (design, needs, and aspirations) paradigm operates within three value-based structural components that engage with specific system components. Defining each of the DNA segments through "How?", "What?", and "Why?" queries leads to interaction. The D blocks are made up of important collaborators, assets, and tasks. Channels, client connections, and parts are contained in the N block. The value offer, income, and expenses are all covered in the A block [55]. These models always view the value through extra intermediaries to clarify the business model when defining the building block components. However, the blockchain pledges to eliminate the middlemen in commercial arrangements. Due to their static methods, these frequently used business models appear to be unable to describe blockchain-based business properties and values.

2.3. Blockchain

In today's world, as nearly every action, service, or communication involves some sort of data transfer, information has risen to prominence as the most valuable asset in every exchange. Information quality and availability must be guaranteed while working with large data sets. For data-driven decisions to be trusted by stakeholders, data must be transparent, accountable, and verifiable. The agri-food industry is one of many physical and service-providing markets [56] that could benefit from the deployment of blockchain technology, which is now popular in financial applications and transactions [57]. Numerous

industries have been affected by blockchain, which has altered how organizations create, function, and interact with customers. Blockchain-based business models have aided businesses in modifying their strategies and identifying new methods by which to thrive in the digital age.

A blockchain-based business model is characterized by the three primary properties of blockchain technology: transparency, immutability, and decentralization [58]. The essence of commerce consists of peer-to-peer interactions within a dependable and trustworthy network. Decentralization profoundly impacts how businesses function. Profit production and the flow of entities and transactions are designed to maximize the benefits for end-users and businesses. The current paradigm comprises decentralized applications that can conduct peer-to-peer transactions without requiring intermediaries or a central authority [59]. Incorporating decentralized applications into this paradigm eliminates the need for shareholders and employees. Even though blockchain technology drastically modifies the impacts and responsibilities of users, a business model that incorporates its use is viable since users become both owners and employees. Eliminating intermediaries reduces the costs and time associated with third parties, thereby enhancing the ecosystem, boosting returns for investors, and lowering prices for consumers [60].

The blockchain business model offers genuine benefits that any organization can exploit. With this business model, both firm owners and end consumers benefit from the value provided. In addition to removing intermediaries and other security investments that unnecessarily raise the price of their products and services, business owners can benefit from recruiting investors or receiving payments from across the globe. On the other hand, consumers may rely on trustworthy agreements brought about by self-executing smart contracts and feel confident knowing that their personal information is secure. Although the blockchain sector is still in its infancy, it continues to demonstrate its immense potential that is still untapped.

3. Research Methodology

3.1. Planning the Review

This study sought to evaluate the current state of new business models based on blockchain technology. With the utmost seriousness, this investigation reviews all the recent, pertinent literature. The review approach applied herein uses organized RQs, databases, and methods for locating and assessing material. To provide a precise, quantitative, and in-depth evaluation of blockchain-based new business models, specific components of the specified reporting items for systematic reviews were chosen. The entire strategy includes the following crucial actions [61]:

I. Examining the current state of the field.
II. Recognizing the study's evolutional trends.
III. Analyzing the field's challenges and potential future directions
IV. Providing a breakdown of the investigation's findings.

3.2. Research Strategy

An inclusive viewpoint is necessary for a comprehensive review of the literature. Several databases were chosen before the search was conducted to increase the chance of finding highly relevant articles. This study uses sources from Scopus.

3.3. Search Criteria

For various reasons, not all outstanding studies have been included in the search criteria. A total of 553 Scopus results have been analyzed (8 December 2022). A total of 75 studies have been included in this review (Figure 1). The search strings' development was influenced by the study domain and research topics. Relevant information was found and gathered through searches for "Blockchain" AND "Business Model"; OR "Blockchain" AND "Business Development"; OR "Blockchain" AND "Business Management"; OR "Blockchain" AND "Business Framework"; OR "Blockchain" AND "Digital Business"; OR

"Blockchain" AND "Online Business"; OR "Blockchain" AND "Electronic Business"; OR "Blockchain" AND "E-Business"; OR "Blockchain" AND "Business".

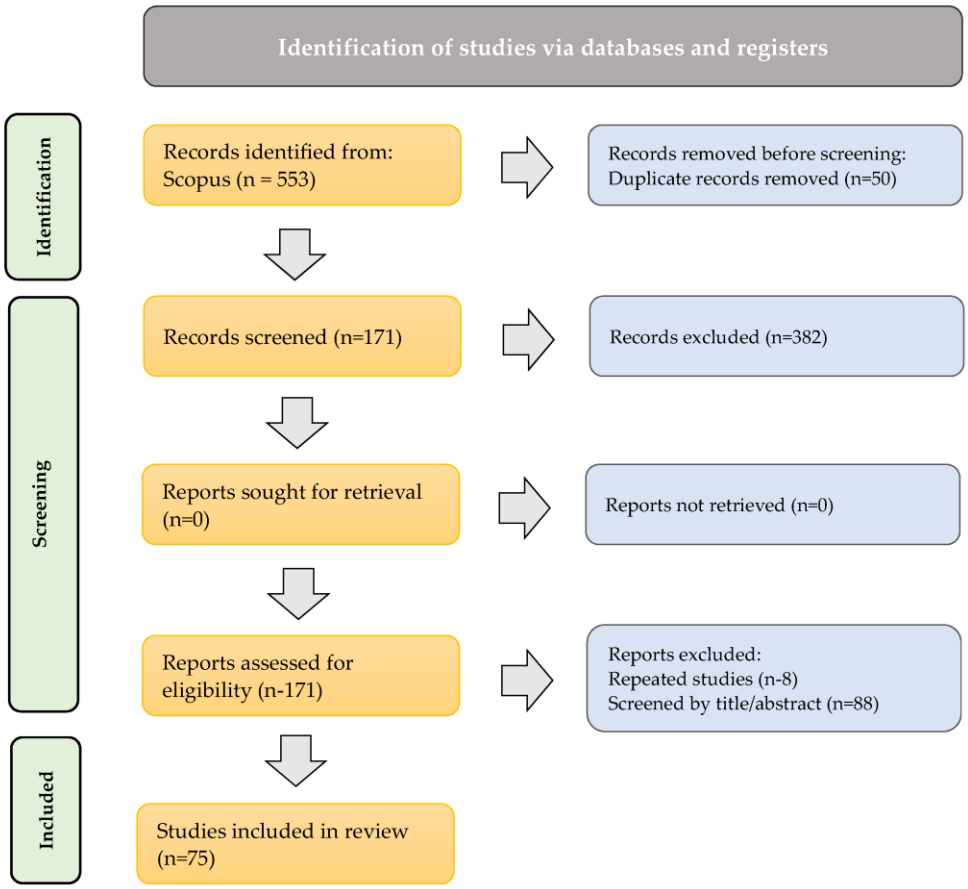

Figure 1. PRISMA flowchart showing how studies were chosen for systematic reviews.

I. Inclusion criteria (IC):
   1. The research could be published at any time between the years 2012 and 2022.
   2. The study is constrained to journals.
   3. The study corresponds to the following type of document: "article".

II. Exclusion criteria (EC):
   1. Studies could not be in-press articles.
   2. Studies could not be duplicated articles.
   3. Studies could not be written work in languages other than English.

4. Results and Discussion

The following is a list of responses to the RQs from the systematic review. The use of new business models based on blockchain appears to have significantly advanced thanks to this study. New business models built on blockchains are described in this section. The future sections will detail the importance of using new business models based on blockchain technology.

4.1. Selection Results

A total of 553 items were obtained in this search, of which 478 were screened. There are 75 articles included in this systematic review. The selected works are listed below, along with an explanation of the general classification results. The review process is constrained by the review database used, which was primarily Scopus.

RQ1: What is the present state of research in this field?

This systematic review examines research papers on blockchain-based new business models published between 2012 and 2022. This systematic review examines descriptive data on annually published papers, topic areas, author nationality, top keywords, and most-cited publications.

Figure 2 displays the number of articles created in each subject area from 2012 to 2022. Business, management, and accounting (35 articles) and computer science (34 articles) are the main topics. Other subject areas covered in the collection include engineering (twenty articles); economics, econometrics, and finance (nine articles); decision sciences (eight articles); energy (eight articles); environmental science (eight articles); social sciences (eight articles); mathematics (five articles); psychology (three articles); materials science (two articles); pharmacology, toxicology, and pharmaceutics (two articles); biochemistry, genetics, and molecular biology (one article); chemistry (one article); medicine (one article); and multidisciplinary studies (one article).

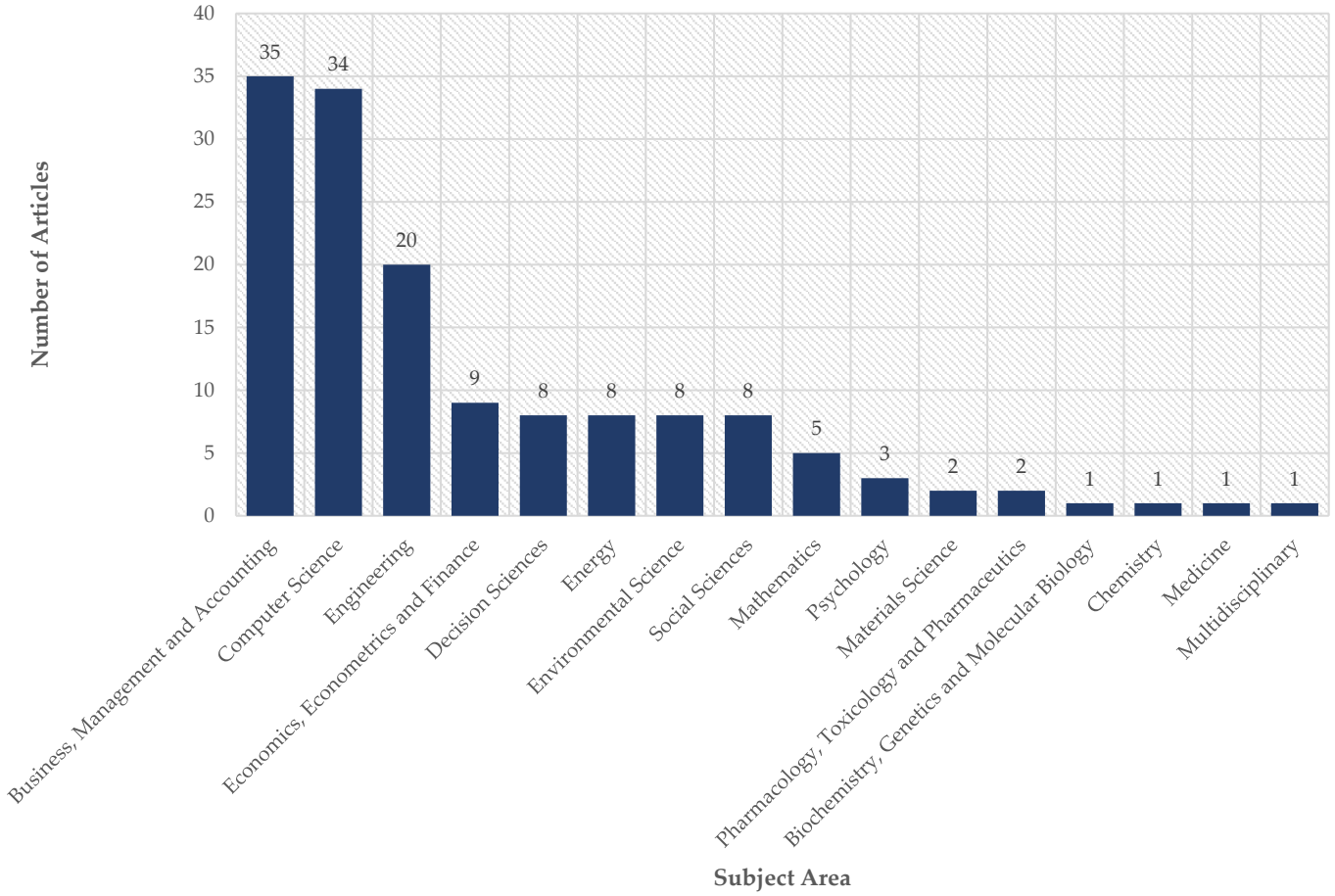

Figure 2. The number of papers published between 2012 and 2022 on the subject.

Figure 3 depicts the number of articles published each year between 2012 and 2022. The first paper was published in 2016, demonstrating how recently blockchain has emerged as a research topic in the literature on new business models. The distribution of publication dates over time is as follows: one paper (nearly 1.33%) was published in 2016, four papers (nearly 5.33%) were published in 2018, eight papers (nearly 10.67%) were published in 2019, fifteen (20%) were published in 2020, nineteen (nearly 25.33%) were published in 2021, and twenty-five papers (nearly 33.33%) were published in 2022. Given the lag-time of academic research and publishing with respect to a compelling new technology that was only presented publicly in 2009, this rapid, upward trajectory is an expected trend.

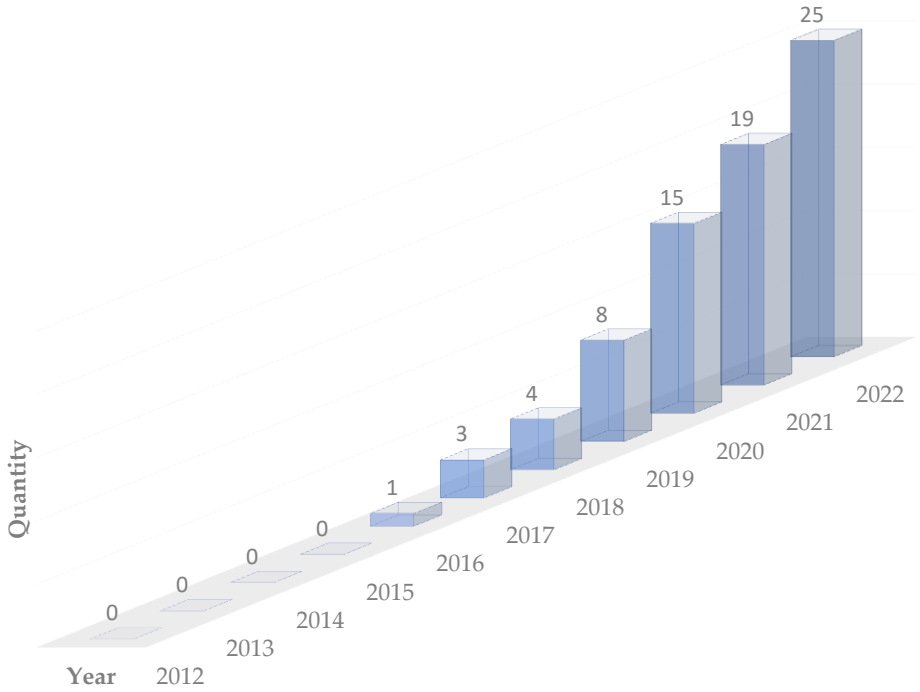

Figure 3. The number of publications published each year between 2012 and 2022.

Figure 4 depicts the relationship between the keywords of the studies chosen from the systematic literature review. Blockchain, business models, and similar terms are the most frequently used keywords. According to the analysis, the following words were frequently used: business process, innovation, business development, the Internet of Things, smart contract, supply chain management, sustainability, and many more.

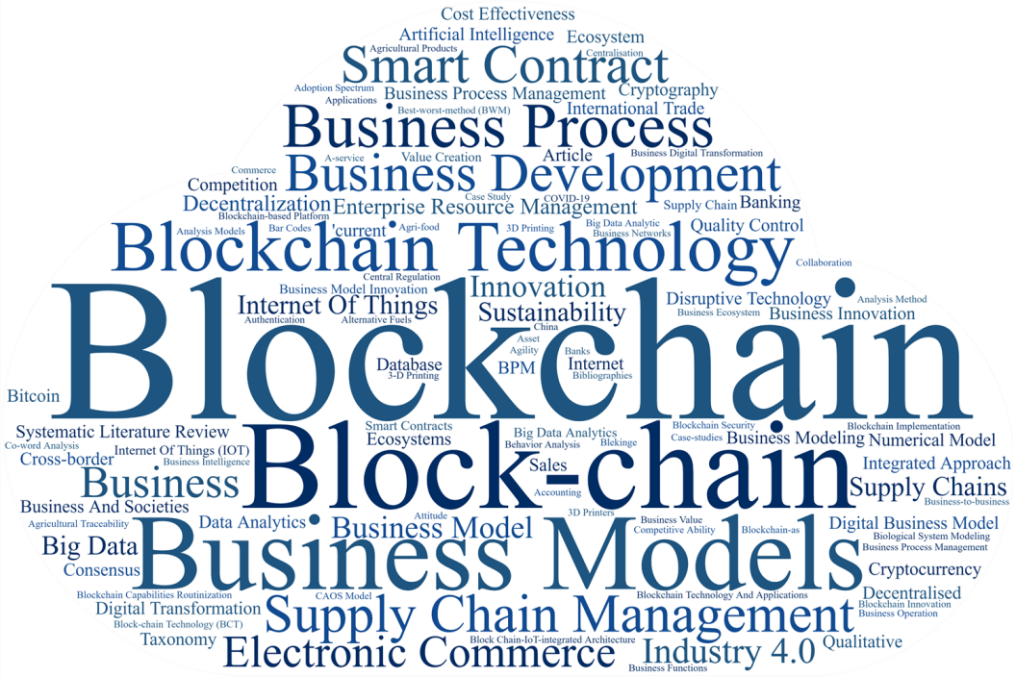

Figure 4. The primary keywords used in the articles.

Figure 5 depicts the included studies ordered by nationality and ranked according to the number of writers from each included nation. It is linked to population and development. China (both highly populated and developed) has the most writers (14), followed

by India (highly populated), the United States (highly populated and developed), and Germany (developed), among others. Blockchain projects are being developed all over the world, with many of them focusing on new business models.

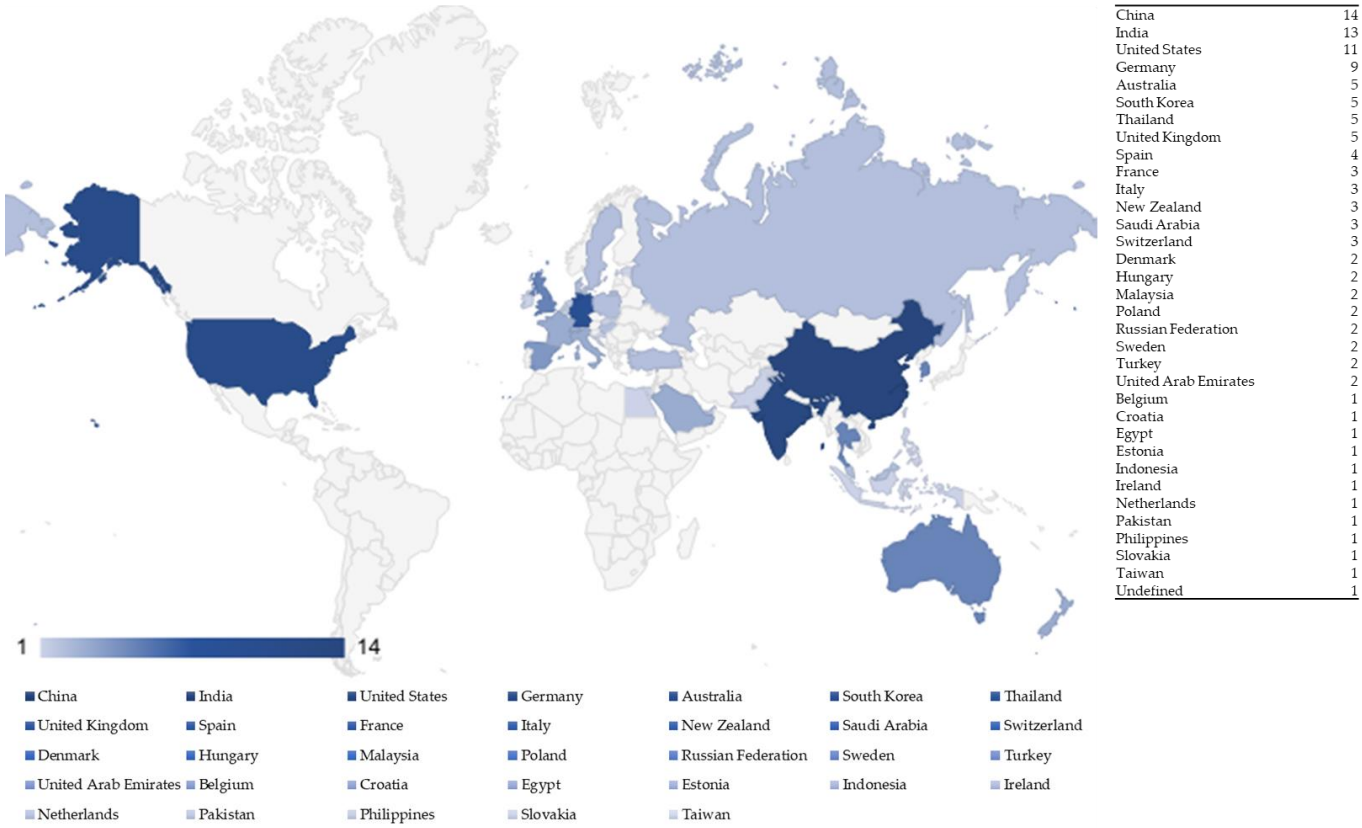

Figure 5. The distribution of authors by country.

Table 1 displays the most-cited articles, including the type of study conducted, on business models and their outcomes from 2012 to 2022. In short, a business model describes a company's plan or strategy for selling a product or service and profiting from it. Each company will develop its own business practices. There is, however, a centralized model that includes the owners or shareholders, the employees, the customers, and the organization. A blockchain business model possesses all three of blockchain technology's main characteristics: it is decentralized, based on peer-to-peer transactions, and operates within a trusted and reliable network.

Table 1. The most-cited articles (2012–2022) on business models and their outcomes.

Type of Study on Business Models	Year	Cited by	Outcome	Reference
Internet-of-Things (IoT) electric business model	2017	362	Design and implementation of IoT-based E-business models using a strong framework.	[62]
Impact of blockchain on the analyzed business model	2019	243	Business gains a competitive advantage, whether new or old, through business model innovation and blockchain.	[63]
Disruption of existing business models by blockchain	2017	136	Blockchain technology can affect and disrupt business models in three key ways: by authenticating traded goods, through disintermediation, and by lowering transaction costs.	[26]

Table 1. *Cont.*

Type of Study on Business Models	Year	Cited by	Outcome	Reference
The development of decentralized business models	2020	131	Decentralized finance may alter the way that modern finance is organized and open new opportunities for innovation and entrepreneurship while highlighting the benefits and drawbacks of decentralized business models.	[34]
Framework for blockchain-based business process management in industry 4.0 service environment	2020	111	To demonstrate how blockchain can be integrated to support quick, accurate, and reasonably priced evaluation and transfer of Quality of Services in the workflow's structure and management, a business process management framework can be used.	[64]
Online business fraud detection	2016	105	Blockchain technology is very effective for stopping objective information fraud, such as the falsification of loan application information. However, with respect to subjective information fraud, such as rating fraud, where the ground truth is difficult to verify, its effectiveness is constrained.	[65]
Blockchain's future applications in business and management	2017	93	To gain and maintain a competitive edge, business managers should comprehend the possible impacts of, and threats posed by, blockchain applications.	[4]
A decentralized token economy	2019	86	It is anticipated that future token economies will be established using new protocols enabled by blockchain technology, thereby creating a new economic framework.	[33]
Use of blockchain and IoT to develop new business processes in the digital economy	2019	71	To identify new areas of study, difficulties, and potentially useful applications when incorporating blockchain into strategies for the growth of business process management, the state of the art was presented.	[35]
Using digital innovations to transform business: data analytics, AI, cloud, and blockchain	2022	61	Wide-reaching and diversified applications across a range of vertical areas were addressed, providing exploratory study options for further inquiry.	[66]

Blockchain's universal technology may be used by numerous disciplines and presented to diverse audiences. The companies Banks and Fintech have embraced it. This explains why applications and new business models are constantly being developed.

4.2. Implications

RQ2: What implications will blockchain have for new business models?

Using blockchain technology, business models may be modified in several ways. Additionally, blockchain restricts the development of new business models. As a positive implication, blockchains provide clients with a variety of reasons to adopt blockchain-based business models [67,68]. Depending on how a blockchain is implemented, the benefits can include significant cost savings due to faster transaction times [69], disintermediation [70,71], less record-keeping with respect to customers due to distributed ledger technology, and improved data traceability and verification.

4.2.1. Theoretical Implications

With the rise of blockchain, the digital revolution, whose origins lie in the growth of the internet, is now approaching a new stage of development. A new, blockchain-based internet will usher in a period of the internet of value, which will reshape current business models through the increased reliability and transparency of information, whereas the pre-blockchain internet was dedicated to its role as the internet of information, which merely connects information providers with the consumers who use it [72]. In this paradigm, users assess goods by exchanging data they have generated as buyers rather than solely relying

on data provided by service suppliers. Through a decentralized procedure that stops one organization from monopolizing information, the development of blockchain will support the achievement of a more objective and equitable consensus.

Blockchain's rules are among its most crucial and significant aspects. There are a variety of protocols with a set of conditions that are being applied to various industrial areas and objectives. These protocols' crucial components are the algorithms that create reliable tools and auxiliary technologies. These algorithms create confidence services that fall into different evidence-type categories. These three kinds of proof are as follows: evidence in an agreement, evidence as a service, and evidence in a service [73]. One of the most well-known protocols is proof of work (PoW), a cryptocurrency-specific method that is based on the proof-of-state agreement protocol. To use the PoW method, multiple miners work together to solve an issue. Although it uses a great deal of energy resources, it ensures stability and offers security from forgery in the absence of reliable intermediaries [74]. PoW guarantees that every transaction is replicated exactly in every network. Everyone can participate in the ecosystem and decide whether each transaction should be evaluated using the PoW consensus algorithm, especially in a public database. Although the enablers are anonymous, all interactions are visible [75]. The crucial aspect of PoW, however, is the steadily increasing cost and time per block and transaction [76]. Proof of stake, a suggested substitute for the PoW consensus algorithm, is cheaper and consumes less computing power. Each stake receives compensation or a penalty based on the success or failure of the deal [77]. A proof-of-value (PoV) procedure is another method of reaching an agreement. The worth of each node's input is established by this kind of consensus. In addition, the system assesses each input and its reputation in the system; then, it ascribes the impact appropriately. The proof-of-a-majority type also includes evidence of the power and preexisting procedures.

4.2.2. Practical Implications

Blockchain verifies assets in a manner distinct from centralized transaction systems, which depend on a single entity [26]. Blockchains replace centralized transaction systems to establish trust between parties. Specifically, blockchain technology enables tiny, scattered parties to manage transactions and conceal their identities [78]. All transactions are secure because of their encryption. Blockchains maintain a system's security and promote individual confidence when paired with decentralization and complex validation techniques [79]. Blockchains contribute to business models and organizational concept of a distributed autonomous organization (DAO) by lowering expenses, facilitating item tracking, and enhancing security [80–82].

A blockchain's assets affect a company's business model and how its practices are conducted [83]. Real, digital, monetary, or user-unique assets may be transferred over blockchain [83,84]. Using blockchain technology for a variety of assets creates several opportunities for altering and enhancing a company's interactions with its customers, rivals, and suppliers.

When blockchain is utilized to eliminate middlemen and provide consumers with access to, and the traceability of, their data, new business models are established by restructuring the status quo [27,85]. Therefore, this form of business model is often used by value networks [27]. When using public and consortium blockchains, which provide rigorous data validation and network access, one may collaborate with confidence. When individuals have mutual trust, data exchange among stakeholders is more effective. For instance, the democratization of access to financial resources minimizes consumer anxiety and preserves the privacy of transactions in the financial sector that lack dependable third-party guarantors [86]. These connections also provide supplementary services to clients by rendering transaction data transparent [87,88]. When you purchase an item, the ability to trace its origin increases your trust in the product's origins and manufacturing standards [87]. Service delivery is an advantage that is compatible with all blockchain network types. There are three ramifications of delivering services through digitally intermediated networks with

robust data validation methods. It increases the efficacy of transactions between parties, who may freely exchange resources and data in an environment facilitated by blockchain technology. It also keeps users on the network, thereby reducing switching expenses [29,89]. Parties may collaborate to create new services, such as online-learning and on-demand services, using a blockchain-based peer-to-peer network [90]. By using blockchain technologies, transaction costs will decrease, security and financial fraud will be mitigated, and energy consumption will decrease. This will precipitate cost-effectiveness [91]. When a public blockchain makes business models conceivable, network effects occur. This kind of technology simplifies the socialization process between individuals without requiring them to exercise authority over one another. Network effects may improve efficiency by expanding the number of participants and dramatically increasing sales [92].

Finally, a blockchain-based business model enables the application of tokenization and cryptography. Cryptography can significantly alter the value proposition of a company model since it ensures that all network interactions are genuine [93]. Tokenization often refers to replacing a secret data component with a non-confidential data component [94]. The value of the business model may increase if tokens are distributed to stakeholders or if third-party tokens are accepted [78]. Tokens on the blockchain ledger may also serve as proof that a firm and its stakeholders are the legitimate owners of certain assets [83]. Various requirements, such as platform openness; the integration of numerous characteristics, such as identification, privacy [95], and interoperability; stability; scalability; and performance, pose challenges for blockchain technology [69]. In conclusion, blockchain technologies provide firms with several opportunities to alter and create new business models. However, there is insufficient research demonstrating how blockchain technology influences business models.

RQ3: What are the applications of blockchain-based business models?

The scope of the data is greater than ever, and the physical bounds are expanding. The platforms that have been developed are also communicating with outside parties. An ecosystem is created by the relationships between the systems, which resemble a symbiotic sort of dependence between external and internal companies. With these new technological foundations, lean and agile types of structures open new possibilities for enterprises to capture and generate new distributed and decentralized values [96]. To create a value-driven dynamic model, the entire system and its contributors should be considered. A structure with a more dynamic network is replacing traditional and linear business models as a result of recent technological advancements that enable hypoconnectivity. The creation of backup plans to incorporate corporate strategies with dynamic business models that account for digitalization is simplified by developing dynamic capabilities. To create digital models, new business model innovation employs sensing, seizing, and transformation skills. New approaches to business planning and design will be developed using digital business models with these dynamic characteristics as well as by employing clear business models that effectively capture a competitive edge. The capacity for sensing enables the discovery of opportunities within the external ecosystem to create value for digital business models [97].

Blockchain's capabilities have the potential to change established business models [98]. Blockchain innovation is creating a new approach to business model innovation by altering the traditional framework. There are case studies [27,30] that outline existing business models and anticipated blockchain business models in various industries, but they do not all share a methodology that examines the model holistically.

4.3. E-Business

In a corporate setting, the integration of IoT and blockchain with business process management will be crucial, especially in the context of intra/inter-organizational data systems and their various design possibilities [99]. The rapid advancement of Internet technology has improved the global economy's integration. The rapid growth of international e-commerce has been facilitated by the constant improvement of technology and business

structures for international trade (CBE) [100]. Hu and Xu [100] explored the causes of the aforementioned issues in the development of CBE and addressed the creation of CBE business models based on blockchains developed according to research on the state of CBE development. The aim of such models was to research the big data and blockchain-based CBE business model. Additionally, they employed blockchain to address issues regarding cross-border trust, cross-border logistics, cross-border payment, and cross-border data flow.

The reputation framework has been developed as a powerful tool to help clients reduce the risks involved in online shopping; however, it is susceptible to rating fraud [65]. The study by Cai and Zhu [65] examined rating fraud by distinguishing objective from subjective fraud. Then, the efficacy of blockchain in preventing objective fraud and its shortcomings in preventing subjective fraud, particularly rating fraud, were covered. Finally, the study systematically examined how robust blockchain-based reputation systems are against various forms of rating fraud. As they might act strategically to conceal themselves, it is difficult to catch fake raters. They also studied the possible benefits and drawbacks of blockchain-based reputation frameworks under the two attack guises of "bad-mouthing" and "vote-stuffing", as well as several attack models, such as a "Sybil attack", a "whitewash attack", a "camouflage attack", and a "continuous attack". Vote-stuffing fraud is more resistant to badmouthing than blockchain-based reputation frameworks. The IoT e-business model presented by Zhang and Wen [62] reimagined many classic e-business model components, enabled P2P trade based on the blockchain and smart contracts, and realized the transaction of smart property and paid data on the IoT. Rane and Narvel [101] sensorized and IoTized an industrial pump to enable real-time operation monitoring and the use of predictive maintenance to manage these assets more quickly. The well-known properties of blockchain, such as boosting decentralization potential; enabling secure, trust-free transactions; and providing autonomous device coordination, together with the advantages of IoT, will aid in achieving Industry 4.0's stated goal of enhancing agility.

4.4. Digital Business

Digital transformation in the corporate world refers to the incorporation of digital technologies across all functional divisions, from product development to customer service. This idea is crucial for a company's and its economy's overall sustainable growth [102]. The study by Bhatti et al. [102] was carried out based on this reality, wherein the main objective was to investigate the significance of digital transformation within an organization through big data, the IoT, and blockchain-based abilities for strategic performance within the Chinese telecom industry. The findings showed a significant correlation between strategic performance and technical competence and between data quality and strategic performance. Moreover, the IoT and big data analytics played a crucial mediating role between the dependent and independent variables. Using the lenses of four emergent technology fields, namely, artificial intelligence, blockchain, cloud computing, and data analytics (ABCD), Akter et al. [66] investigated digital business transformation. The study specifically examined the workings and value propositions of these various but progressively convergent technologies. The potential of ABCD hybridization, integration, recombination, and convergence has not yet been considered due to the dynamic nature of innovation. The study's results, which were obtained via a multidisciplinary approach, demonstrated extensive and varied applications across a range of vertical sectors, thus opening potential areas for further research. The paper also emphasized how these new technologies have real-world applications. To improve business processes and preserve secure client interactions, Wang et al. [103] presented a business innovation strategy based on blockchain and artificial intelligence. There were only a few primary respondents from which the qualitative empirical data were collected, and they stemmed from two different business sectors. By comparing and contrasting how digitalization has affected value development, proposals, and business capture, blockchain and artificial intelligence were analyzed. Moreover, blockchain can help address problems regarding employee interaction and organizational capabilities. The outcome of the experiment reveals that digital transformation is typically viewed as

crucial and enhances business innovation efforts. The numerical outcome suggested by the business innovation strategy based on blockchain and artificial intelligence enhances the demand forecast ratio (97.1%), business development ratio (98.9%), product quality ratio (98.3%), customer satisfaction ratio (97.2%), and customer behavior analysis ratio (96.3%).

In the article by Kifokeris and Koch [104], a brand-new digital business model for independent logistics consultants in the construction industry was proposed. It included the design of a socio-material blockchain solution for coordinated information, material, and financial flows. A permissioned and private proof-of-authority blockchain system integrating the supply chain flowing in a general socio-material environment was conceptualized by fusing academic research and empirical findings. The value proposition of a digital business strategy for an independent construction logistics consultant then incorporates this solution. The proposal calls for, among other things, increased output and better process management, while also supporting the consultants' ability to innovate and gain a competitive edge. While some business model sections, such as channels, are not considerably impacted, others, such as essential resources, are updated via blockchain. Issues such as the lack of knowledge about blockchain and the power imbalances within socio-material constellations should be resolved to prevent obstacles from obstructing the implementation of this digital business model.

Gimerská and Šoltés [105] minutely explained how blockchain may be used to digitize a purchasing group's processes. The analyzed company's core business, a financial service called central regulation, and other services were the key areas of focus. Following a review of the literature, the most well-known blockchain projects in big businesses over the past few years were examined to identify successful adoptions. The new blockchain extension was used to explain the purchasing group's processes. The findings may prove useful for the administration of purchasing groups because they indicate a rise in supply chain transparency and, concurrently, an improvement in payment-processing efficiency. For buying clubs that use a centralized payment system, the combination of permissionless and permissioned blockchains might be a workable approach.

The use of blockchain technology and the efficiency of supply chains were investigated in the study by Elrefae and Nuseir [106] regarding digital business strategy, information sharing, and trading partner pressure. A cross-sectional study design was used. The study's conclusions showed that the adoption of blockchain technology is significantly influenced by digital business strategy, information sharing, and trade partner pressure. In addition, implementing blockchain technology is essential for enhancing supply chain efficiency. The effectiveness of blockchain as a mediating factor was ultimately proven via the conducted analysis. Ivaninskiy and Ivashkovskaya [107] demonstrated that agency conflict is generally mitigated by digitization. Even while shareholders were not more hostile toward management, they did become more engaged. The authors determined that industries such as healthcare, banking, communications, and information technology have the most influence. These are the industries that ecosystem-based business model innovation has the largest impact on. The authors concluded that ecosystem-based business models and digitalization work in tandem to reduce principal–agent conflict.

4.5. Adoption and Industries

Blockchain implementation offers an organization many advantages that can lead to changes in its business model. However, it can be difficult to pinpoint how a blockchain contributes to the innovation of company models [108]. The research by Purusottama et al. [108] identified the use of blockchain as a new technology sub-element with respect to business model improvements precipitated by value creation. This form of technological adoption impacts value capture and value proposition in varying ways. Additionally, using the developed model, this study categorized the complexity of blockchain adoption and the degree of business model innovation to classify the adoption of blockchain in business model innovation. The results demonstrated that the cases in this study are scattered over the conceptual model's four quadrants.

Three new decentralized platform archetypes—hosted, shared, and federated platform models—were discovered through the use of cluster analysis [109]. The study by Lage et al. [109] advanced the understanding of newly emerging decentralized business systems. The results showed that shared and federated archetypes, which make up two-thirds of the platforms under study, do not adhere to conventional paradigms. Instead, they sought to forge new connections inside the community and in business. Moreover, the shared platform archetype is the most disruptive because it exhibits a greater degree of business-model-related and decentralization shift.

Blockchain's adoption in and application to the hospitality and tourism industries were identified by Kizildag et al. [110]. These areas include smart tourism, due diligence, the creation of loyalty programs, collaborative initiatives, integrated property management systems, verified review and rating systems, smart contracts, the de-intermediation of hospitality and tourism, tracking and service customization, and payments and cryptocurrencies. The adoption of blockchain-based systems may encourage the emergence of a weak intermediary (such as loyalty programs and/or review and rating systems) and multi-center (such as guest operations and customer service) business sectors in this sector. Table 2 summarizes some industries where blockchain-based business models play a role.

Table 2. Role of blockchain-based business models in some industries.

Ref	Agri-Food	Sustainable Business Models	Supply Chain	Transportation	Smart Contracts	Smart City	Sports	Music	Healthcare
[101]	√	√							
[105]			√						
[104]			√						
[111]				√	√				
[112]			√						
[113]						√			
[114]		√		√					
[115]							√		
[116]								√	
[117]		√							
[118]		√							
[119]			√						
[120]			√						√
[121]			√						
[122]	√	√							
[123]		√							
[124]		√							
[125]		√							
[126]		√							

4.6. Perspectives

RQ4: What new business models based on blockchain will emerge in the coming years?

The creation of new company initiatives and the alteration of existing business models are increasingly being combined with the enabling potential of blockchain. The study area is still relatively fresh, which provides researchers with new opportunities to observe.

Although managers are aware of and use blockchain to enhance the value of all business operations, further efforts are required for successful company management. The sophisticated aspects of distributed ledger technology are being tested and used, with industry professionals and developers introducing and experimenting with methods of integrating blockchain into regular corporate operations. Globally, researchers and academics are analyzing the costs and benefits of businesses employing blockchain technology. In the future, blockchain technology will be crucial in all areas, including the placing and hiring of staff, the management and organization of financial and accounting tasks, the implementation of marketing plans, and improvement of the cash or production cycle. The blockchain community is educating staff and managers about integrating technology into their daily operations. In the coming years, start-ups and small businesses will profit from blockchain's cheap cost. Businesses will be able to handle all the crucial data of company operations thanks to blockchain's simple method for tracing records that are permanent and irrevocable. Using a permissioned or private blockchain, this may be distributed to key parties such as suppliers, clients, investors, and staff members. The network's data will become more trustworthy and secure for all participants as more genuine transactions are added using encryption. The removal of middlemen will improve lead times for firms and shorten their operational and cash cycles. The business community's confidence will increase when internal and external company transactions are more transparent.

Due to the relative speed of developments in the private sector, it is even possible that enterprises' use of blockchain technology may become widespread and accepted before cryptocurrencies are more generally utilized by the general public and governments. Most people today may not even be aware of how blockchain technology impacts their dealings with major corporations. Blockchains could soon become as commonplace as internet connection. Although blockchain technology is very promising, it is still rather difficult to implement. As technology develops, it will have an influence on businesses at their core as opposed to solely goods and applications. In addition to merely their business models, corporations' modes of functioning have changed. The following sections present NFTs and play-to-earn (P2E) as emerging technologies in this field.

4.6.1. NFT

A digital commodity based on blockchain is called a non-fungible token (NFT). Cryptocurrencies and tokens can be used as blockchain-based digital commodities. Typically, smart contracts are used on the blockchain network to generate tokens [127]. NFTs were developed as a result of years of research and advancement regarding blockchain [128]. Digital assets known as NFTs are used to symbolize the possession of a variety of distinctive, substantial, and occasionally abstract but frequently concrete digital products [129]. The data unit used to symbolize these things on a blockchain digital record is called an NFT [130]. NFTs are non-exchangeable, unlike tradable tokens, which makes them one of the finest methods for individually identifying a commodity [131]. A digital asset's uniqueness or non-interchangeability is guaranteed by an NFT [130].

An NFT, as originally described in the literature [132], enables users to purchase, own, and exchange distinctive virtual objects that are recognized using blockchain. By utilizing NFTs' capabilities, businesses can expand their product offerings through virtual deals and boost exchanges between the virtual and physical worlds. For instance, Nike recently achieved remarkable price points for its exclusive, virtual, NFT-based goods. The value of NFTs can reach astounding sums thanks to their unique identifiers, whereas conventional virtual items (such as virtual clothing or virtual artwork) typically have less value than their physical equivalents [133].

Even in crowded and competitive marketplaces, NFTs provide businesses and creators with a way to accentuate themselves and offer distinctive experiences that can help them forge deeper bonds with their audiences. NFTs may serve as digital assets used to create special experiences for viewers by granting them exclusive access to information, products, and other items and services. Fans may feel more invested in and linked to a company or artist as a result, thereby helping to foster a feeling of exclusivity and community. The same can be said for NFT initiatives. Early users of social media platforms were able to develop larger followings and acquire more influence as the platforms increased in prominence than their competitors who were slower to engage in such platforms. Early adopters of NFT initiatives, such as companies and creators, stand to gain from the technology's development and adoption as more people join the NFT environment and it becomes more widely used.

4.6.2. P2E

Concerns about the rising price of games are not the only ones shared by the gaming community; in fact, according to certain studies, generally, playing games is not a rewarding activity [134]. The majority of people who participate in intense (and frequently competitive) gaming typically have little to show for all their effort, despite the emergence of a burgeoning, multi-billion-dollar esports business that benefits a small, elite proportion of players. Although they may spend 30 h per week playing games, such gamers rarely receive any real money for their efforts. Thus, interest in the possible benefits of so-called "Play-to-Earn" or P2E games, which may pay players for their gaming activity, has increased [135]. The concept behind this is that players may obtain both in-game tokens or incentives for their participation as well as tangible assets that they can change into fiat money. In other words, this model transcends the currently dominant in-game currencies, point systems, and assets and progresses towards one that more closely mimics an open trading market wherein in-game success can be converted into real-world financial results. The idea of P2E games has been around for a while in the form of virtual in-game currencies (such as those used in the *Diablo* series) and the trading of in-game assets for real money [136], which consists of skin trading, wherein players can sell and buy cosmetic features offered in games through trading systems or other third-party websites. Recently, this technology has advanced such that it incorporates blockchain.

The P2E business strategy enables players to gather and cultivate cryptocurrencies and NFTs, which may be exchanged for cash. In the "crypto gaming industry", where blockchain-based games allow token economics to thrive as a rewards system at scale for users to play and be involved in, this model has already established itself as a standard. There are three major kinds of agents in the gaming business, which is a subset of the entertainment industry. Such agents range from game system companies, which support the creation of games by creators, to those who produce games and video game devices. While offering the console at cost and making money from games has been the standard business strategy for decades, the advent of digital games has altered how games are promoted and sold, thus paving the way for free-to-play business methods. The P2E business strategy enables players to gather and cultivate cryptocurrencies and NFTs, which may be exchanged for cash. This strategy represents a new approach in the gaming world because players are monetarily rewarded for playing games. Figure 6 depicts various kinds of gaming company models.

Figure 6. Various kinds of gaming business models.

5. Conclusions

In conclusion, a business model is a plan or strategy used by a company to provide goods or services and profit from them. Each company will develop its own way of conducting business. However, there is a centralized model that consists of the business, its clients, its employees, and its owners or shareholders. A blockchain-based business model is decentralized, runs on a secure network, and relies on peer-to-peer transactions, which are the three main characteristics of blockchain technology. Adopting blockchain-based technology may cause businesses to reevaluate their current business models, which could boost their profitability, productivity, and efficiency. By using blockchain, forecasting, optimization, scheduling, planning, management, and resource allocation can all be improved.

Since the technology is still in its infancy and there has been little research on the effects of the various blockchain networks, their role in new business model creation needs to be given more attention (such as consortium, private, and public). A thorough investigation of potential blockchain-based business models developed between 2012 and 2022 was sparked by this discovery. This study examined the state of blockchain-based new business models, their applications, and the revolutionary potential of their distinctive features. A total of 75 distinct publications on this topic were considered for this evaluation. As with any other business model, there is no predetermined blueprint for how every blockchain company model must operate. Thus, the objectives and business model of the company will determine which strategy is best. Business managers need to be aware of the risks and potential effects of blockchain applications to gain and maintain a competitive edge. Blockchain-based applications appear to have great potential in terms of improving performance and generating income. Thus far, the corresponding business models consist of decentralized apps that enable peer-to-peer interactions without the use of central authority or middlemen.

The present status of blockchain-based business strategies is characterized by a rapid upward rise. Blockchain technologies offer businesses numerous opportunities to change and create new business models. Blockchain technology can disrupt established company structures. By altering the conventional framework, blockchain innovation is developing a new method of business model innovation. New business endeavors and changes to established business models are increasingly being coupled with the facilitating potential

of blockchain technologies such as NFT and P2E. Since this field is still relatively new, academics will have novel opportunities to analyze this field.

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