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Emerging technologies in sharing economy: a review and research agenda

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ABSTRACT

Emerging technologies, including artificial intelligence (AI), blockchain, machine learning, big data, and the Internet of Things, play a pivotal role in sharing economy (SE) services. Empirical studies on the roles of these emerging technologies in SE are increasing. However, the existing studies are highly fragmented, and the current literature fails to provide a comprehensive understanding of the role these technologies play in SE. Employing AI-based machine-learning topic modeling techniques, this systematic literature review identifies dominant research areas and maps the research related to the role of emerging technologies in SE. Our content analysis identified nine themes organized into four broad categories. Based on these findings, we have developed an integrated framework and provided insights into future research avenues. Furthermore, based on the findings, we provide theoretical and practical implications.

1. Introduction

Sharing is a very old practice but emerging technologies (ETs) and digital platforms revitalize online sharing practices (Akbari et al., 2022; Dabbous and Tarhini, 2019: Hossain, 2020). Ridesharing and accommodation sharing are widely known practices across the world (Ahmad et al., 2024). This phenomenon is termed as sharing economy (SE) in the literature (Belk, 2014). It is also termed as "peer-to-peer economy", "collaborative economy", "collaborative consumption", "platform economy" and "gig economy" (Acquier et al., 2017; Rojanakit et al., 2022). Some SE activities operate on a born-sharing model, while others follow an on-demand approach, enabled by ETs (Rong and Luo, 2023). Furthermore, service providers are both professionals or amateurs (Xiang et al., 2023). SE is defined as "*a socio-economic system enabling an intermediated set of exchanges of goods and services between individuals and organizations which aim to increase efficiency and optimization of sub-utilized resources in society*" (Muñoz and Cohen, 2017, p.21). The SE creates abundance by providing access to underutilized assets and reducing transaction costs (Geissinger et al., 2020). Ridesharing, short-term rentals, food delivery, grocery delivery, and co-working are widely known services of the SE. Such services have eased various other services and disrupted conventional services such as hotels and transportations (Rojanakit et al., 2022). AirBnB, BlaBlaCar, Lyft and Uber are prominent examples of SE (Boons and Bocken, 2018; Hossain and Mozahem, 2022; Nadeem et al., 2020).

SE is driven by new technologies such as artificial intelligence (AI), blockchain, machine learning (ML), Internet of Things (IoT), big data and cloud computing which we refer to as ETs for the purpose of this study. These technologies provide new ways of value creation to serve customers, enabling rapid expansion of data-intensive business models of SE (Narayan, 2022). Technologies are critical components of SE practices, as advancements in technology drive the growth and development of SE (Belezas and Daniel, 2023). They enable SE companies to gain hyper-scalability (Gerwe and Silva, 2020). For example, data and algorithms play crucial role in optimizing SE operations (Basukie et al., 2020). Technology has an indirect yet significant impact on the intention to engage stakeholders and consumers in sustainable consumption by fostering trust (Dabbous and Tarhini, 2019). Business models of the SE utilize hardware and software together, hence, service providers and consumers can interact and exchange services in real time. They allow a centralized pricing strategy based on service demand and booking cancelations, for example (Hossain, 2021). Studying how ETs are

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shaping the SE services is crucial to enrich our understanding of SE. Reviewing relevant literature is a key method to accomplish this goal.

A number of review articles have synthesized the SE literature from different perspectives. They have provided an overarching integration of literature (Cheng, 2016; Hossain, 2020), explored SE related to trust (Ter Huurne et al., 2017), public sector (Ganapati and Reddick, 2018), business models (Ritter and Schanz, 2019), hospitality and tourism (Mody et al., 2021), factors that impact SE performance (Rojanakit et al., 2022), and globalization of SE (Parente et al., 2018). There is no doubt that ETs are vital to the success of SE, continuously enhancing the SE activities (Belezas and Daniel, 2023). As the SE continues to evolve, the role of ETs on SE presents a fertile ground for scholarly inquiry (Ghodsi et al., 2024). How ETs are shaping SE activities to develop solutions, and drive meaningful impacts needs a comprehensive review of the existing literature. To this end we do not find any significant effort in previous research. In recent years number of studies examining ETs in the SE have grown rapidly. Current research on ET and SE is fragmented with diverse and scattered findings limiting our holistic understanding of how these technologies collectively shape SE. As most studies often focus narrowly—examining specific technologies like artificial intelligence (AI) or blockchain in relation to isolated aspects of SE such as business models or trust mechanisms, there remains a lack of holistic perspectives. This fragmentation underscores the need for an integrative synthesis that captures the interactive and multi-dimensional influence of emerging technologies across the broader SE landscape (Ghodsi et al., 2024). Without synthesizing this fragmented knowledge, scholars and practitioners risk overlooking critical connections, resulting in duplicated efforts, inconsistent insights, and missed opportunities for leveraging these technologies effectively.

Moreover, the role of ETs in SE extends beyond operational improvements, encompassing broader implications for customer behavior, managerial practices, and socio-governance issues. These far-reaching impacts highlight the need for a socio-technical lens—one that integrates both technological and social dimensions—to fully understand how ETs shape the SE. To address this gap, our review systematically synthesizes empirical research explicitly through a lens of socio-technical systems (Geels, 2004), revealing various ETs drive transformations at the user, organizational, societal, and institutional levels within the SE context.

In this study, our objectives are: (1) to analyze growth and publication trends related to ETs within SE; (2) to systematically identify and categorize key socio-technical themes, clearly highlighting technological, societal, and institutional interactions; (3) to develop an integrated framework demonstrating mutual influences between ETs and SE outcomes; and (4) to propose a future research agenda informed by socio-technical insights, offering clear guidance for further exploration of technology-driven changes within SE.

Using an AI-driven approach, this study employed Latent Dirichlet Allocation (LDA) modeling technique to reveal the semantic structures and significant themes underlying a large corpus of literature (Aleem et al., 2023).

This review study makes five main contributions. First, it reports the state of the art of the literature on the role of ETs in SE. We show how ETs such as AI, ML, IoT, blockchain, cloud computing, and digitization enhance the SE services. Second, applying AI-based machine learning tools, we identify a set of broad themes and pressing issues that each theme entails. Third, it develops an integrative framework that maps the interplay between technologies, actors, and outcomes, advancing conceptual clarity using a socio-technical systems perspective. Fourth, we advance a socio-technical systems perspective to reinterpret the literature, offering a deeper conceptual understanding of how emerging technologies interact with social, economic, and institutional dynamics in the SE. Finally, we propose a set of research questions that scholars can explore in the future.

The rest of the paper is structured as follows. Section two reports the theoretical underpinnings of this study. Next section describes searching, collection and analysis of the articles. Section four reports the findings of the review in two main segments: descriptive findings and the findings of thematic content analysis. Section five points out the implications and future research avenues followed by conclusion in section six.

2. Theoretical underpinnings

2.1. Sharing economy

The SE represents a digitally enabled model of resource exchange, encompassing goods, services, and experiences, that fosters new forms of economic activity and social interaction (Boons and Bocken, 2018). The SE is shaped by social, economic, and technological aspects, each playing a crucial role in its success and sustainability. Economically, the SE challenges traditional ownership models by promoting access over ownership (Acquier et al., 2017). Through shared consumption, resources are better utilized, reducing idle capacity and promoting economic efficiency (Rojanakit et al., 2022). For instance, a car or apartment that would otherwise remain idle can be rented out, generating economic value without the need for producing new assets (Basukie et al., 2020). Socially, trust is a foundational element that facilitates exchanges between individuals who may otherwise be strangers (Hossain, 2020). Platforms build this trust using reputation systems, user ratings, and reviews, enhance user confidence and ensure smoother interactions (Hawlitschek et al., 2018). Technologically, digital platforms act as intermediaries, enabling efficient sharing by connecting users and providers through advanced technologies (Jarrahi et al., 2021). The network effects generated through such platforms explain the rapid economic growth; as more users join, the platform becomes more valuable, attracting further participation and establishing a feedback loop (Viriyasitavat and Hoonsopon, 2019). Together, these economic, social, and technological aspects create a robust system, in which technological aspect forms the backbone.

The SE has been inextricably linked to technological advances since its inception, as its very foundation relies on digital platforms to facilitate peer-to-peer transactions (Ghodsi et al., 2024). From early online marketplaces that connected users with shared interests to today's sophisticated platforms like Uber and Airbnb, technology has been the enabler of trust, scalability, and efficiency in SE organizations (Hossain, 2020). This reliance on technology is not accidental, but fundamental, as it provides the infrastructure and tools necessary for the SE to exist and thrive.

2.2. Emerging technologies

Emerging technologies (ETs) refer to innovative technological advancements characterized by novelty, significant transformative potential, and varying stages of adoption across industries (Laurila, 1997; Ahmad et al., 2024). Unlike general-purpose or conventional technologies, ETs such as artificial intelligence (AI), blockchain, the Internet of Things (IoT), augmented and virtual reality, and 5G connectivity offer unique and transformative ways of addressing operational and organizational challenges (Huang et al., 2020). These technologies rapidly evolve, significantly disrupting traditional business models and reshaping how economic activities are structured and conducted.

The adoption of ETs has steadily accelerated across diverse sectors, including finance, healthcare, logistics, and notably, the sharing economy (Ahmad et al., 2024; Belezas and Daniel, 2023). Within SE platforms, ETs play critical roles by enabling optimization of services, streamlining operations, and enhancing real-time connectivity among users and providers (Belezas and Daniel, 2023). For instance, AI-powered analytics enable predictive modeling and personalized user experiences, substantially improving operational efficiency and consumer engagement (Chen et al., 2022). IoT technologies enhance real-time monitoring and seamless digital-physical integration, enabling

better resource management and optimized service provision (Gao and Li, 2020). Blockchain provides decentralized, secure, and transparent transaction environments, significantly enhancing trust and accountability among users, especially in peer-to-peer exchanges where uncertainty and risks are inherently high (Pazaitis et al., 2017; Hawlitschek et al., 2018).

Collectively, ETs drive substantial changes within the SE, transforming how platforms operate, how value is created and exchanged, and how organizational and institutional processes adapt to rapidly changing technological contexts. Thus, a focused understanding of ETs' transformative potential within the SE is critically important for comprehending broader societal, economic, and organizational dynamics.

2.3. Sharing economy as a socio-technical system and the role of ETs

The SE can be conceptualized as a socio-technical system, where social and economic practices are integrally interconnected with and significantly shaped by technological innovations (Geels, 2004; Bijker, 1987). Socio-technical systems (STS) theory posits that economic activities, societal behaviors, and institutional frameworks evolve in close relationship with technological capabilities, suggesting that technology is never purely neutral or passive but actively participates in shaping and structuring social interactions and economic transactions (Geels, 2004). SE platforms exemplify these socio-technical dynamics vividly (Akbari et al., 2022; Dabbous and Tarhini, 2019). For example, Uber and Airbnb not only leverage digital platforms to facilitate transactions but actively reshape societal expectations regarding consumption, ownership, trust-building practices and labor relations. Uber has transformed urban mobility, impacting transportation norms and reshaping regulatory environments, while Airbnb has disrupted traditional hospitality industries, altering norms around accommodation, regulation, and property utilization.

ETs are instrumental in addressing fundamental SE challenges such as trust management, resource optimization, real-time matching, and personalized service delivery (Pazaitis et al., 2017). AI technologies, for example, shape user expectations through predictive analytics, facilitating customized interactions and transforming traditional customer-service relationships (Chen et al., 2022). Blockchain technologies reconfigure institutional trust frameworks and governance structures by providing secure and transparent transactions without central intermediaries, transforming regulatory practices and accountability frameworks (Pazaitis et al., 2017). IoT significantly enhance resource tracking and operational transparency, change user behaviors and raise new institutional challenges around data privacy and security (Gao and Li, 2020). Therefore, ETs not only strengthen the core functionality of SE platforms but actively catalyze socio-technical transformations across economic, organizational, and societal domains.

By adopting an STS lens, our review thus aims to systematically analyze and synthesize existing empirical research on how ETs actively shape socio-economic, institutional and organizational outcomes within SE contexts. In practical terms, this entails not only examining how ETs enhance the operational efficiency of SE platforms, but also considering their broader implications for users, labor dynamics, societal norms, economic structures, and institutional actors such as policymakers and regulators.

3. Methodology

This study employed a two-pronged approach to integrate insights from the existing literature. First, we used AI-based machine learning techniques—specifically topic modeling LDA—to reveal the underlying semantic structures within the large body of literature. This method facilitated the identification of dominant and emerging topics across the field. It helps to identify main themes that are prevalent in the literature. Machine learning based topic modeling is a superior technique for reviewing the growing body of literature in the field (Mustak et al., 2021). While bibliometric techniques provide an objective way to analyze literature using keyworks, document citations, or references, effectively answering who, what, and where questions, they do not provide content-specific analysis. Traditional thematic and qualitative analyses of literature, on the other hand, focus on the content of the literature, but suffer from author bias and lack of reproducibility (Ahmad et al., 2023).

LDA provides the best of both worlds. Using machine learning, LDA objectively analyzes the content of research papers to uncover underlying latent themes while minimizing author bias and subjectivity. Recent literature has seen a growing application of topic modeling, specifically LDA in literature review studies (e.g., Ligorio et al., 2022; Mustak et al., 2021). This approach reduces researcher bias by leveraging statistical patterns to reveal themes objectively, providing scalability and consistency that are difficult to achieve through manual content analysis. By streamlining topic discovery and enabling integration of new findings as they emerge, LDA makes it easier to conduct comprehensive, up-to-date literature reviews in rapidly evolving fields (Mustak et al., 2021).

Second, we pursue content analysis of the selected studies in nine themes organized into four broad categories. Content analysis enabled us to develop an integrated framework and provided insights into future research avenues. Topic modeling and content analysis together offer a robust method to review the existing literature on the topic. Given our socio-technical theoretical framing, the combination of AI-based LDA modeling and thematic content analysis is particularly suitable for this study. These methods allow us to objectively identify and systematically analyze complex socio-technical interactions embedded within the existing literature. Thus, our methodological choices directly support our theoretical goal of analysing mutual influences between technological innovations, societal behaviors, and institutional contexts in the SE.

3.1. Data collection

We selected the Web of Science (WoS) database as our principal source for finding relevant articles. The WoS is highly recognised for its stringent journal selection procedures, which guarantees high-quality, peer-reviewed content (Martín-Martín et al., 2021). It serves as a dependable resource for systematic literature reviews, particularly for research centred on high-impact and influential studies and there is a large number of review studies which rely only on the WoS as the data source (Falagas et al., 2008; Visser et al., 2021). Although databases like Scopus and Google Scholar were evaluated, we selected WoS for its standardised metadata, long indexing period going back to 1900 and consistent indexing of high-quality academic sources, which are crucial for producing robust and replicable findings (Singh et al., 2021). Scopus, while extensive, suffers from missing or incorrect indexing, duplicate records and metadata inconsistencies (Franceschini et al., 2016). Google Scholar, despite its breadth, exhibits unclear indexing procedures, frequently incorporates non-academic materials, and may yield inconsistent outcomes owing to discrepancies in data quality (Beel and Gipp, 2009). These constraints render WoS more appropriate for our investigation since it offers high-impact and reliable data crucial for systematic reviews in dynamic research domains.

We started the process by identification of keywords. For this to systematically find relevant articles, we created a list of keywords based on preliminary searches for "emerging technologies" and the "sharing economy (SE)" on WoS and Google Scholar databases. We selected and analyzed the 20 most commonly referenced current articles on each phenomenon to generate a sample set of keywords. The final compilation, comprising 30 keywords (10 related to SE and 20 to new technologies), is displayed in Table 1.

In the next step, for the WoS search, to systematically identify relevant articles, we developed a comprehensive search string using Boolean operators and the wildcard "*" operator to account for variations in

Table 1
Keywords used for searching articles.

Keywords for sharing economy	Keywords for emerging technologies
Shared economy, peer-to-peer economy, gig economy, collaborative economy, collaborative consumption, platform economy, peer to peer market, on-demand economy, peer to peer platform	Digitalization technology, internet of things, artificial intelligence, cloud computing, big data, blockchain, virtual reality, augmented reality, machine learning, deep learning, 5G, non-fungible token, NFT, web intelligence, machine intelligence, robots, natural language processing, emerging technology, fog computing, autonomous system

terminology. Keywords for both the SE and ETs were combined strategically. Terms related to the SE were grouped using the OR operator and combined with the wildcard "econom*" ensuring that various phrases (e.g., "shared economy," "gig economy," "peer-to-peer economy") were captured without repeating "economy" each time. The "*" operator was applied to allow for variations in terminology and suffixes, such as "technolog*" to include both "technology" and "technologies." This approach improves the inclusivity of the search and ensures that all relevant variations of key terms are covered. Table 2 shows our search string.

The study was not limited to a specific discipline because the SE is a multidisciplinary topic that is studied in many disciplines. An overview of the inclusion and exclusion criteria is provided in Table 3.

An overview of the data collection and analytical process is provided in Fig. 1. The initial search yielded 524 potentially relevant journal articles. Two authors of the review team separately reviewed first 20 studies of this pool to assess their relevance to the study's purpose and establish inclusion and exclusion criteria. These criteria were developed through discussions among the authors to ensure a common understanding of the relevant literature, focusing on articles that addressed both the SE and one or more ETs. After applying these criteria, the final pool consisted of 156 articles.

The selected sample size of 156 articles is well-suited for our analytical approach, specifically the use of Latent Dirichlet Allocation (LDA) for topic modeling. LDA requires a balanced dataset that is large enough to capture a diverse range of topics yet focused enough to maintain interpretability and relevance (Blei et al., 2003). Although the sample is not extensive enough for broad bibliometric analysis, it provides the depth necessary for systematic topic modeling and in-depth exploration of key themes within SE and ETs. The sample size was therefore deliberately selected to facilitate meaningful LDA analysis, allowing for the identification of nuanced topic structures without compromising analytical rigor.

3.2. Topic modeling technique

We used topic modeling, a technique based on natural language processing and machine learning, to conduct this study. Understanding

Table 2
Search String for Web of Science.

Keyword Group	Keywords and Operators
Sharing Economy Keywords	("shared" OR "peer-to-peer" OR "gig" OR "collaborative" OR "platform" OR "on-demand") AND ("econom*")
Operator	AND
Emerging Technologies Keywords	("digitalization technolog*" OR "internet of things" OR "artificial intelligence" OR "cloud computing" OR "big data" OR "blockchain" OR "virtual reality" OR "augmented reality" OR "machine learning" OR "deep learning" OR "5G" OR "non-fungible token" OR NFT OR "web intelligence" OR "machine intelligence" OR robots OR "natural language processing" OR "emerging technolog*" OR "fog computing" OR "autonomous system*")

Table 3
Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
- Articles with a main focus on the SE and emerging technologies - English language articles - Peer-reviewed journal articles - Articles that focus on one or more emerging technologies and the SE	- Articles that mention SE and/or one or more types of emerging technologies without a focus on them - Articles focusing on either SE or one or more types of ET - Editorials, conference articles, reports, book chapters and notes

enormous volumes of unstructured text is a continuous challenge, and this is where topic modeling comes in to make sense of these large textual data collections. Topic models provide a formalization for revealing a textual collection's topics (themes) and have been used to facilitate information retrieval, comprehend scientific concepts, and identify diverse perspectives (Paul and Girju, 2010; Yau et al., 2014; Wei and Croft, 2006). Recent years have witnessed an increasing application of topic models outside the core discipline of computer science, as a methodology in academic research, like in the larger domain of business and management sciences to streamline the process of unsupervised theme detection from data. (Aleem et al., 2023). The statistical algorithms of AI based topic modeling eliminate human biases that are often present in traditional literature reviews, allowing us to conduct and present a much more robust and objective analysis (Suominen and Toivanen, 2016; Vanhala et al., 2020).

3.3. Data analysis with LDA and content analysis

To analyze the data, we applied Latent Dirichlet Allocation (LDA), which is a statistical model that uses unsupervised ML and natural language processing (NLP) to discover latent topics in a collection of documents (Blei et al., 2003; Nikolenko et al., 2017; Suominen and Toivanen, 2016). This approach scans the assigned documents to find the word and phrase patterns within them. Subsequently, it automatically clusters word groups and related phrases that best represent the documents (Jacobi et al., 2015). With this information, it is possible to deduce the focus of those texts where the generated topics serve as themes in this research.

In the LDA statistical model, D represents all the documents (in this case the articles), These documents contain T number of topics which are articulated through W words among all the documents. Nikolenko et al. (2017) outlines the core principles of LDA modeling as follows: Each article $d \in D$ of length is modeled as a discrete distribution (d) over the set of topics $(zj = t) = (d)$. z is a discrete variable that assigns the topic for each occurrence of a word as $j \in d$ (Aleem et al., 2023). In turn, each topic is connected to a multinomial distribution over all the words. The Dirichlet priors α is assigned to the distribution of topic vectors Θ, $\Theta \sim \text{Dir}(\alpha)$, in congruence to β for the distributions of words in topics, $\varphi \sim \text{Dir}(\beta)$ (Aleem et al., 2023; Nikolenko et al., 2017).

We used Python 3.11.4 to implement the LDA topic modeling technique. There are a few pre-processing steps necessary when using the LDA model library within Python. In Step 1, we imported our dataset from MS Excel into Python, concatenated all columns, and removed the null values. At Step 2, we processed our data frame to remove unrelated information contained within it, such as underscores, non-ASCII (American Standard Code for Information Interchange) characters, and most common "stopwords" such as "the," "is," and "from." By doing so, we can improve the model's implementation in terms of computer processing speed. Furthermore, these processes ensure that the generated topics contain minimal noise, i.e., information that does not represent a theme. In step 3, we sequentially applied the tokenization and lemmatization algorithms to create a dictionary of the entire corpus. At step 4, we identified the optimal number of latent topics that captured the essence of our dataset in the best possible way through numerous repetitions of "topic coherence". Thus, we discovered nine topics were

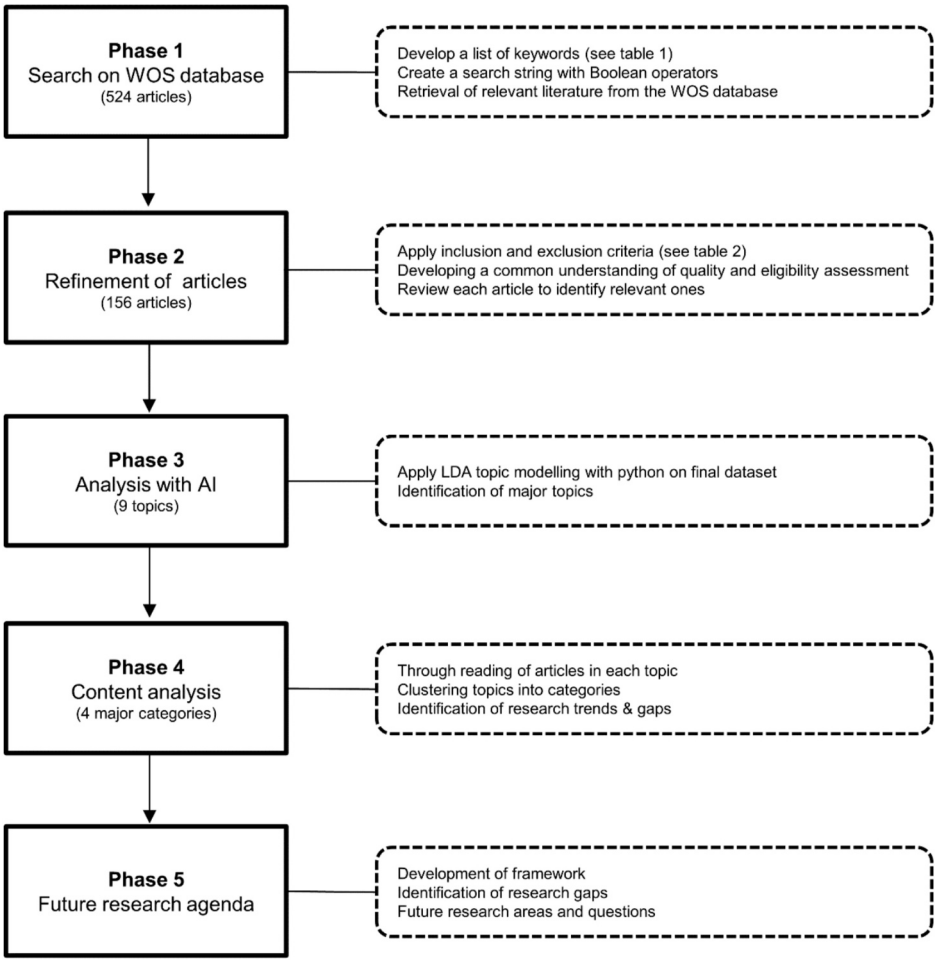

Fig. 1. Article search, collection and analysis process.

most suited to the task at hand (see Fig. 2).

In step 5, we applied the LDA Model contained within the Genism library to the nine topics. Fig. 3 depicts an illustration of the modeling algorithms. The individual themes were covered in the Findings section.

We created an inter-topic distance map using Python latent Dirichlet allocation visualization (pyLDAvis) (Fig. 4). While explaining topic modeling through LDA, Sievert and Shirley (2014) argue that the "relevance" (value of λ) of keywords to a topic can be interpreted as high either through "frequency" or as "lift". A word can be considered highly associated with a topic if its frequency in that topic is high, i.e., $\lambda = 1$, or a word can also be considered highly associated with a topic if its "lift" is high ($\lambda < 1$). While frequency refers to the number of occurrences of a word in the whole corpus, lift refers to the ratio of a term's probability within a topic to its marginal probability across the corpus (Taddy,

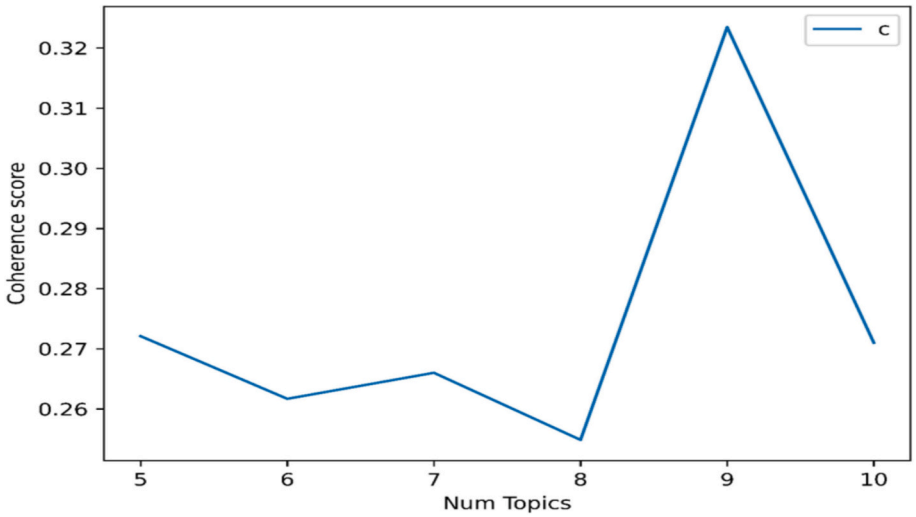

Fig. 2. Identification of the optimal number of topics through coherence scores.

```
In [21]: # Find the best number of topics using coherence score
import operator
index, value = max(enumerate(coherence_values), key=operator.itemgetter(1))
best_topic_number = topics_list[index]
print("Best Number of Topics: ",best_topic_number, "  ====>  Coherence Score: ",value)

Best Number of Topics:  9   ====>  Coherence Score:  0.3234802998440492

In [22]: # train lda model on Best Number of Topics value
best_model = models.LdaModel(corpus, num_topics=best_topic_number, id2word=dictionary_LDA, passes=40, iterations = 100, alpha=0.05, eta=0.01)

In [23]: # calculate coherence score
coherencemodel = CoherenceModel(model=best_model, texts=text_data, dictionary=dictionary_LDA, coherence='c_v')
coherence_score = coherencemodel.get_coherence()

print("Num Topics =", best_topic_number, " has Coherence Value of", round(coherence_score, 4))
```

Fig. 3. Illustrative topic modeling algorithms.

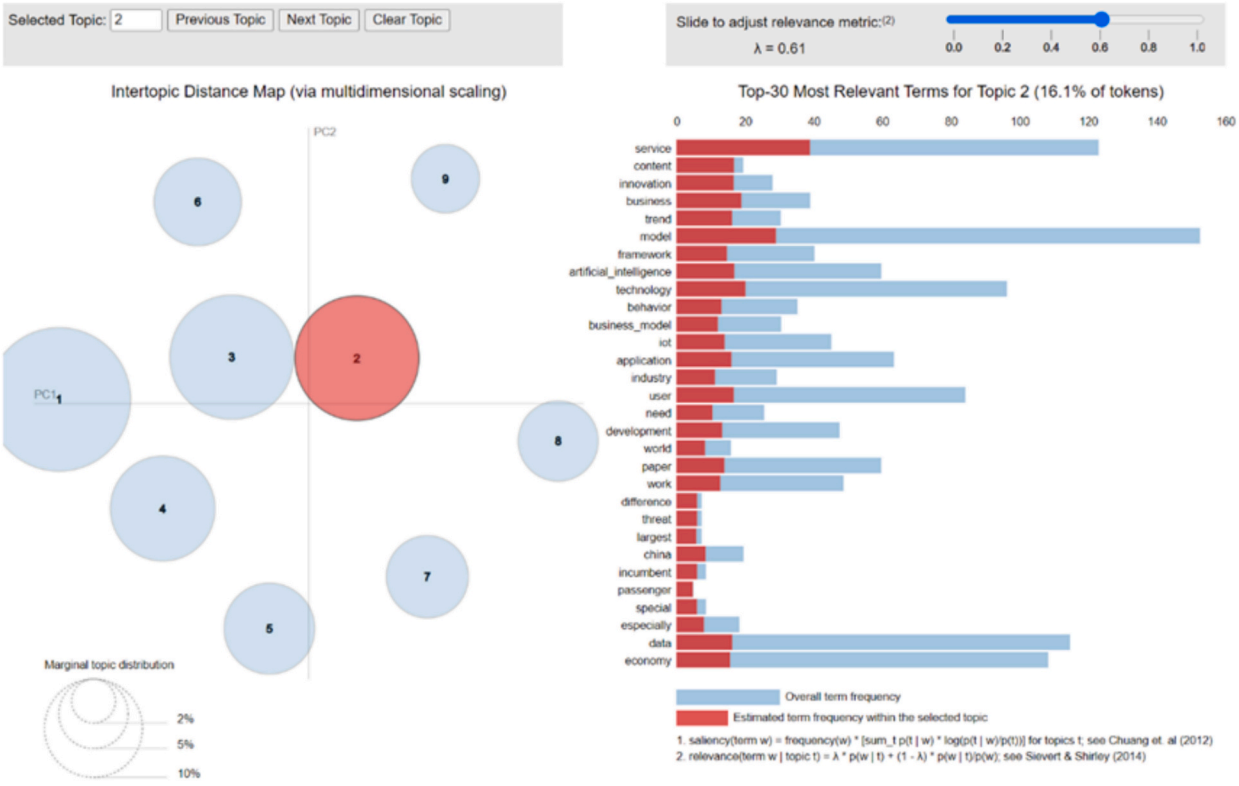

Fig. 4. Inter-topic distance map.

2012). Using "lift" instead of frequency decreases the rankings of globally frequent terms, which can be helpful for better topic formulation. In the case of "lift" as a measure of relevance, $\lambda = 0.6$ is considered the most suitable value (Sievert and Shirley, 2014). We used "lift" as a measure of relevance, with $\lambda = 0.6$. Applying this measure, we removed global terms such as 'study', 'research', 'originality' and 'online' from each topic, leaving behind the most re-occurring terms relevant to each topic.

Fig. 4 illustrates the 30 most important terms present in each topic. The size of the circles indicates the importance of each topic within the overall literature base, while the distances between the circles represent the connectedness among the topics. The size of the circles reduces in a sequential manner showing that the theme covered in Topic 1 has received the most attention in literature as compared to the theme covered in Topic 9 that has received the least attention. Based on the parameter of $\lambda = 0.6$, our topic modeling analysis reveals nine key themes in the relevant literature (Table 4). To structure our analysis, we grouped these themes into four categories which are discussed in section 4.2. Since service is a key element of SE phenomenon, naturally it is expected to be a dominant topic in the literature. Business, trend, and model are also key topic as SE is closely related with the research topic.

In addition to LDA topic Modeling, content analysis was chosen explicitly to provide qualitative depth and nuanced understanding of socio-technical interactions within the themes. It allowed systematic categorization of qualitative data, clarifying how ETs dynamically influence and are influenced by societal practices and institutional structures. After identifying the core and latent topics in the dataset, we performed a content analysis (Khanra et al., 2021). First, we organized the data in MS Excel according to "main idea," "methods," "major themes and related key findings," and "future research" fields in relation to the topics identified by LDA topic modeling. Each article was analyzed to identify its correspondence with the topics. All 156 articles were annotated according to the pre-identified topics. We selected one topic at a time and retrieved its associated articles for further analysis. For each topic, corresponding articles were analyzed according to their core findings and arguments, along with their theoretical positioning and conceptual development.

Table 4
Key topics of investigation on emerging technologies in SE.

Topic Number	Basis of the Model	Theme
Category 1: Artificial intelligence in SE		
1	Accommodation, Model, Demand, Machine Learning, Network, Based, Peer to Peer, Short Term, Customer, Rental	How AI-powered algorithms are used
2	Service, Content, Innovation, Business, Trend, Framework, Model, Artificial Intelligence, Technology, Business Model.	Exploring the transformative impact of AI in the perks and perils of AI use
3	Platform, Sharing, Economic, Economy, Algorithm, Artificial Intelligence, Big Data, Prosumers, Development.	AI-driven institutional changes: reshaping the landscape of sharing economy and regulation
Category 2: Blockchain technologies in SE		
4	System, Sharing, Service, Blockchain based, Blockchain technology, Trust, Platform, Smart contract, Shared mobility.	Blockchain technology for trust, smart contract, and shared services in a decentralized system
5	Blockchain, Capacity, Planning, Uber, Stakeholder, Government, Urban governance, Regulation	Utilizing blockchain for governance and regulation while considering key stakeholders
Category 3: Technologies impacting business models and sustainable development		
6	Trust, Business Model, AI, Digitalization, Economy, Institutional, Governance, Platform, Optimization, Transformation.	Business model in SE platforms for optimization and transformation
7	Management, Value Creation, Technology, Sustainability, Digital Platform, Decentralized, User, Consumer	Technologies for sustainable, decentralized services for consumers
Category 4: Technology-modified relationships between actors in the SE		
8	Platform, Worker, Organizational, Gig economy, Behavior, Digital Technology, Consequences, Sharing, Data	Workers and SE platform: tension and consequence
9	Delivery, Vehicle, Internet thing, IoT, Monitoring, Mobile, Accuracy, Application, Decentralized, Data, Service,	Decentralized IoT monitoring and delivery services

4. Findings

4.1. Publication trends

Fig. 5 shows the publication trends overtime. It shows that publication appeared from 2015 and there is an increasing upwards trend of publication until 2021. Noticeably, year 2022 witnessed a significant surge of publications, as the number of publications in 2022 is more than double of any preceding year.

A budding academic interest is also evident in the range of journals published on the SE and ETs. Journal of Business Research and IEEE Access are two journals, each of which has published seven articles (see Fig. 6). The presence of articles on SE and ETs in journals spanning business management, information systems and technology highlights the importance of the topic and its appeal to multiple research communities.

4.2. Key themes on emerging technologies in sharing economy

Our LDA analysis identified nine themes that capture the diverse ways in which ETs influence the structure, practices, and governance of the sharing economy. These themes reflect the socio-technical dynamics through which ETs shape user behavior, platform operations, organizational practices, employee relations, institutional arrangements, and regulatory frameworks. To facilitate interpretation, we grouped these themes into four overarching categories based on their functional relevance and conceptual proximity (Table 4).

4.3. Category 1: Artificial intelligence in SE

In recent years, researchers have shown growing interest in AI and large language models (LLMs), particularly regarding their socio-technical implications for SE platforms (Cameron, 2022; Jiang et al., 2019; Wang et al., 2019). For example, about 35 % of the articles we looked at talk about the role of AI in SE. This is not surprising because SE's main idea is that sharing is more important than owning things for people who use platforms, and these platforms need to keep coming up with new ideas to stay successful. Therefore, AI is important for SE because it helps managing the growing power and demands of consumers who want more control, access, and choices in services and transactions (Tarkhanova et al., 2018; Han and Broniarczyk, 2022). In this context, AI is perceived as something that sparks new ideas and innovations. However, digging deeper reveals three main study areas: (a) how AI-powered algorithms are used, (b) the good and bad sides of using AI, and (c) the changes that AI brings to organizations and systems.

4.3.1. How AI-powered algorithms are used

Research related to the theme of 'AI-driven algorithmic applications'

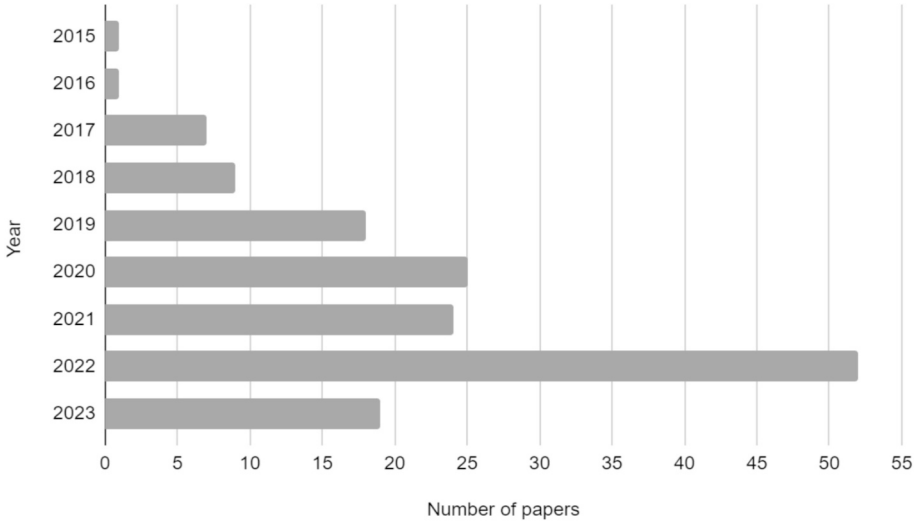

Fig. 5. Number of publications on SE and ETs over time (*The publication number of year 2023 is not for the full year as data was collected on May 31, 2023).*

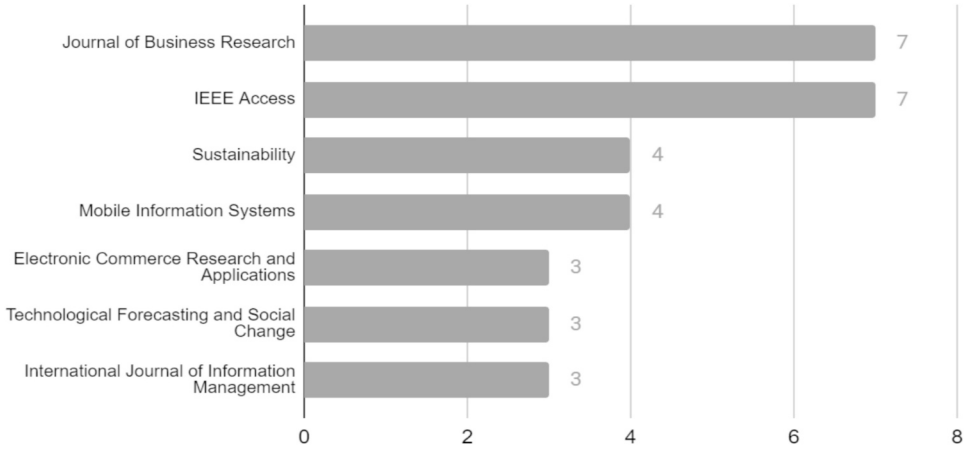

Fig. 6. Top journals in terms of publications on emerging technologies in sharing economy.

is concerned with how algorithms perform computational and intelligent tasks (Lee, 2018; Noponen, 2019). From a socio-technical viewpoint, algorithms not only perform technical functions but also actively influence social behaviors and institutional practices through automated decision-making, shaping user interactions and organizational structures. In this context, AI is seen as an algorithm with the potential to act as a distinct, independent, and technological entity (Huang and Rust, 2021). Therefore, the main focus of developing ML algorithms is to mimic human thinking (Jarrahi et al., 2021) and automate structured tasks (Luo et al., 2019), such as providing recommendations and guidance for processes (Cheng et al., 2022). AI, in the form of conversational chatbots (Carter, 2018), can interact with users in a human-like manner (e.g., Li et al., 2017) or analyze users' feedback, preferences, experiences, and attitudes (Chen et al., 2022). Similarly, researchers have worked on methods to gather user feedback (Wang et al., 2019) and have proposed well-founded models to estimate the performance of platforms' listings (Kirkos, 2021). Some of these studies focus on the platform itself and AI's ability to predict its usage (Xu et al., 2023), while others examine how AI impacts service quality, enhances team collaboration, and builds trust (Zuo et al., 2022; Cheng et al., 2022; Abdar and Yen, 2017a, 2017b).

Overall, this research cluster primarily employs a linear input-output research design (Cao et al., 2022; Jiang et al., 2019; Sanayha and Vateekul, 2022). The underlying premise of this research is that deep learning methods, neural networks, and processes harness computational power that yields high levels of performance and reliability. The focus here is on prediction and estimation, rather than delving into qualitative properties and the complex intricacies of the rights of platform users, providers, and designers (Gerards, 2019; Muller, 2020). There is a certain optimism about the performance implications of AI algorithms. Nevertheless, the performance implications of AI will be challenged if customer cynicism about AI incurs costs, such as loss of loyalty and distrust, that ultimately outweigh the potential efficiency gains (Chen et al., 2022). There is also a notable absence of attention to ethical considerations, such as how to mitigate algorithmic bias or ensure accountability in AI systems, especially in the context of the SE where the stakes for fairness and equity are high. This algorithm dominant research narrative also relegates the possibility of implementation failure to the background, overlooking organizational inertia and the social dynamics of AI usage within an analytical organizational structure, as opposed to an analog one (Jarrahi et al., 2021; Bonadio et al., 2022).

4.3.2. Exploring the transformative impact of ai in the perks and perils of ai use

This theme focuses on the transformative socio-technical potential of AI, emphasizing its capacity to reshape interactions among businesses, users, and societal structures within the SE (Reshetilo, 2017, 2018). AI is credited with enabling organizations to create large networks and reap the benefits of network effects (Satornino et al., 2023; Chen et al., 2022; Reshetilo, 2018). It offers the possibility to match users more effectively at a large scale and diffuse knowledge in online marketplaces (Yu, 2022), thereby enhancing user experiences and expanding platform networks. AI enhances the creation and delivery of value by streamlining interactions between buyers and sellers (Andreassen et al., 2018; Wang, 2021), allowing businesses to better capture value and adapt their offerings to customer needs. By reducing reliance on traditional intermediaries, AI reshapes the way transactions are facilitated, creating more direct interactions within platforms (Hossain, 2021; Cutolo and Kenney, 2021). AI driven transformation impact is often evaluated through the lens of traditional frameworks. For example, some studies have used the "business model canvas" tool developed by Osterwalder and Pigneur (2010) to understand how much it costs and what choices businesses make when they use AI (Andreassen et al., 2018).

Whether the benefits of AI are evenly distributed across all stakeholders, or certain groups, such as smaller market entrants, are disadvantaged by AI's increasing complexity and cost is unaddressed in current research. Although AI reduces the need for intermediaries, this shift may exacerbate power asymmetries within platforms, allowing operators to exercise greater control through opaque algorithms (see Farmaki and Kaniadakis, 2020). Furthermore, there is lack of tools and frameworks for critical evaluation of AI transformative effect. Traditional frameworks tend to focus on static elements such as costs and revenue streams but may not fully address the dynamic and evolving nature of AI-driven platforms, where stakeholder power dynamics, control, and network relationships are structured in unique ways and continue to evolve with advances in AI capabilities (Ren et al., 2023).

4.3.3. AI-driven institutional changes: Reshaping the landscape of sharing economy and regulation

This theme explicitly illustrates socio-technical dynamics by highlighting how AI reshapes relationships between technological systems, economic activities, social structures, and regulatory institutions within the SE context (Budanov et al., 2018; Tarkhanova et al., 2018; Zhou, 2022). AI can help reducing economic disparities among different groups of platform users, improving shared and environmentally friendly services, and finding solutions for complex governance issues (Liyanage et al., 2019; Lutz, 2019; Noesselt, 2020; Zhang et al., 2021). Research stresses the need to adjust regulatory frameworks to address AI's evolving impact on labor structures (Graetz et al., 2022; Santoni de Sio et al., 2021; Sanyal and Ferreri, 2018). Challenges posed by AI in SE are not just only in terms of how businesses are structured but also in how they are regulated (Sanyal and Ferreri, 2018). In this regard some studies seek to develop models and propose ways to understand the

impact of AI-driven changes in institutions, rather than just looking at cause-and-effect relationships (Cameron, 2022). Nevertheless, lack of research on real-world applications of these proposed regulatory frameworks or challenges of cross-jurisdictional governance is still a major issue. While the conceptual aspects of how institutions should handle AI and establish security and privacy rules is a crucial step toward the regularization of AI (Noesselt, 2020), previous research mostly overlook the application of AI within labor processes and how it can disrupt or control work dynamics and social relationships within these platforms (Woodcock, 2022).

4.4. Category 2: Blockchain in sharing economy

4.4.1. Blockchain technology for trust, smart contract, and shared services in a decentralized system

Blockchain is defined as "*a technology that enables the immutability and integrity of data in which a record of transactions made in a system is maintained across several distributed nodes that are linked in a peer-to-peer network*" (Viriyasitavat and Hoonsopon, 2019; 33). From a socio-technical perspective, blockchain transforms not only technological infrastructure but also social interactions, institutional trust mechanisms, and regulatory governance practices. It deploys decentralized, open-source systems based on shared, verified, and monitored data through consensus mechanisms across multiple distributed nodes (Kolade et al., 2022; Pazaitis et al., 2017). Applying crypto-economic models, blockchain enables automation, decentralized governance, membership management, and decentralized data infrastructures (Zutshi et al., 2021).

In SE services, transactions often occur momentarily between unknown parties, where trust is a critical concern. Blockchain facilitates trust-free systems to revolutionize interactions between peers that would typically require a high level of trust backed by third-party service providers (Hawlitschek et al., 2018), as such blockchain is well-suited for serving as a trust mechanism in the SE (Hawlitschek et al., 2020). Blockchain-based shared manufacturing systems allow peer-to-peer resource sharing, thereby fostering trust (Yu et al., 2020). For example, distributed ledger technology has the potential to improve the mobilization and deployment of urgent needs in emergency response, enhancing trust between emergency responders and commercial organizations regarding emergency supplies, transport capacity, and storage space (L'Hermitte and Nair, 2021).

In SE accommodation, users prefer blockchain systems due to their desirable characteristics, which often lack in existing services, such as low transaction fees, prompt transaction settlement, integrity, smart protocol, and algorithm autonomy (Muharam et al., 2023). SE goes beyond its technological protocol roles and functions; it has the capacity to interact with and influence people in a way that goes beyond its basic technological features. Digital content in SE may face threats, hacking, and privacy concerns, all which blockchain can mitigate through transparent, tamper-proof, and secure systems (Khan et al., 2020). Service level agreements for smart contracts document the services and define the service standards, facilitating multi-user collaboration and automating the process without the need for a third party (Hang and Kim, 2019). Thus, blockchain possesses reliable protective capabilities in the information management system of SE (Xiao, 2021).

4.4.2. Utilizing blockchain for governance and regulation while considering key stakeholders

Blockchain enables real-time monitoring and forecasting (Yang et al., 2022) and can enhance government services and smart city planning (Verma and Sheel, 2022; Coyne and Onabolu, 2017; Fiorentino and Bartolucci, 2021). Blockchain systems, recommended for secure data storage, find applications in various sectors like ridesharing, warehouse management and insurance (Fiorentino and Bartolucci, 2021; Alkhammash et al., 2022; Chang et al., 2022; Herko, 2019; Kumar et al., 2023). They disintermediate transactions and cut costs in collaborative housing while aiding sustainable finance (Nasarre-Aznar, 2018; Ren et al., 2023; Sun et al., 2016). However, concerns such as competition, taxation, and platform regulation are prevalent in SE (Liu, 2022; Lin et al., 2022; Posada, 2022; Dorwart, 2022; Gao and Li, 2020; Muller, 2020). Blockchain has the potential to transform value chain governance (Kolade et al., 2022), and blockchain-based management systems are proposed as new tools to enhance traceability and transparency, storing large data accessible to wide group of stakeholders (Fiorentino and Bartolucci, 2021).

4.5. Category 3: Technologies impacting business models and sustainable development

4.5.1. Business model in SE platforms for optimization and transformation

Economic growth and technological advancements have reshaped industries and given rise to new business models in the SE (Viriyasitavat and Hoonsopon, 2019; Yin, 2022). From a socio-technical standpoint, these new business models represent dynamic interactions between technological innovation, shifting societal expectations, regulatory challenges, and institutional transformations. These new business models challenge traditional approaches, requiring companies to proactively develop innovative ones (Niemimaa et al., 2019). SE firms have identified diverse business models to adapt to economic and technological shifts (Pisano, 2015), enabling cost-effective and efficient transactions (Yin, 2022). Cloud-based platforms play a crucial role in scalable business models, utilizing data from user behavior to enhance their offerings (Narayan, 2022). Success in lateral exchange markets depends on the value delivered to users (Satornino et al., 2023). Society experiences benefits from SE, which promotes resource utilization and green logistics (Liyanage et al., 2019; Lim et al., 2020). However, drawbacks and challenges persist, for example in bike-sharing in large Chinese cities, where sustainable business models remain elusive (Gao and Li, 2020; Westland et al., 2019). To achieve sustainability, authorities should regulate markets and operator conduct (Gao and Li, 2020). Thus, technological advancements in SE platforms are deeply embedded within broader socio-technical transformations, reflecting mutual influences among technology, society, and institutions.

Technology has driven innovation in the logistics industry, with smart logistics offering automation, efficiency, and cost savings in SE. Business model design requires understanding an organization's structure, innovation drivers, and customer preferences (Pisano, 2015). AI enhances platform efficiency and personalization (Satornino et al., 2023) and evaluates competitiveness in B2B e-commerce (Zhou and Wang, 2022). Algorithms utilizing big data from the IoT can effectively classify vast amounts of data and predict the developmental trajectory of SE and new business models (Yin, 2022). Moreover, blockchain technology has the potential to enhance existing business models and introduce new ones, supporting sustainability efforts and mitigating environmental impacts (Liyanage et al., 2019; Lim et al., 2020). Blockchain can also support ethical marketing activities and practices for businesses (Tan and Salo, 2023). However, SE firms face challenges in adopting socially and environmentally sustainable models, particularly in mobility context (Westland et al., 2019; Gao and Li, 2020). While some impactful research exists on business models, technologies, and sustainable entrepreneurship, this remains an emerging field of study. Significant potential exists for organizations to design innovative and sustainable business models within the SE, offering benefits to both established and new companies (Pisano, 2015).

4.5.2. Technologies for sustainable, decentralized services for consumer

Previous research has depicted SE in two main ways: as grassroots, peer-to-peer system driven by trust and user interactions (Budanov et al., 2018), or as a digital platform ecosystem where companies act as intermediaries supporting sharing behaviors (Wang et al., 2020). Advancements in technology can disrupt how value chains are managed (Kolade et al., 2022). For example, a blockchain-based network can

address urban transportation challenges for economic growth and social cohesion and minimizing environmental impacts, particularly in low-income regions with chaotic transport systems (Herko, 2019). SE services need seamless integration with other public and private services to provide sustainable travel options. Sharing data on movement and assets enables users to access various transport modes and payment systems, reducing congestion and environmental impacts (Herko, 2019). Efficient data collection and analysis in areas like urban traffic, logistics, energy, and the environment can promote resource conservation, support decision-making, and contribute to a green economy and sustainable development (Zhou, 2022). Gao and Li (2020) focus on the dockless bike-sharing industry and IoT, emphasizing that businesses should integrate social-environmental benefits and economic profitability into their value propositions. This suggests that companies need to innovate their business models to support sustainable development, incorporating both social and environmental advantages. (Gao and Li, 2020). Technology has the potential to steer businesses toward environmental and social sustainability while fostering economic growth. Although limited studies have focused on technology-driven sustainable value creation, they offer valuable insights into sustainable urban logistics development.

Technological development holds immense potential to make businesses more environmentally and socially sustainable while also creating new opportunities for business and economic growth. In the context of the circular economy, big data analytics, blockchain, and the IoT have been highlighted (Chauhan et al., 2022), but there is a lack of exploration in the realm of SE. For instance, blockchain technology has the potential to enhance circular procurement, circular design, and recycling efforts (Khan et al., 2021). This reflects an explicit socio-technical transformation, highlighting how technological advances interact dynamically with social values and institutional priorities to shape sustainability outcomes.

4.6. Category 4: Technology-modified relationships between actors in the SE

4.6.1. Workers and se platform: Tension and consequence

From a socio-technical perspective, SE significantly reconfigures traditional interactions and power dynamics among organizations, workers, and consumers through technological mediation (Niemimaa et al., 2019). The articles under this topic have illumined algorithmic management, and workers' position and rights. Many researchers emphasize the challenges arising when SE platform organizations exert power over their customers, service providers and workers (Jarrahi et al., 2021; Muller, 2020). Therefore, regulating SE companies is crucial (Dorwart, 2022; Gao and Li, 2020; Muller, 2020).

SE offers people opportunities to get income with their excess and idle resources, including their time (Seo et al., 2017; Loh et al., 2023). This can be especially important for people with low income at the base-of-the-pyramid (Pandey et al., 2022). However, there are persistent tensions among key stakeholders due to the precarious nature of SE models. Positive aspects of algorithmic management include customer focus, continuous feedback, short development cycles, collective ownership, individual accountability, and an acceptance of failure (Balog, 2020). Conversely, negative aspects involve the deterioration of relationships between managers and employees (Jarrahi et al., 2021). SE markets often adopt a two-sided approach, with organizations functioning as platforms offering shared resources, short-term jobs, and engaging prosumers (Niemimaa et al., 2019).

The problematic nature of managerial practices in platform organizations becomes evident in discussions on algorithmic management and their relationships with workers. Companies design their algorithms to maximize platform growth while maintaining a competitive edge, often shifting costs onto workers and local communities (Jarrahi et al., 2021). These algorithms can discriminate against workers lacking bargaining power (Muller, 2020). For instance, Uber frequently adjusts its algorithms to the detriment of both workers and customers (Jarrahi et al., 2021).

Nevertheless, it is still possible for workers in these "culture-less" organizations to find meaning in their work through technology. They may engage in workplace games, such as striving for positive service interactions and tracking them using the app's rating system (Cameron, 2022). Since workers are often considered entrepreneurs, they must rely on their personal networks and cannot engage in collective bargaining due to antitrust regulations. They are, however, subject to algorithmic surveillance and control (Muller, 2020; Posada, 2022), and platform companies can utilize the vast amount of data they own to stifle dissenting voices (Maffie, 2023).

Platform companies may employ the "mythology of big data" to undermine the credibility of their workers' voices (Maffie, 2023). SE serves as an excellent case study for understanding human behaviors, including issues related to trust, preferences, emotions, and decision-making (Abdar and Yen, 2017a, 2017b). The institutional conditions and context are changing due to digitalization and short-term work offered on SE platforms leading to changes in the structure and dynamics of employment and labor market. Even the concept of platform work is hard to define, and the amount of platform workers difficult to measure (O'Farrell and Montagnier, 2020). This reflects fundamental socio-technical tensions, highlighting the complex interplay between technological innovation, worker autonomy, and institutional frameworks shaping labor relations.

4.6.2. Decentralized IoT monitoring and delivery services

Only a few articles delve into the role of IoT even though it serves as a fundamental component in many SE models, offering numerous application opportunities. Most of the articles give examples of using IoT in mobility services. For instance, IoT can be used to enable dockless bike-sharing (Gao and Li, 2020), create secure monitoring systems for car-sharing passengers to detect risky areas during vehicle operation (Zhou et al., 2019) and collect usage data when transitioning private parking spaces for public use (Chou et al., 2022).

Other use cases mentioned in the articles include sharing of research instruments remotely with the help of IoT (Park et al., 2021), eco-friendly delivery methods using shared vehicles (Lim et al., 2020), a negotiation framework between prosumers and distribution system operators in peer-to-peer energy sharing (Liu et al., 2023), and communication between the owner and user of a shared vehicle to track its location (Seo et al., 2017). Moreover, IoT can automate services relying on sensor data, such as machine-to-machine interactions in electricity markets (Viriyasitavat and Hoonsopon, 2019).

However, IoT in SE also presents challenges, as individuals lease their IoT devices to generate profits and seek feedback on their device usage, raising security and privacy concerns that need addressing (Liu et al., 2020). Blockchain can enhance trust in IoT solutions (Viriyasitavat and Hoonsopon, 2019). Blockchain facilitates secure information channels and easy access to shared information among different partners (Alkhammash et al., 2022) by eliminating the need for third-party trust guarantees and enabling fully automated shared services (Viriyasitavat and Hoonsopon, 2019).

IoT plays a pivotal role in various areas like visual information technology, intelligent robot operations, vehicle scheduling, and cargo traceability, contributing to improved utilization rates, reduced fuel consumption, and environmental protection (Wang, 2021)), helping to improve operational efficiency and effectiveness and resource management. More research is needed to understand the wider prospects of IoT in SE and how IoT can be used to enhance sustainability in other areas beyond mobility services. Such interactions exemplify socio-technical dynamics, demonstrating mutual influences between IoT-driven technological capabilities, user behavior adjustments, institutional regulatory adaptations, and broader societal implications.

5. An integrated socio-technical framework and future research agenda

5.1. Integrated socio-technical framework

Drawing on the socio-technical synthesis of our findings, we propose an integrated framework (Fig. 7), which provides a holistic view of how ETs shape societal practices, institutional structures, organizational dynamics, user behavior, and governance mechanisms within the SE. While we recognize that this framework may not capture all aspects of ETs in the SE, it offers a broad perspective on the review topic. Studies considered one or multiple ETs. This review presents a comprehensive list of ETs examined in the literature. Our findings identify four key ETs: AI, blockchain, IoT, and cloud computing. AI encompasses components such as big data, deep learning, and natural language processing. Blockchain includes technologies for distributed ledgers, smart contracts, tokenization, cryptography, and consensus protocols. IoT involves sensor technologies and machine-to-machine communication, while cloud computing offers distributed data systems, data storage, warehousing, and scalable infrastructure. Collectively, these ETs enable a range of applications, including core platform services, matching systems, user experience enhancements, and risk and trust management.

Core platform services facilitated by ETs include authentication and access, payment processing, and resource management (Hawlitschek et al., 2018; Viriyasitavat and Hoonsopon, 2019). Matching systems leverage ETs for dynamic pricing, supply-demand optimization, and resource allocation (Satornino et al., 2023). User experience benefits from personalized recommendations, service personalization, and enhanced review and rating systems (Andreassen et al., 2018; Chen et al., 2022). ETs also play a critical role in risk and trust management, enabling fraud detection, quality assurance, and dispute resolution (Hawlitschek et al., 2018). The applications of ETs lead to multiple outcomes. As reflected in Fig. 7, these are conceptualized as socio-technical outcomes because they reflect the influence of ETs across the layered social systems of the SE—ranging from individual user experiences to institutional structures and societal norms. In trust, reliability, and security, they foster safe information channels, secure data storage, and traceability (Pazaitis et al., 2017; Narayan, 2022). ETs improve efficiency by reducing transaction fees and service costs, enabling value sharing among partners, eliminating third-party involvement, and providing easy access to information (Viriyasitavat and Hoonsopon, 2019). They enhance service quality and user experience through better service guidance, customized recommendations, human-like interactions, and the replacement of traditional contracts with smart contracts (Chen et al., 2022). Furthermore, ETs drive innovation, disruption, and resource optimization through real-time services, better forecasting, efficient scheduling, smart protocols, and disruptive business models (Satornino et al., 2023; Gao and Li, 2020).

However, ETs also introduce challenges in the SE context. They enable firms to monitor their workforce, exert control, and shift

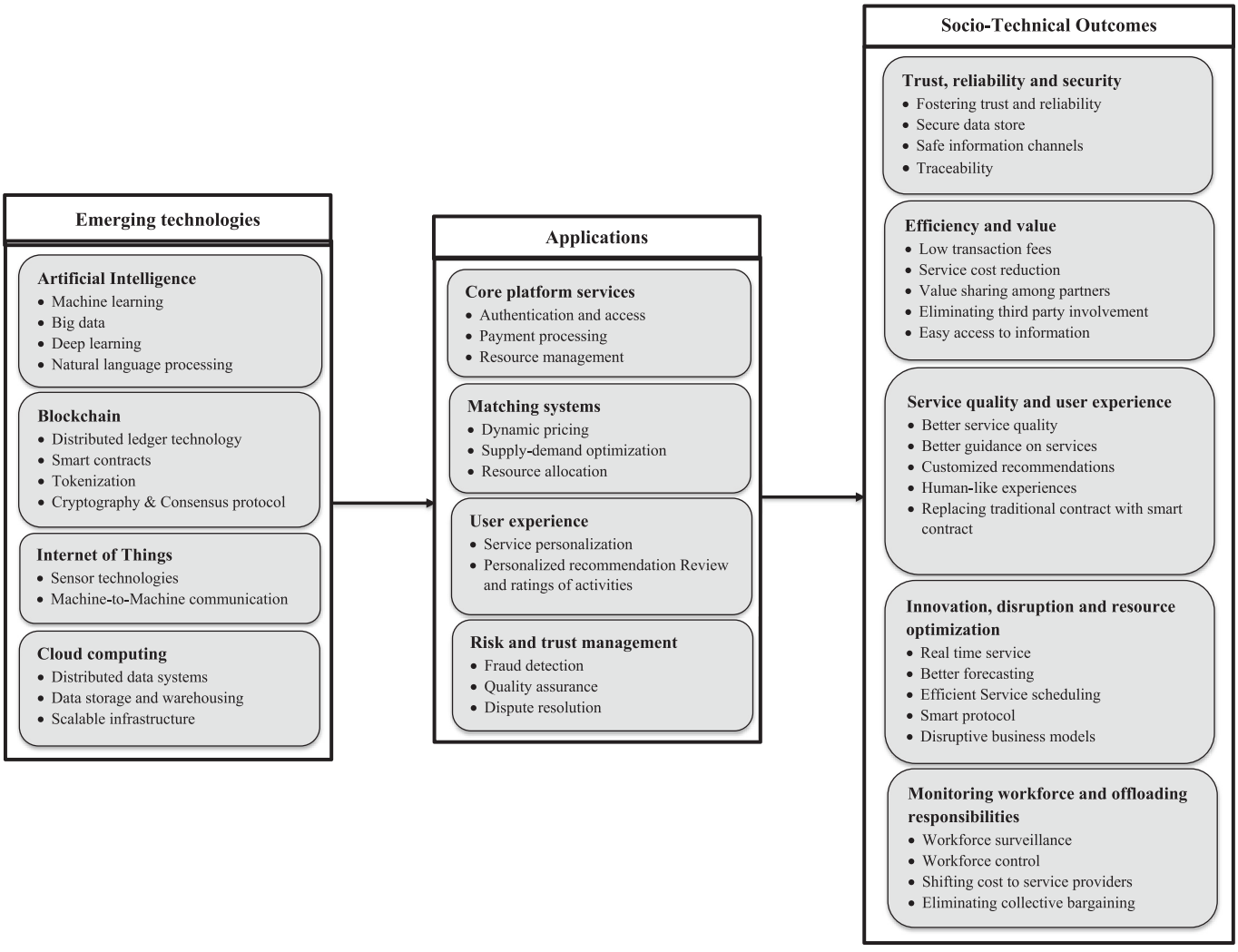

Fig. 7. An integrated Socio-Technical framework of the current research on emerging technologies in sharing economy.

responsibilities onto service providers and contractors. Alarmingly, this includes practices like workforce surveillance, offloading organizational responsibilities, and diminishing collective bargaining power, leaving workers with little voice to influence SE contracts.

5.2. Future research agenda

This future research agenda builds on the socio-technical framing that guides the overall study, aiming to advance a more integrative understanding of how emerging technologies (ETs) interact with the sharing economy (SE). While the agenda is structured around key thematic categories identified in the literature synthesis, the formulation of research directions within each theme remains informed by the socio-technical framing—highlighting not only technological applications but also their broader organizational, institutional, and societal implications. In this section, we identify underexplored areas within each theme and present potential research questions in tabular form. These questions aim to guide scholars in addressing theoretical and practical gaps and to support further inquiry into the complex, evolving interplay between ETs and SE ecosystems.

5.2.1. Future research agenda for AI and the SE

While current research has uncovered important insights into how AI intersects with and transforms SE platforms and actors, the role of AI in SE is still in its embryonic stage. There remain significant gaps that warrant further scholarly attention. Future research should adopt a more critical lens when examining AI in sharing contexts, beyond simply being an optimisation tool (Jarrahi et al., 2021). Table 5 offers some avenues for advancing this research theme in this category. There is a need to assess how AI algorithms can accommodate diverse SE cultures, increase adoption among sharing platform participants, and protect user privacy—aspects that have been overlooked in techno-centric SE studies (Chen et al., 2022; Perles-Ribes et al., 2021). Assessing whether AI matches human capabilities in creativity, critical thinking, and decision making is critical because sharing platforms operate in dynamic environments. This requires not only framing AI as an autonomous technology but also considering its embeddedness in broader socio-technical systems of the SE.

Furthermore, research on AI in SE should address competitive dynamics. For example, how can sharing platforms use AI for strategic advantage and value creation (Andreassen et al., 2018)? Furthermore, how might AI reshape power asymmetries between sharing stakeholders (Satornino et al., 2023)? While AI offers efficiencies, its downsides, such as reduced human roles, entrenched biases, and implementation challenges, warrant examination. Developing frameworks to balance AI innovation and regulation is critical as common institutions grapple with AI proliferation (Graetz et al., 2022).

Furthermore, advancing theoretical perspectives on AI in sharing beyond cause-and-effect approaches is key (Lutz, 2019). Adding more perspectives like sociomateriality, coordination, and critical theory can help us understand AI-sharing interactions in more than one way. Building native theories around AI sharing can catalyze context-specific, actionable insights, rather than importing universal models. Adopting pluralistic methodologies toward such contextualization can further enrich our understanding of AI in SE.

Overall, we argue that the research community to adopt a critical lens to examine the promises and perils of AI across technological, competitive, organizational, regulatory, and social aspects of the SE. Rather than focusing solely on AI as an exogenous driver, studies need to examine its embedded, relational dynamics with SE actors. Promoting nuanced, multidimensional views on how AI affects SE can help reveal opportunities and conflicts and allow for the fair and ethical use of AI.

Table 5
Future research directions for AI in sharing economy.

Research Topic	Research Question	Example Studies
Algorithm design	How can AI algorithms account for cross-cultural differences in the development and implementation of sharing platforms?	Chen et al., 2022
Organizational adoption	In what ways can AI acceptance be fostered across diverse sharing economies, inter-organizational roles, and hierarchies?	Perles-Ribes et al., 2021
Ethics and privacy	How can AI systems be designed to better protect user privacy and data vulnerabilities in sharing platforms?	Jarrahi et al., 2021
Competitive advantage	How can sharing platforms leverage AI for sustained competitive advantage and value creation?	Andreassen et al., 2018
Platform optimisation	What are the potential and limitations of AI in reducing transaction costs and matching buyers and sellers?	Satornino et al., 2023
Stakeholder dynamics	How might AI reshape power dynamics and relationships between platform stakeholders?	Graetz et al., 2022
Regulation and policy	What regulations and policies are needed to balance AI innovation and ethical risks across sharing economies?	Lutz, 2019
Implementation challenges	How can AI implementation challenges and organizational resistance be effectively managed?	Ganapati and Reddick, 2018
Human-AI comparison	How does AI compare with human capabilities for creativity, critical thinking, and decision making in dynamic sharing environments?	Chen et al., 2022
Theoretical frameworks	How can theoretical perspectives on AI be advanced beyond cause-effect and techno-centric approaches?	Netter et al., 2019

5.2.2. Future research agenda for blockchain in SE

Table 6 summaries some key research directions on blockchain in SE. While blockchain technology shows promise for enhancing trust, security, and efficiency in SE, further research is needed to fully understand its potential and limitations. Specifically, several critical questions remain to be addressed. First, research should explore how blockchain-based systems can be designed to foster greater trust between parties in SE transactions (Hawlitschek et al., 2018). Since blockchain enables people to do business with each other anonymously, looking into how to make trusted user interfaces and reputation systems for blockchain

Table 6
Future research directions on blockchain in sharing economy.

Research Topic	Research Questions	Example Studies
Trust	How can blockchain platform design enhance trust between pseudonymous parties in SE transactions?	Hawlitschek et al., 2018
Efficiency and scalability	What blockchain architectures can scale efficiently for SE use cases like short-term rentals or ridesharing? How can hybrid centralized-decentralized models improve blockchain efficiency?	Alkhammash et al., 2022
Technical limitations	What consensus protocols enable fast, low-latency blockchain transactions on sharing platforms?	Chang et al., 2022
Sustainable financing	How can blockchain disrupt financing and incentivize sustainability on sharing platforms?	Ren et al., 2023
Regulation and policy	What governance frameworks address liability, tax, competition issues in blockchain-based sharing business models?	Verma and Sheel, 2022
Sector-specific applications	How can blockchain provide value in specific sectors like short-term rentals, ride sharing, peer-to-peer energy trading?	Kolade et al., 2022
Social impacts	How does user behavior and social dynamics differ on blockchain-based sharing platforms vs traditional platforms?	Pazaitis et al., 2017

platforms could help them become more popular. Developing and validating metrics to assess perceived trust levels among SE users on blockchain in SE would also shed light on blockchain's ability to engender trust. Second, blockchain's complexity and inefficiency issues need to be tackled to enable widespread adoption (Alkhammash et al., 2022). Even though blockchain offers security benefits, its heavy computational and data storage demands pose scalability challenges. Research on approaches to enhance the efficiency and usability of blockchain architectures in SE applications will be crucial. This could include investigating hybrid centralized-decentralized models or layered blockchain frameworks.

Third, new cryptographic and consensus protocols are needed to fix some technical problems with too few transactions, too slow services, and privacy leaks (Chang et al., 2022). People who work together in the SE often need to make transactions quickly and with little delay. More research needs to be done on blockchain protocols that can support millisecond transaction finality. Enhancing anonymity while retaining accountability also remains an open challenge.

Fourth, studies are needed to learn more about how blockchain can be used in certain areas of the SE, like short-term rentals (Muharam et al., 2023). Research should examine user perceptions, motivations, and experiences to uncover blockchain features that provide the most value for different cases. This can guide the development of tailored blockchain platforms. Fifth, blockchain's potential to enable novel models of sustainable finance bears further examination (Ren et al., 2023). As blockchain can support decentralized governance and tokenized assets, researching how it could disrupt financing and investing in shared assets/services will be fruitful.

Finally, as blockchain in the SE becomes more relevant, there will likely be more regulatory uncertainty about taxation, liability, and practices that hurt competition (Laurell and Sandström, 2017; Verma and Sheel, 2022). Research at the intersection of law, economics, and technology will be a key to developing balanced governance frameworks. Overall, views from different fields, such as human-computer interaction, cryptography, mechanism design, and regulation, will help blockchain's role in the SE grow.

5.2.3. *Future research agenda for business models and sustainable development in the SE*

Potential opportunities for advancing research on themes in this category are presented in Table 7. There is a lack of comparative research on different sectors of the SE deploying different configurations of business models and technologies. Previous research on the role of technology in SE business models has focused primarily on the mobility sector (e.g., Westland et al., 2019; Gao and Li, 2020). By examining a variety of sectors, such as goods sharing, clothing rental, and space sharing, researchers can gain greater clarity on sector-specific differences in the use of new technologies for business model transformation and whether certain technological innovations are more impactful or valuable in some sectors than others.

More research is needed to understand the role of technology in defining the operational sustainability of firms, and why some firms with innovative SE business models are better at harnessing new technologies than others. In addition, how such firms balance the exploration-exploitation dilemma in their business model innovation remains unexplored. As new technologies proliferate, SE scholars should examine the intersection of business model adaptation, technological integration, and sustainable performance. Further research should look into best practices and frameworks which can guide technology integration and business model recalibration for sustainable performance.

Despite the transformative potential of cloud computing across business models, its impacts and applications in the SE remain underresearched. Instead, the current literature focuses more on the potential applications of AI, and to a lesser extent blockchain, in business model transformation (e.g. Satornino et al., 2023; Pazaitis et al., 2017). Future research can explore how cloud computing contributes to value creation by optimizing resource allocation and solving capacity issues to ensure an efficient and seamless experience for participants. Research could examine cloud configurations, contracts, pricing strategies and policies, such as those for serverless computing, that efficiently handle spikes in user demand while minimizing costs, thus enabling cost effective business scalability. Research efforts could also focus on identifying best practices for managing the scalability/security trade-offs that arise as SE platforms grow.

While the SE has the potential to contribute to sustainable development, it is important to recognize that sustainability is not often inherent in its framework (Curtis and Mont, 2020). Surprisingly, there has been little research dedicated to exploring the sustainability aspects of the SE and the ways in which ETs can enhance social well-being and mitigate environmental concerns. Given the growing importance of sustainable development on the agendas of many companies (Amui et al., 2017), there is significant untapped potential for integrating ETs to address the complex challenges of social and environmental sustainability within both established and incumbent SE companies. A particularly promising

Table 7
Future research directions for business models and sustainable development in sharing economy.

Research topic	Future research suggestions	Exemplary studies
Firm survival	What factors explain the differing success of SE firms in adopting modern technology?	Pisano, 2015
Exploration -stability paradox	How can SE firms effectively engage in continuous business model innovation to adapt to the rapid technological changes?	Niemimaa et al., 2019
Well-being, environmental sustainability and circular economy	How can emerging technologies be harnessed to enhance the social well-being aspects of SE business models? How can SE firms align their business models with principles of UN Sustainable Development Goals? In what ways can emerging technologies facilitate the transition to a circular economy?	Hong et al., 2022
Operational sustainability	What is the role of technology in defining the operational sustainability of SE firms? What are the primary indicators for sustainability in the context of SE?	Niemimaa et al., 2019
User sustainability education	How can SE platforms harness the power of AI to promote sustainable choices and behaviors among their users? How do emerging technologies enable SE platforms to engage users in sustainability education and behavior change, fostering a culture of responsible consumption and transition to circular economy?	Gao and Li, 2020 Herko, 2019
Cloud computing customizations	What cloud configurations, contracts, and policies, such as those related to serverless computing, are most effective in handling spikes in user demand while minimizing costs for SE platforms?	Liyanage et al., 2019
Cloud computing risks	What are the potential risks and challenges associated with the reliance on cloud computing in SE platforms? How can SE firms effectively manage the trade-offs between scalability and security as they grow and handle increasingly large volumes of data?	Narayan, 2022

avenue for future research is in urban logistics, which could benefit from an examination of how technologies can facilitate the development of business models that provide consumers with credible information about the environmental and social sustainability implications of their choices (Herko, 2019). In a broader context, companies need to innovate their business models to align with the principles of sustainable development goals (Gao and Li, 2020). Consequently, future research should strive to provide more comprehensive insights into how ETs can catalyze the development of sustainable business models that incorporate both social and environmental benefits across the whole supply chain in the SE. Of particular interest is the integration of circular economy principles such as reuse, refurbish, repurpose, recycle and recover into sharing business models at scale. In transition to circular economy businesses have a critical role in translating circular economy into practice (Ahmad et al., 2023).

5.2.4. *Future research agenda for technology-modified relationships between actors in the SE*

Table 8 depicts the future research directions on technology-modified relationships between actors in the SE. Algorithmic management is a common practice in companies operating under the SE model (Basukie et al., 2020). Reward-oriented algorithms often favor SE organizations over workers (Jarrahi et al., 2021), which raises ethical questions. Further research is needed to develop ethical frameworks and rules for algorithmic decision making that are accountable and transparent to both internal and external stakeholders. Another critical area for future research is the well-being of workers. Workers in the SE experience independence and autonomy, with the flexibility to work anytime, anywhere (Wood et al., 2019). However, they also face continuous monitoring, control, stress and surveillance, as well as opaque decision-making processes (Muller, 2020). Future research should examine how algorithmic management in the SE affects the mental, social and psychological well-being of workers, and how it can be improved with systematic changes in work arrangements.

Table 8
Future research directions for technology-modified relationships between different actors in sharing economy.

Research topic	Future research suggestions	Exemplary studies
Algorithmic management solutions	What algorithms and data should be transparent or explainable to sharing economy workers? What are effective strategies for increasing workers' voice and minimizing the harms of algorithmic management? How can workers be involved in algorithmic management? What are best practices for sharing economy platforms to communicate algorithmic policies and protections to workers?	Basukie et al., 2020; Woodcock, 2022
AI governance frameworks	What strategies enable effective multidisciplinary collaboration on AI governance frameworks for the sharing economy? How can internal governance structures ensure ethical and accountable AI deployment on sharing platforms?	Hong and Lee, 2018
Platform work measurement	How to measure the amount of platform workers and get more accurate labor market statistics? How can different platforms work together to provide comparable platform work data?	O'Farrell and Montagnier, 2020
IoT data security risks	What are effective collaboration models for sharing platforms to develop multi-technology IoT solutions? How does outsourcing vs. in-house IoT security impact the performance of sharing platforms?	Dorwart, 2022
IoT, ETs and sustainability	How can eco-design principles be applied to IoT devices and other ETs used in the sharing economy? What responsible energy and e-waste policies should SE platforms adopt?	Rahman et al., 2019

Appropriate regulations are needed to enable trust and accountability in the decentralized SE. In particular, research is needed on how to regulate the growing use of algorithmic management and AI in the SE. We recommend that future research adopts a multidisciplinary approach that brings together legal, business, and technical experts to inform the development of comprehensive organizational internal AI governance frameworks that constitute corporate governance models of organizations in the SE.

The volume of platform work is difficult to measure and there is a lack of consistent and comparable statistics, which hinders the development of reliable labor market statistics and regulations. ETs continue to create more earning and working opportunities, and have led to more diverse types of platform work arrangements that are difficult to define and measure. Therefore, developing reliable measurement methods that are applicable to different contexts and industries is an enormous task for future research in the technology-driven SE.

While IoT, data security and privacy issues have gained attention in recent years, research has been more descriptive than prescriptive. To address IoT security concerns in the SE, the integration of multiple and complementary technologies, such as blockchain and IoT, is a potential way forward (Viriyasitavat and Hoonsopon, 2019). However, developing internal research capabilities to create innovative, multi-technology solutions is a challenge for sharing companies due to talent shortages and fierce competition for experts in ETs. An alternative is to collaborate with external parties, that develop relevant blockchain-IoT services, but the performance and security implications of such outsourcing require further investigation.

In addition, more research is needed on how to reduce the environmental impact of ETs in general and IoT in particular. IoT devices consume a significant amount of energy, leaving a large carbon footprint (Nižetić et al., 2020) that undermines the sustainability contribution of the SE. In addition, the responsible disposal and recycling of electronic waste from obsolete IoT devices is an overlooked challenge for the SE. In this regard, future studies that can assess the life cycle impacts of ETs and explore strategies to mitigate these impacts through eco-design and improved waste management could provide valuable insights.

6. Conclusion

This study examines the role of ETs in SE. Utilizing a systematic literature review approach, we employed AI-based machine-learning topic modeling techniques to identify dominant research areas and map the research related to the role of ETs in SE. We offer implications of this study as follows.

6.1. *Theoretical implications*

This study makes a significant theoretical contribution by explicitly employing a socio-technical systems perspective to examine how ETs shape the SE phenomenon. Addressing fragmented literature, this systematic review integrates findings on AI, blockchain, IoT, and cloud computing, demonstrating how these technologies shape social norms, organizational processes, user behaviors, regulatory practices, and institutional structures. Through a unified approach, we provide an integrated view of how ETs influence SE. This synthesis contributes theoretically by foregrounding the socio-technical perspective as a core lens through which to understand the interplay between emerging technologies and the structural evolution of SE platforms. It brings to the fore how technological developments intersect with governance, labor

dynamics, institutional configurations, and societal norms.

One central theoretical contribution of this review is shifting the focus to technological perspectives within SE, diverging from traditional economic views. ETs are reshaping market boundaries, enabling hyper-scalable business models, and fostering rapid innovation. These technologies facilitate SE activities driven by data-rich transactions, enabling scalable, responsive supply-demand matching and tailored services (Hawlitschek et al., 2018). Additionally, ETs support decentralized systems of trust and value exchange, allowing direct, peer-to-peer interactions without centralized intermediaries (Gerwe and Silva, 2020).

This research also advances understanding of how these technologies foster trust among unknown individuals online. We examine how ETs mediate trust between multiple parties, whereas traditional models rely on reputation-based mechanisms. Furthermore, the role of AI in predicting user preferences introduces new theoretical considerations for automated trust, where technology manages relational dynamics and service quality, adding complexity to trust mechanisms within SE environments (Chen et al., 2022). In contrast, blockchain technology introduces a decentralized trust model through distributed networks, challenging conventional trust frameworks by positioning blockchain as a self-sustaining trust mechanism suitable for anonymous peer-based transactions. Our study expands the theoretical understanding of trust by positioning blockchain as a potential alternative to centralized trust agents, providing insights into how blockchain reconfigures trust and governance in online marketplaces (Narayan, 2022; Pazaitis et al., 2017).

Our findings underscore the importance of interdisciplinary studies within SE to explain how technology is developed, adopted, managed, and leveraged for competitive advantage. Applying theories from various disciplines—such as sociology, psychology, information systems, law, political science, management, innovation theory, networks, resource-based view, economics, organizational theory, strategic management, business, technological capabilities, ethics theory, sustainable supply chain management, behavioral and cognitive science—can help advance SE research by integrating diverse insights for deeper understanding of SE by integrating insights on workers, sellers, buyers, consumers, networks, organizational dynamics, dynamic capabilities theory, operations management and theoretical frameworks that address human and technological interactions. Our thematic analysis demonstrates that SE is shaped by complex technological interactions that impact business operations and social relationships. For instance, algorithmic management redefines traditional labor dynamics in SE by automating oversight and task allocation, challenging labor theories that assume established employer-employee structures. These findings prompt scholars to reconsider SE through the lens of sociotechnical interactions, highlighting the distinct ways ETs influence relationships and work patterns in SE contexts (Jarrahi et al., 2021; Budanov et al., 2018). In technology management, resource-based view (Barney, 1991) highlights the role of technological capabilities, such as R&D competencies, intellectual property, and absorptive capacity, as key drivers for firm performance. Dynamic capabilities theory (Teece et al., 1997) focus on firm's ability to integrate, build, and reconfigure internal and external competencies to explain how firms adapt to technological discontinuities and leverage innovation to sustain competitive advantage. By applying this socio-technical perspective, we move beyond narrowly instrumental understandings of technology to examine the recursive and layered effects ETs exert across different domains of the SE. It emphasizes the importance of aligning technological innovations with human and organizational factors to ensure successful implementation and use. This approach broadens the theoretical lens for future SE research, encouraging scholars to situate technological change within its broader social, institutional, and ethical contexts. We invite researchers to view SE not only as an economic model but as a space of technological innovation that drives socio-economic behaviors (Kolade et al., 2022; Satornino et al., 2023) and sustainable development.

6.2. Practical implications

This review identifies different areas of business operations where practical applications of different types of ETs in organizational operations are evident. SE organizations can leverage these technologies to enhance customer trust, streamline service delivery, improve personalization, and increase operational scalability. However, practitioners in SE organizations should also be aware of the challenges and take a cautious approach to emerging technology implementations. For example, blockchain implementations can be complex and costly, sometimes outweighing the benefits. Similarly, AI models can introduce unintended biases if not rigorously tested and continuously monitored. Moreover, given the growing debate about the ethical, sustainability and legal aspects of ETs, SE companies should adopt self-regulatory approaches and implement organizational and technical controls to protect against potential legal complications. Changes in the laws governing the use of ETs will have a significant impact on SE companies that make ETs a central part of their business model.

SE platforms should evaluate the readiness and scalability of ETs not only in technical terms but also through pilot testing, cost-benefit analyses and user feedback mechanisms. Integrating cross-functional teams—including legal, technical, and UX specialists—can help identify risks early and adapt implementations accordingly. In particular, platforms leveraging AI should implement explainability features and fairness audits to ensure transparency and mitigate reputational or legal risks.

For policymakers, our review identifies several societal and governance issues arising from the application of ETs in SE, including user privacy, security, labor rights, and sustainability, that require government intervention and regulatory action. AI systems used for matching, pricing, or content moderation, as well as IoT devices, collect vast amounts of data to optimize SE services. This poses a challenge to regulations such as GDPR, which restricts the movement of data and gives users the right to modify and even delete data. Recently, the Dutch Data Protection Authority (DPA) fined Uber €290 million for transferring the data of European taxi drivers to the United States. SE companies operating across borders face the greatest regulatory challenges in their use of ETs. To navigate such regulatory complexities, SE firms should invest in localized compliance strategies, maintain transparency in data collection and usage policies, and develop flexible architectures that allow for jurisdiction-specific adaptations. Establishing data stewardship roles and engaging with data protection authorities early in the design of ET systems can pre-empt legal risks and build public trust. The key challenge for policymakers is to develop adaptable and competitive frameworks that protect social values and workers' rights, while enabling technological innovation and promoting equitable growth across the SE sector. Policymakers can also promote responsible innovation by funding regulatory sandboxes for testing ET applications, supporting cross-sector data governance frameworks, and encouraging collaboration between public institutions, platforms, and civil society. In the context of labor rights, targeted legislation could address platform accountability for algorithmic decisions, ensuring that workers have mechanisms to contest, understand, and influence automated systems affecting their income and work conditions.

CRediT authorship contribution statement

Mokter Hossain: Writing – review & editing, Writing – original draft, Project administration, Formal analysis, Conceptualization. **Farhan Ahmad:** Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Majid Aleem:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Formal analysis, Data curation. **Anu Bask:** Writing – review & editing, Writing – original draft, Formal analysis. **Mervi Rajahonka:** Writing – review & editing, Writing – original draft, Formal

analysis.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used DeepL and ChatGPT 4o to improve language and readability. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of competing interest

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Data availability

Data will be made available on request.

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