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Sharing economy from the sustainable development goals perspective: a path to global prosperity

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Abstract

Purpose – The sharing economy, supported by digital platforms, efficiently matches the demand and supply of underused resources. Expanding globally and impacting different industries is offering a new path to sustainable resource consumption. The United Nations endorsed the sustainable development goals (SDGs), responding to a global call to end poverty, protect the environment and ensure that by 2030, everyone lives in peace and prosperity. Researchers have linked the sharing economy with SGDs, and extensive efforts have been exerted to quantify its impact.

Design/methodology/approach – Due to its evolving nature, especially in developing countries, there is a need for research to assess its promises and challenges from the SDG perspective. This research fills in this gap and contributes to the sharing economy studies by exploring its evolution within the framework of sustainable development goals, followed by an assessment of various methodologies for measuring the sharing economy and highlighting the significance of the web mining technique.

Findings – The proper implementation of this decentralized business model within a country is encouraging optimal resource use, lowering energy consumption and increasing long-term economic development. The sharing economy is a disruptive force that addresses the pillars of sustainability.

Originality/value – The research holds importance in addressing the achievement of the SDGs through the sharing economy, necessitating focus from policymakers and scholarly discourse on its merits. The transformative impact of the sharing economy poses questions about its encouragement or regulation, with the potential to disrupt established monopolies and possibly create new ones. Its successful implementation underscores the significance of effective data sharing and governance.

Keywords Information and communication technology, Sustainable development goals, Sharing economy, Web mining, Egypt

Paper type Research paper

1. Introduction

The current and forthcoming environmental and societal challenges confronting humanity underscore the necessity of aligning environmental preservation with economic advancement and expediting the shift towards sustainable development. In response to these challenges, the United Nations introduced the sustainable development goals (SDGs) in 2015, presenting a global initiative that aims to eradicate poverty, safeguard the environment and foster peace and prosperity for all by 2030 (United Nations, 2015), making them crucial for the survival of our planet. Tu *et al.* (2023) clarified that the SDGs encompass the essential themes of earth, people, peace and wealth, categorized into social, environmental and economic pillars. The pursuit of

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the SDGs involves protecting ecosystems, ensuring access to quality education and healthcare, eradicating poverty and fostering inclusive societies. Pradhan *et al.* (2017) highlighted that current production and consumption patterns challenge the achievement of the SDGs. The SDGs index provides a comprehensive overview of each country's progress towards achieving the SDGs by computing a score for each goal (Sachs *et al.*, 2023).

Egypt has actively pursued the attainment of the SDGs through strategic initiatives delineated in the Egyptian strategic plans to address economic, social and environmental challenges while concurrently advancing sustainable development. For instance, the Egyptian government has implemented targeted programmes aimed at poverty alleviation and social inclusivity. Additionally, it has implemented policies specifically designed to empower women. Recognizing the pivotal role of investment in infrastructure, industry and innovation for economic growth and sustainability, the Egyptian government has prioritizing these domains (ElMassah and Mohieldin, 2020). The government demonstrated its commitment through robust monitoring mechanisms and regular assessments to track its progress.

Diverse perspectives on capitalism and consumerism have emerged following the 2008 global financial crisis, navigating the space between advocating for enhanced regulation of the existing system and exploring radical alternatives. A third viewpoint rooted in collaborative consumption has gained attention (Heinrichs, 2013). The rapid evolution of information and communication technology (ICT), encompassing cloud computing, artificial intelligence, big data analytics and the Internet of Things, is blurring the lines between the physical and virtual realms, influencing the structure of businesses. These technological advancements, coupled with factors such as globalization and economic crises, have given rise to the sharing economy (SE), intending to promote sustainable consumption (Rong, 2022).

In contrast to Keynesian economic models, this new economic model has the potential to shift societal perspectives towards a less materialistic way of life (Kaniadakis and Farmaki, 2022) and facilitate the decentralized exchange of goods and services among individuals, transforming society from one that predominantly values ownership to one that prioritizes sharing. Airbnb, Uber and others are considered pioneers in the SE, credited with unlocking the commercial potential of underutilised personal assets (Klarin and Suseno, 2021). The overall value of the global SE is predicted to jump to 600bn US dollars by 2027, up from 113bn US dollars in 2021, at a compound annual growth rate of approximately 32% (Statista, 2023). The United States and China stand at the forefront in generating sharing revenue, experiencing consistently high growth rates; the sharing economy represents 1.67% of China's gross domestic product (GDP). Additionally, the Middle East emerges as a region with significant potential for the growth of SE markets (GlobalNewsWire, 2022).

Joseph Schumpeter coined the term *creative destruction* to describe innovations that can significantly reshape markets by introducing new products and making existing ones obsolete. Concerns have been raised by Bergh *et al.* (2021) regarding the rapid rise of the SE and its potential to disrupt established industries globally. For instance, while some studies revealed that Airbnb serves a different market segment than regular hotels, other lines of research expose challenges imposed on the hotel business (Jiao and Bai, 2020). Conversely, despite initial resistance from consumers, proponents argue that the SE is a more cost-effective and socially oriented alternative to traditional consumption patterns. It has the capacity to enhance the quality of life without incurring ownership costs (Szymanska, 2021). For example, car-sharing services can lead to a more efficient use of vehicles, reducing the environmental impacts associated with manufacturing. Advocates of the SE argue that it offers a range of benefits that align with the 2030 agenda for sustainable development (Curtis and Mont, 2020).

The primary objective of this paper is to delve into the phenomenon of the sharing economy, exploring its evolution, underlying principles, drivers, potential and challenges. Additionally, we aim to establish connections between the promises of the sharing economy

and the SDGs, highlighting how this emerging phenomenon can contribute to the achievement of sustainable development objectives. To effectively assess the impact of the sharing economy on the SDGs, researchers have introduced various indices for measurement. This research primarily aims to evaluate claims regarding the relationship between the sharing economy and the attainment of the SDGs. To achieve this, an extensive literature review is conducted, encompassing articles that establish connections between SE and SDGs, with a specific focus on those attempting to quantify its impact on SDGs. The review delves into various methodologies proposed for measuring SE, leading to an exploration of the government's role in promoting and regulating this emerging phenomenon.

This paper specifically focuses on reviewing the proposed techniques for measuring the impact, with a particular emphasis on web scraping. Web scraping emerges as a valuable technique for quantifying the sharing economy phenomenon, especially in contexts where official data is lacking, enabling real-time assessment of its dynamics. The research concludes with a comprehensive discussion and outlines potential avenues for future research.

This research makes several significant contributions. Firstly, it advances the rapidly evolving research field of the sharing economy by presenting a comprehensive theoretical framework that examines the sharing economy within the context of sustainability. The study categorizes various measurement techniques employed in assessing the SE, emphasizing the potential role of web mining techniques. By understanding the potential impact of the sharing economy on SDGs and society, large businesses operating within the SE can use the insights from this research to develop strategies that align with sustainability goals and enhance their social and environmental impact. Further, policymakers can design more effective regulations and policies to harness its benefits while mitigating potential risks.

2. The sharing economy debates: visions and critiques

2.1 The sharing economy concept

Sharing and collaborative behaviours have deep historical roots, serving as integral components for both survival and the cultivation of social bonds (Miguel *et al.*, 2022). Although early sharing economies were motivated by community building, social connections, charity and non-monetary transactions, the new model is driven by commercial benefits. The global economic downturn prompted a re-evaluation of consumer spending habits, leading to a transition to innovative approaches for consuming underutilised assets facilitated by online platforms among peers; this shift encouraged a move towards sharing and collaboration instead of ownership. The emergence of the SE was notably influenced by the financial crisis in the early 2010s, coinciding with the adoption and rapid expansion of a new generation of sharing services facilitated by digital multi-sided platform economies. According to Google Trends, the term sharing economy gained widespread recognition in 2013 (Bergh *et al.*, 2021), marking the beginning of its rapid and continual growth in popularity in subsequent years.

The SE, alternatively termed the collaborative platform economy, platform economy or peer-to-peer economy, serves as a flexible term denoting interaction among dispersed groups of individuals facilitated by digital platforms. These platforms empower users to exchange goods and services, share resources and collaborate in various consumption and production activities, leveraging capital and assets. According to Frenken and Schor (2017), the widespread growth of the SE is driven by the aim to improve access to underutilised products and services, ultimately leading to a decrease in overall consumption. They distinguish the SE from other platform types based on three distinctive features: peer-to-peer interaction, temporary access and the involvement of physical goods. Constantiou *et al.* (2017) described SE as a platform structure fostering community and mutual benefit using idle resources, emphasising efficient access rather than ownership.

Maurer *et al.* (2020) conducted a semantic network analysis of SE definitions. Various authors highlight its diversity, heterogeneity and paradoxical nature, as observed by (Schor, 2016). The novelty of SE is underscored by some authors, with an anticipated contribution being the democratization of the economy, as noted by Etter *et al.* (2019). Schlagwein *et al.* (2020) defined the SE as *an IT-facilitated peer-to-peer model for commercial or non-commercial sharing of underutilised goods and service capacity through an intermediary without a transfer of ownership*. Pouri and Hilty (2021) note that the SE has escalated peer-to-peer interactions to unprecedented levels, influencing societal and economic networks. The SE facilitates structural changes by establishing networked societies and providing an easy means to share and manage necessary data.

A word cloud is a visual representation of textual data wherein words are displayed in varying sizes corresponding to their frequency in the text. R, a programming language, enables textual data analysis and graphical presentation. After installing the necessary packages in the R software and uploading the data, data pre-processing steps are performed. Ensuring the conversion of the text to lowercase and the deletion of punctuation, stop words and whitespace. Then, the corpus is converted into a document-term matrix (DTM), which counts the frequency of each word in the text. Users can also set a minimum frequency threshold for words to be included in the graph. After that, the word cloud package is used to generate the graphical representation. The software not only allows the generation of the word cloud but also offers multiple options for customization of the word cloud's appearance, including adjustments to size, colour and layout. Figure 1, based on diverse definitions for the SE from multiple sources (Acquier *et al.*, 2017; Dabbous and Tarhini, 2019; Eckhardt *et al.*, 2019; Lueng *et al.*, 2019), provides a visual summary where more prominent words signify higher frequency in the definitions.

Source(s): Figure by authors

Figure 1.
Cloud word of SE definitions

The SE crosses various sectors, such as accommodation, transportation, household, professional, technical and financial services. The primary goal is to facilitate temporary access to or ownership of idle assets in exchange for compensation, challenging traditional institutions' management of resources. Heinrichs (2013) framed the SE as a counteraction to capitalism and consumerism, while Hamari *et al.* (2016) posit that sustainability and environmental considerations are the driving factors for collaborative consumption; Morell *et al.* (2020) depict the SE as a decentralized network leveraging ICT advancements to ensure easy access to shared resources. The definition of the SE lacks universality in the literature, but recurring themes encompass aspects like temporary resource access, dependence on digital platforms, an economically market-driven model and a focus on resource sustainability.

The sharing economy involves three principal participants: service providers, consumers and digital platforms that serve as intermediaries to facilitate transactions. Barnes and Mattsson (2016) explained that individuals may play the dual role of producers and consumers, referred to as prosumers. Within the SE, triadic interactions encompass a platform operator, a peer service provider and a consumer, diverging from the traditional dyadic interactions between a firm and a consumer, as Benoit *et al.* (2017) highlighted. The framework of the digital platform economy comprises four key concepts: digital users from both the demand and supply sides; digital technology entrepreneurship involving app developers and diverse agents contributing to entrepreneurial innovation, experimentation and value creation on platforms; digital multi-sided platforms serving as orchestrators of social and economic activities between users and agents and digital technology infrastructure encompassing all regulations governing all aspects of digital activities (Zoltan *et al.*, 2020).

2.2 The pillars for the development of the sharing economy

Technological advancements have reduced or eliminated barriers in the identification, search, match, verification and exchange processes for sellers and buyers, enabling the establishment and operation of sharing marketplaces. The emergence of these marketplaces is attributed to the advancement in ICT, which is not only facilitating the sharing of information but also enabling its governance and management effectively. Pouri and Hilty (2018) justify that the popularity of smartphones, the internet and the rapid expansion of social network services have transformed social and commercial relationships by facilitating online transactions based on social connections, even with strangers. Yin *et al.* (2021) stated that the primary catalysts for the expansion of the SE include population growth, urbanization, resource scarcity and technological advancements. A growing number of individuals are recognizing alternative methods to utilize the untapped potential of their possessions or offer their services. Consequently, a shift towards this trend has been observed. The SE is a business model capable of achieving economies of scale where network members act as suppliers and consumers of services or goods simultaneously.

Operating on a peer-to-peer basis allows users to save money by opting for more affordable alternatives, such as accommodation sharing instead of traditional hotels. Accommodation providers, in turn, can earn extra income by renting out unused assets, creating a new revenue stream. In the realm of ride and car sharing, service providers enjoy a flexible working schedule, unlike those employed by traditional taxi companies. Meanwhile, users seeking ride-sharing services benefit from modern transportation without the burdens of car ownership. Beyond economic gains, participants in sharing activities derive social and psychological benefits, including authentic experiences, personal growth and a sense of community (Köbis *et al.*, 2021).

Another motivator for the spread of SE is environmental concerns. According to Geissinger *et al.* (2019), the new model addresses various environmental issues by reducing

overall consumption and corresponding resource utilization. Further, Grybaitė and Stankevičienė (2018) underscore the significance of social factors influencing the expansion of the sharing economy, including population density, a sustainability-oriented mindset, lifestyle preferences among the younger generation, altruistic attitudes and an inclination towards an independent way of life. Creating models for assigning the importance of technological, economic, political and regulatory and social-cultural indicators, Grybaitė and Stankevičienė (2018) suggest that technological readiness and the socio-cultural environment play a crucial role in the advancement of the SE because they enhance both the capability and motivation to engage in it. One of the initial purposes of individuals engaging in the SE is environmental friendliness, obtaining underutilised commodities and services via a shared platform significantly decreases both resource waste and greenhouse gas emissions. This is evident in areas such as transportation and shared housing (Zhu and Liu, 2021). The main factors leading to the advent of SE were classified (Ryu *et al.*, 2019; Navickas *et al.*, 2021; Jin *et al.*, 2023; Sharma, 2023) under four pillars: technological, environmental, social and economics. Figure 2 displays the main components under each pillar.

2.3 Twining the sharing economy to sustainable development goals

As the population grows and economic activity expands, countries face concerns threatening their long-term prosperity. The SDGs address global challenges through a comprehensive framework designed to achieve a more equitable, sustainable and peaceful world (Mensah, 2019). Aiming to eliminate poverty and hunger, ensure access to essential services like water and sustainable energy for everyone, support inclusive education and decent work to generate development opportunities, foster innovation and resilient infrastructure for sustainable communities, reduce inequality, especially regarding gender, care for environmental integrity and promote collaboration among people to ensure responsible consumption and production.

Although researchers believe that SE is a disruptive innovation that may alter traditional economic systems, they have argued regarding its positive economic, environmental and social impact (Fang and Li, 2022). Advocates of the SE perceive it as a solution to address resource scarcity by reshaping production and consumption patterns through the efficient

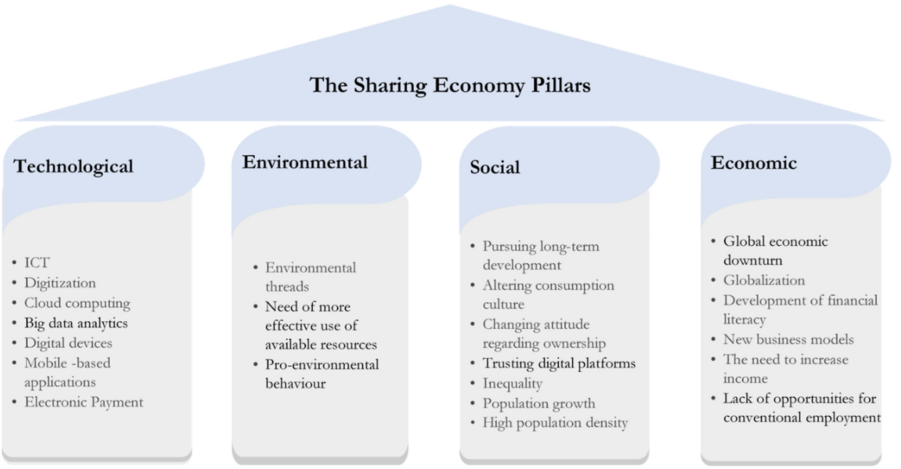

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Figure 2.
The pillars for the development of the sharing economy

use of underutilised resources, enhanced resource allocation and consumption. Martin (2016) believes that the SE contributes to the achievement of the SDGs by optimizing the use of underutilised assets. As Mont *et al.* (2020) explained, SE, facilitated by advanced capabilities for managing and securing the sharing activities, has the potential to address multiple challenges.

According to Heinrichs (2013), SE challenges hyper-consumption, which involves consuming more than necessary and beyond means by allowing individuals to use assets when necessary, reducing the need for everyone to own every good. According to Szymanska (2021), SE is a sustainable economic model and a driver for sustainable economic growth since it raises living standards and quality of life by permitting the use of existing resources. SE is changing employment and working conditions and reducing inequality by providing income to individuals of diverse socioeconomic backgrounds. Pérez-Pérez *et al.* (2021) have elucidated that the SE, by advocating for low-carbon emissions and promoting sustainable consumption and production practices, holds the potential to contribute to the achievement of all SDGs. Further, Dabbous and Tarhini (2021) affirmed that the sharing economy acts as a catalyst in reducing gender disparities, promoting education and addressing income inequality by providing individuals from various socioeconomic backgrounds with opportunities to serve as microentrepreneurs, thereby generating income from their existing assets.

Pouri and Hilty (2018) defend that SE lowers transaction costs and facilitates seamless communication between service/item providers and users, suggesting that increased adoption of the model within a country promotes the optimal use of resources. In addition, SE is a business model generating green, inclusive and sustainable value chains that change consumption and production patterns. Thus, advancements in SE values lead to the efficient use of energy resources. Lueng *et al.* (2019) elucidate that SE stimulates economic activity on a broader scale, enhancing the productivity of goods and services and contributing to resource availability for the future, suggesting that when a larger portion of the population in a country embraces and actively engages in SE, even individuals in remote areas gain access to resources. In accordance with Hu *et al.* (2019), who argue that a continual increase in the number of SE users within a country, particularly in areas with limited social or economic facilities like education or transportation, allows people to access these facilities. As a result, physical and human resources are generated for the future, fostering more sustainable development in the country.

Ma *et al.* (2022) argue that promoting the SE in a region leads not only to cost savings but also generates income by renting out resources during spare time, allowing the saved monetary resources to be directed towards eco-friendly initiatives and social activities, key components of sustainable development. Lyaskovskaya and Khudyakova (2021) illustrate that SE has the potential to alleviate social and environmental issues, contributing to a heightened level of sustainable economic development. Additionally, Zhu and Liu (2021) elaborate that the SE will enhance environmental awareness, making green lifestyles more appealing to consumers.

2.4 The potential disruptive effects of the sharing economy

Despite the promotion of SE as promoting sustainability and reducing resource consumption (Boar *et al.*, 2020) and as a revolutionary business concept that would alter how people view a materialistic lifestyle (Tu *et al.*, 2023), researchers raised questions regarding its disruptive impact and the possibility of leading to the monopolization of these new sharing economy firms. For instance, Schor (2016) highlighted the necessity for the sharing economy to align with government regulations, while Williams and Horodnic (2017) discussed its potential to reshape market competition. Additionally, Ramzy and El-Samadicy (2018) explored the

significant impact the sharing economy could have on altering the employment landscape. Although the autonomy and flexibility intrinsic to the SE create supplementary opportunities for individuals encountering difficulties in entering the labour market or those grappling with traditional work schedules and locations, as Sasikumar and Sersia (2020) indicated, it is imperative to acknowledge that it also introduces high levels of uncertainty and insecurity within the labour market.

The flexible nature of SE platforms often leads to job instability and potentially unfavourable working conditions. The SE platforms frequently classify their service providers as independent contractors rather than employees, resulting in a lack of access to benefits typically afforded to regular employees. As noted by Köbis *et al.* (2021), in the context of ridesharing, drivers experience the pressure of incentive-based work schemes and are not compensated for additional tasks, such as waiting for the next ride. Additionally, classifying service providers as independent contractors rather than employees has significant economic and social consequences. This classification impacts their social status relative to regular employees. Unlike employees, who can join labour unions to safeguard their rights and interests, contractors typically lack the right to unionize and represent their interests. Moreover, SE service providers are often amateurs or semi-professionals, introducing a level of unprofessionalism that can diminish service quality compared to traditional enterprises. Some SE platforms do not establish standards for how service providers should execute their tasks, further affecting the quality of service.

Furthermore, Querbes (2018) revealed that researchers and regulators expressed their concerns regarding customer protection on digital platforms. For instance, accountability is unclear in the case of customer dissatisfaction. The absence of safety standards also undermines customer protection, as the SE's decentralized business model prevents platforms from ensuring the same safety standards as traditional providers (Lee *et al.*, 2020). For example, food-sharing platforms that connect individuals who want to cook for others may not comply with the same food safety and hygiene standards as restaurants. Additionally, customers depend on information provided by SE platforms, such as star ratings and reviews, to inform their decisions (Vinod and Sharma, 2021). Recent academic research has revealed instances of deceptive listings by service providers, resulting in customers being misled by various aspects such as photographs or descriptions. Consequently, information asymmetry, which includes scenarios where information is unavailable to customers, contributes to customers occasionally lacking confidence in SE services due to occurrences of false information, unequal access to information and the platforms' control over information.

The services provided by SE models introduce an element of unfair competition between the new and traditional models. The SE platforms often operate with fewer regulatory constraints and lower overhead costs than traditional businesses, enabling them to offer services at more competitive prices. For instance, hotels argue that home-sharing platforms operate similarly to them but without the same obligation to adhere to tax or safety regulations (Mosaad *et al.*, 2023). As a result, traditional businesses may struggle to compete, leading to market distortions and potential economic instability, which may have ramifications for the overall structure and competitiveness of the market.

3. Web data mining approaches and applications

The web is a source of valuable information, encompassing a wide variety of text, images, videos and more, reshaping the field of information retrieval; accessible data on the web comprises structured, semi-structured and unstructured quantitative and qualitative information. Leveraging web data effectively involves addressing several technical challenges associated with the volume, variety and speed at which data is generated and

disseminated. This evolving landscape, the Big Data era, although demanding innovative approaches to tackling data, promises unprecedented insights that can drive advancements across various fields. Web data mining, also called web scraping, is the practice of using programmes for collecting data from the web, defined as the construction of an agent to download, parse and organize data from the web in an automated manner (Broucke and Baesens, 2018).

Typically, a system for extracting web data engages with a source on the internet, fetching and extracting information contained within it (Ferrara *et al.*, 2014). To initiate this process, a web scraping programme generates a request to retrieve resources from a specific website. Once the targeted website successfully receives and processes the request, the requested resource is fetched from the website and sent back to the web scraping programme. Then, for analytical purposes, the extracted data is transformed into a structured format. Web scraping may use static or dynamic scraping methodologies. In static web scraping, the web page's content is downloaded and parsed to extract the desired information, while dynamic scraping involves interacting with the website in real time, including handling content that is loaded dynamically. Compared to static methodology, dynamic web scraping requires more computing resources due to the need to handle the changing content (Fernandez and Williams, 2020; Rajan and Paul, 2021).

Real-world applications of web scraping flourish across various domains (Lotfi *et al.*, 2022). For instance, in finance, web scraping can aid in market trend predictions and investment decisions by scaping and analysing news articles and financial reports. In electronic commerce, businesses apply web data mining to investigate website usability (Kumar *et al.*, 2023) and attain a more comprehensive understanding of customer behaviour, predict trends and enhance personalized recommendations. Social media platforms apply web data mining to understand user preferences, improve content recommendations and detect emerging trends (Thakur, 2023; Turon *et al.*, 2023). Additionally, in cybersecurity, web data mining plays a crucial role in identifying and preventing potential threats by detecting anomalies in network data. The applications of web data mining are continually evolving, offering valuable insights and optimization opportunities across numerous domains.

Web mining has been extensively applied to extract valuable insights and enhance the user experience on the Airbnb platform. Overall, Airbnb serves as a compelling example of how web mining applications can significantly contribute to the success and evolution of an online platform in the hospitality and SE industries. Through the analysis of vast amounts of data, including online reviews, customer feedback and transaction histories, web mining techniques enable Airbnb to understand user preferences, improve accommodation recommendations and optimize its platform for both hosts and guests. Gyodi (2019) examines the characteristics of Airbnb networks and their potential influence on the traditional hotel industry. Relying on an exclusive dataset created through web scraping of Airbnb listings and hotel offers from Booking.com in Paris, Barcelona, Berlin and Warsaw. The empirical analysis uncovers that only a minority of Airbnb listings can be classified as sharing economy services, while commercial offers constitute a critical share of listings on the platform. Whereas Airbnb promotes tourism in areas overlooked by traditional hotels, it is also heavily concentrated in neighbourhoods that have historically attracted travellers and thus contributes to increasing pressure from tourism. Further, Lee *et al.* (2020) analysed 169,666 online reviews from Airbnb users who stayed in London between 2011 and 2015. The empirical insights from this analysis shed light on how Airbnb users' perceptions of good-quality accommodations evolve over a five-year period and across different seasons. Likewise, based on 10,068 reviews posted by Airbnb hosts Xue *et al.* (2022) explored the characteristics of being a good guest.

Web mining is classified into three domains: web content mining, web structure mining and web usage mining (Siddiqui and Aljahdali, 2013). The process of web content mining

revolves around extracting valuable information from the content found on the web. Content data commonly consists of a mixture of text, images, audio, video and occasionally structured records such as lists and tables (Johnson and Gupta, 2012). An illustrative example of web content mining includes mining product reviews, where the analysis of user-generated content helps in understanding consumer sentiments and preferences. From investigating customer sentiments in reviews to evaluating the impact of listing descriptions on performance, web mining plays a pivotal role in shaping Airbnb's strategy, improving the quality of service and fostering a dynamic and responsive marketplace.

Web structure mining, as outlined by Chakrabarti *et al.* (1999), aims to systematically uncover the inherent model governing the link structures within the Web. This model relies on the topology of hyperlinks. In the usual setup of a web graph, web pages serve as nodes and hyperlinks act as edges, establishing connections between the linked pages. Structure mining involves delving into the structural information present on the web and can be categorized based on the specific structural information utilized, whether through hyperlinks or document structure. While web content and structure mining rely on the actual or primary data available on the Web, web usage mining focuses on extracting secondary data derived from user interactions during their engagement with the Web. The web usage data encompasses information from various sources, such as web server access logs, browser logs, user profiles, registration data, user sessions or transactions, cookies, user queries, mouse clicks, scrolls and any other data resulting from user interactions (Ramya *et al.*, 2013). Web usage mining involves the automated identification and analysis of patterns within clickstreams and related data collected or generated through user interactions with web resources, typically hosted on a web server. The objective is to capture, model and analyse behavioural patterns and interactions between users and a website (Liu, 2007).

Web mining approaches prove valuable for businesses seeking to collect information about customer preferences, navigation tendencies and purchasing habits. Web mining has significantly transformed the data analytics landscape, steering in a new era of insights and opportunities. The following section explores the power of web mining techniques within the SE stream of research.

4. Measuring the impact of the sharing economy towards the achievement of SDGs

4.1 Quantifying the sharing economy: development of key indicators

Frenken and Schor (2017) raised the question: *how can we empirically assess the various impacts of the current sharing economy platforms in terms of people, planet and prosperity?* To address this inquiry, this study thoroughly inspects the literature that proposes methodologies for measuring SE and its impact within the framework of the SDGs. Numerous studies have put forth indices for measuring the SE, relying on multiple indicators. For instance, Lee (2016) aggregated ten variables deemed crucial for SE development, including total population, urbanization, GDP per capita, the share of millennials in the population, tourist arrivals, percentage of Internet users, broadband subscription per capita, the inverse of mobile subscription cost, broadband speed and the percentage of Facebook users. Building on this, Hussain *et al.* (2023) measured the impact of the SE in 20 developing countries across Asia and Africa; the findings confirmed the substantial influence of the sharing economy on sustainable economic growth.

Further, Zoltan *et al.* (2020) proposed a digital platform economy (DPE) index measured at the national level, based on 61 indicators categorized into four indices: *Digital Technology Infrastructure*, which focuses on the coordination and governance required to establish institutional standards related to digital technology; *Digital User Citizenship*, addressing explicit legitimization and implicit social norms enabling user participation in the digital

society; *Digital Multi-sided Platforms*, where digital technology users and agents of the entrepreneurship ecosystem converge, serving as intermediaries for transactions and knowledge exchanges and *Digital Technology Entrepreneurship*, comprising various third-party agents engaged in experimentation, entrepreneurial innovation and value creation using hardware/software to build products connected to platforms. Assessing the DPE Index for 116 countries, the United States of America and the UK secured the top positions, achieving 85 and 83 on the proposed index, while Egypt ranked 85th with a value of 19.5. Szerb *et al.*'s (2022) findings confirmed the high connection between DPE Index scores and country development.

Aggregating the following four indicators, *Platform Technology Infrastructure* is measured via the number of Internet access ports, domain names, web pages, e-commerce enterprises and sharing platforms; *Internet Information Resources* is measured by the penetration rate of the internet, mobile and fixed phone; *Platform Business Application* calculated by e-commerce sales revenue, online procurement and profit of software companies; *Digital Finance*, an index of digital financial inclusion, Yang *et al.* (2022) constructed an index for SE. Their findings suggesting an inverted U-shaped influence on high-quality economic development, this implies that SE has both positive and negative effects. Once the platform economy reaches a certain threshold of development, there is a risk of platform enterprises potentially monopolizing the market due to their technological and information advantages in the absence of government guidance and supervision. Such a scenario is deemed detrimental to the progress of the real economy and does not contribute to the high-quality development of the overall economy.

The other stream of research quantifies SE by collecting data from websites; web mining facilitates the measurement of user engagement, usability and other pertinent metrics. Bergh *et al.* (2018) computed the Timbro Sharing Economy Index (TSHE), a worldwide index produced for 213 countries dedicated to the sharing economy, utilising traffic volume data and scraped data. Using the Timbro Sharing Economy Index, Pérez-Pérez *et al.* (2021) analyse the expected contributions of sharing platforms to sustainability. The main findings suggest that the SE can assist countries in achieving their sustainability goals and advance towards a more sustainable consumption and living model. Yin *et al.* (2021), using the Timbro Sharing Economy Index, explored the connection between the level of SE engagement and environmental degradation. The results indicate that a high level of participation in the SE is inversely correlated with CO2 emissions. Through cross-sectional analysis, it is deduced that sharing activities contribute more positively to the environment than any adverse impact resulting from increased consumption stimulated by SE practices. Unfortunately, the Timbro Sharing Economy Index is limited to the year 2018, and there is no updated information available.

Morell *et al.* (2020) use web mining to examine the democratic attributes of the SE in addressing the challenges highlighted by the SDGs. The findings revealed that SE fosters global partnerships and aligns with SDGs related to sustainable consumption, production patterns and resilient economies. The economic model supports SDGs focused on sustainable livelihood, well-being, quality education and inclusive and sustainable economic growth. The technological policies emphasize resilient infrastructure and innovation through open software and decentralized platform infrastructure architecture. Similarly, Dabbous and Tarhini (2021) constructed an indicator to assess the utilization of the SE by collecting the popularity of multiple sharing platforms through Google Trends. The research investigates the correlation between the developed indicator for the 18 Organization for Economic Cooperation and Development (OECD) countries during the 2014–2018 period and GDP per capita as a measure of sustainable economic development and energy consumption as an indicator of energy efficiency. The results affirm a positive correlation between the use of the SE and both energy efficiency and sustainable economic development.

Karobliene and Pilinkiene (2021) measured the SE by four indicators: the percentage of individuals utilising dedicated websites or apps to arrange a transport service from another individual, the percentage of individuals utilising dedicated websites or apps to arrange accommodation from another individual, the percentage of individuals living in cities who made the last online purchase in the last 12 months, and the percentage of individuals living in cities who engage in Internet use for selling goods or services. Lyaskovskaya and Khudyakova (2021) in Russia within the period from 2016 to 2020; the model focused on measuring the quantitative connections between SE development and the three pillars of sustainable development goals: the unemployment rate, change in gross domestic product and generation of production and consumption waste. They concluded that although the growth of the SE does not lead to a decrease in the unemployment rate, it positively impacts the other two factors.

Clickstream data describes the sequence of pages or the path taken by users when they explore a website. Using Clickstream data on SE users, value and usage were computed by multiple researchers in different countries. Further, Bergh *et al.* (2021) used clickstream data demonstrating unique trips to multiple sites classified as sharing economies. In line with Geissinger *et al.*'s (2019) results, they emphasize that elevated sharing economy value facilitates the efficient allocation of resources, financial savings and reduced environmental impact, thereby ensuring sustainable economic development. Buletova and Stepanova (2020) illustrate that rising the number of SE users within a country grants individuals' equal access to natural or manufactured resources, irrespective of variations in income and living standards. Consequently, achieving sustainability in economic development becomes feasible, as everyone can equally participate in creating or seizing economic opportunities. The results indicate that the positive impact of sharing economy users extends to the efficient utilization of energy. Additionally, the results indicate a positive correlation between sharing economy values and the efficient use of energy.

Further, the findings indicate a positive influence of sharing economy users and sharing economy values on sustainable development. In China, Ye *et al.*'s (2023) research investigates the effects of sharing economy users and SE value on the Chinese economy's sustainable economic development, measured by the sustainable development index. The results indicate the positive linkages SE users and values have with SGD. Implying that when many people are encouraged to share various resources, the resources are likely to be fully utilized without wastage. In line with the findings of Jin *et al.* (2023), illustrating that when the number of SE users grows, energy consumption may be lowered by making better use of energy or sharing technology that runs on renewable energy on a big scale, resulting in increased energy efficiency.

Chang and Fang (2023) investigate the influence of SE users and values as well as green energy, on the attainment of sustainable economic development in China. The study uses gross domestic product growth as a direct indicator to determine sustainable economic development, renewable energy production and renewable energy consumption are used to assess green energy. Inflation and foreign direct investment are included in this analysis. The results reveal positive correlations between SE users and values, renewable energy production, renewable energy consumption, FDI, inflation and the realization of sustainable development. In accordance with Zhang *et al.*'s (2023) findings regarding the leading ten Asian economies, demonstrate a favourable effect of SE on sustainable economic development. This stream of research implemented in Asian countries concludes that SE enhances innovation and productivity, reduces energy consumption, increases employment and improves living standards.

4.2 Assessing the sharing economy within the sustainable development goals frameworks

Combining index creation and web mining techniques enables researchers and policymakers to comprehensively evaluate the dynamics of the SE, offering valuable insights into its reach

and impact. A classification based on the SDGs three pillars – economic, social and environmental – of previous empirical research is conducted. The findings of Karobliene and Pilinkiene (2021) revealed that the SE fosters economic expansion, entrepreneurial activities and the generation of employment opportunities, making notable contributions to GDP within EU countries; they proved that the SE impact contribution to economic SDGs in high-income countries is higher than in low-income countries. In China, the findings of Ye *et al.* (2023) confirmed the positive correlations between SE users, SE values and sustainable economic development. The widespread sharing of resources leads to optimal resource utilization, resulting in cost savings and environmental sustainability. Similar conclusions are drawn by Fang and Li (2022) and Chang and Fang (2023), who emphasized the positive impact of increased SE users and values.

Regarding the economic dimension, SE has been conceptualized as a model capable of enhancing income prospects, wealth redistribution and prosperity via the provision of new and innovative employment opportunities. Shereni (2019) revealed that the SE serves as a mechanism to address unemployment challenges and foster the emergence of microentrepreneurs who engage in short-term lodging rentals through platforms such as Airbnb. This economic model empowers individuals and fosters the growth of microentrepreneurs (Del-Aguila-Arcentales *et al.*, 2022). The SE has been characterized as a source of flexible employment options, revolving around short-term contracts, freelance engagements and independent work arrangements.

As posited by Wang *et al.* (2022), the SE economy has the potential to create openings for businesses in rural and developing regions, broaden the economic landscape and foster additional income across various societal strata. The economic and financial opportunities facilitated by sharing activities also have the potential to alleviate poverty on both an international and domestic scale. Orabi (2019) conducted a study to examine the SE's role in the local economic development of Gharb Soheil village, a Nubian tourist destination; data were collected from 115 Nubians using the Airbnb platform for hosting tourists. The results highlighted a significant contribution of the sharing economy to local economic development, with 68% of respondents citing earning their main or additional income as their primary motivation. Notably, 89% reported positive lifestyle changes upon becoming Airbnb hosts.

Therefore, SE has been linked to the achievement of the SDG aimed at ending poverty in all its forms worldwide, providing individuals with opportunities to generate income for their sustenance and promoting employment and decent work. The SE is associated with economic growth, as elucidated by Tussyadiah and Pesonen (2016). Airbnb's influence extends beyond mere disruption; it actively enhances key aspects of tourism. The platform is identified as a catalyst for increasing the array of destinations chosen by tourists, prolonging the duration of their stay and amplifying the spectrum of activities they engage in, thereby optimizing overall tourism expenditure.

Additionally, the SE is linked to economic benefits such as reduced total costs and enhanced marketing. Shared laundry services are predicted to cut resource use by 30–90% compared to individual machine ownership and usage at home (Einav *et al.*, 2016). In contrast to pipeline businesses, which adjust production capacity based on demand, sharing platforms employ sophisticated and dynamic pricing on the supply and demand sides. For instance, Uber employs surge pricing to attract a higher number of drivers to meet increased demand in specific locations and times, simultaneously allocating spare capacity to users with the highest utility. This approach allows for rapid scalability of capacity, particularly during periods of high demand that are less price-sensitive. Moreover, capacity constraints can be flexible, as exemplified by Uber Pool, which enables a single vehicle to carry multiple passengers along a designated route, thereby enhancing vehicle capacity and supply. Consequently, SE demonstrates greater flexibility and faster responses to changes than pipeline businesses (Wirtz *et al.*, 2019).

Regarding the social dimension, the SE has been portrayed as a model that contributes to diminishing socioeconomic disparities both on a global scale and within individual countries (Hamari *et al.*, 2016). The SE can play a role in diminishing gender disparities by offering increased flexibility in work options. According to the World Bank, in 2018, 55% of Airbnb accommodation providers were women. Airbnb is contributing to gender equality and women's empowerment. SE enhances social connections, cooperation and networking. The utilization of digital platforms and peer-to-peer reviews is expanding sharing activities beyond family and friends to include individuals who are strangers.

Regarding the environmental dimension, numerous scholars have confirmed the positive impact this phenomenon can have on the environment. A ride-sharing system has the potential to decrease fuel consumption and the material and energy requirements for producing additional cars. Martin and Shaheen (2011) found that car sharing decreases the average greenhouse gas emissions of households in North America. Likewise, Firnkorn and Müller (2011) explored Car2go in Germany and revealed its positive impact on the environment. Other sharing economy examples, like bike-sharing contribute to environmental advantages by reducing traffic. Adopting a consumption model focusing on collaborative consumption, swapping and reuse has the potential to decrease overall goods production, associated pollution and waste generation (Perkumiene *et al.*, 2021). Additionally, Laukkanen and Tura (2020) highlight that this decrease in resource consumption plays a role in alleviating the adverse environmental effects of both domestic and commercial activities, thereby preserving assets for future use.

While these studies provide valuable insights into the alignment of SE practices with sustainability objectives, there exists a notable gap in research, particularly in emerging economies. However, the limited attention given to the sharing economy in the context of SDGs in emerging economies underscores the need for more comprehensive investigations. Understanding the role and impact of the sharing economy within the SDG framework in emerging economies is crucial for identifying opportunities and addressing potential pitfalls, ultimately contributing to the formulation of effective policies that promote sustainable development and inclusive growth. The next section explores the role of the government as a regulator and how it fosters SE development.

4.3 Fostering and regulating the sharing economy: government initiatives and strategies

Experiencing rapid and exponential growth, the SE has garnered significant attention, emerging as a top priority for governments worldwide (Morell *et al.*, 2020). Operating within an environment where policy responses are unsystematic towards which policies may be more beneficial; on the other hand, collaborative practices present significant potential and opportunities for public innovation that remain untapped. Although SE represents a significant paradigm shift, steering this change in a positive direction necessitates addressing imposed challenges to redirect the new model towards a sustainable future. Hong and Lee's (2020) results validate the connection between the effectiveness of government and SE expansion. A higher degree of government effectiveness correlates with increased development of the sharing economy.

Bentkowska (2021) highlighted that the evolving landscape of the SE poses challenges for established institutions. There is no universal solution or standardized strategy for crafting effective regulations, as various countries and cities adopt diverse approaches. It is essential to note that not all rules contribute positively to the advancement of the SE. Governments worldwide exhibit varying responses to it. Unlike countries like Finland, Sweden and Singapore, which embrace SE, the South Korean government outright banned Uber (Hong and Lee, 2020). Although previous studies have addressed issues related to technology, economics and environmental impact, they have not incorporated other pertinent

sustainability considerations, such as inclusion or legal implications. The digital platform model is described as having the ability to self-regulate through the platform's internal vetting and reputation systems; raising concerns regarding how to protect the platform's vetting systems from misuse and discriminatory practices. Thus, creating a supportive market and regulatory environment for the growth of small, independent businesses, along with mitigating the dominance of large monopolies, is crucial.

Efforts to promote inclusion should encompass initiatives to enhance Internet accessibility and literacy. Yin *et al.*'s (2021) results indicated that SE gained greater popularity in areas characterized by elevated levels of urbanization and education. Educational programmes can play a vital role in raising awareness about social and environmental issues linked to excessive consumption. These measures collectively contribute to shaping and expanding the SE while respecting the individuals and communities integral to the sharing philosophy. In addition to facilitating access to SE opportunities for marginalized groups, promoting inclusivity and reducing socioeconomic disparities. Building awareness to inform the public about the benefits and risks of participating in the SE. Foster collaboration between SE and traditional industries to leverage the strengths of both sectors, contributing to economic growth and job creation. As Jiang and Zhang (2019) suggested, governments could establish standardized requirements to ensure that service providers meet minimum operating standards, thereby guaranteeing customer safety throughout service delivery.

Governments in emerging economies can take several strategic actions to promote and facilitate the growth of the SE. Invest in robust digital infrastructure to enhance Internet connectivity and accessibility. A strong online presence is critical for the success of digital platforms; widespread access enables broader participation, ensuring that individuals across different regions can participate in sharing activities seamlessly. Another key strategy involves the development of a conducive regulatory framework that accommodates the unique characteristics of SE. Establish clear guidelines that ensure consumer protection, fair competition and adherence to legal standards while fostering innovation. Furthermore, governments may consider offering tax incentives or subsidies to encourage SE growth and foster innovation. Implement mechanisms for ongoing monitoring and evaluation of sharing activities. Regular assessments help identify challenges, measure the impact and adjust policies as needed to ensure sustainable development. By implementing these strategies, governments in emerging economies can create an enabling environment for the SE to thrive, contributing to the overall well-being of their populations.

5. Discussion and future research

The SE has emerged as a transformative force with profound implications for economic development, social cohesion and environmental sustainability. An innovative economic model that fosters a sense of community and strengthens social bonds by encouraging collaborative consumption and resource sharing among individuals. Extensive research emphasizes its capacity to tackle diverse challenges and align with worldwide endeavours aimed at attaining sustainable and inclusive development. It not only contributes to unlocking new entrepreneurial opportunities but also promotes sustainability through the efficient use of resources. According to Economist Thomas Piketty, the concentration of wealth-generating activities within the hands of a privileged few leads to the perpetuation of economic inequality, as those who control substantial resources continue to accumulate wealth at a faster rate than the general population (Facchini and Couvreur, 2015). The sharing economy presents an economic model where the decentralized structure of resource sharing could potentially reduce the concentration of wealth, leading to a more equitable distribution of wealth.

The degree of government participation in the market has long been a topic of scholarly debate. As a novel economic model, the early growth of the SE in emerging economies is closely tied to government support and guidance. Governments should provide the necessary infrastructure to support its development, in addition to establishing a regulatory framework that fosters innovation and, at the same time, addresses issues related to liability and consumer protection. By actively engaging with stakeholders, including platform operators, consumers and local communities, governments can contribute to the sustainable development of the SE, promoting economic inclusivity, social cohesion and environmental responsibility. While excessive intervention may impede the advancement of SE, imprudent guidance could result in market monopolies during later stages of development. Therefore, assessing the degree of government intervention becomes essential and necessitates further and continuous research.

The sharing economy is a potential source of job creation, especially in high unemployment rates and low-income regions. Sundararajan (2016) explained that the ramifications of the SE go beyond job creation, as it blurs traditional employment boundaries and challenges distinctions between personal and professional spheres. This shift has profound economic and social implications, shaping the contemporary employment landscape. Future research in this area holds promise for understanding the long-term effects of the SE on employment patterns, job security and income distribution. Exploring potential synergies or conflicts and examining the role of government policies in shaping SE employment will be crucial for policymakers. As the SE continues to reshape conventional notions of work, comprehensive research efforts will provide valuable insights into navigating and harnessing its potential while addressing emerging challenges. Further, as Oberg (2024) highlighted, there is a need for further study tackling SE scalability and its relation to its sustainability.

The increased availability of information gives rise to concerns regarding privacy and security. Questions arise concerning the types of data being gathered, the location and security of data storage and the utilization of data by collectors. From an ethical standpoint, there should be a threshold beyond which the technology-enabled collection of an individual's life details becomes excessively intrusive. Ensuring users' privacy is essential for their engagement with SE and its sustainability. For instance, the scandal involving Cambridge Analytica and Facebook exposed millions of users, serving as a turning point that prompted increased government regulation of the internet to protect consumer privacy (Zoltan *et al.*, 2020). Research in this domain can contribute significantly to privacy-centric policies and guidelines that foster a trustworthy environment for users participating. Understanding the privacy challenges faced by service providers and consumers will be pivotal in ensuring the functioning of digital platforms. Further, cashless payments streamline the user experience on digital platforms, eliminating the need for physical currency. This convenience attracts more participants to engage, thereby fostering its growth. Research is essential to explore the correlation between the proliferation of digital payments and the advancement of the SE, considering the associated benefits and risks.

While there has been substantial research on the impact of SE in advancing the SDGs, it is noteworthy that most of these studies predominantly focus on the United States of America, the EU and various Asian countries. In accord with Sadiq *et al.* (2023), previous scholars explored SE with a focus on high-income nations, and many fewer studies have examined this topic in the context of low-income countries. Despite the valuable insights gained from these investigations, there exists a significant gap in the literature about emerging economies. Recognizing the diverse socioeconomic landscapes and distinct challenges faced by countries in other regions, there is a pressing need to develop and expand research efforts in these areas. By directing attention towards emerging economies, researchers can gain a more comprehensive understanding of the role of SE in addressing sustainable development challenges, fostering inclusive growth and contributing to global sustainability objectives.

While Sharm el-Sheikh was recognized as a prominent Airbnb destination in 2017 (EgyptIndependent, 2017), experts believe that Airbnb has not achieved great success in Egypt, mainly due to its failure to adapt to local conditions and establish trust between lenders and borrowers. Trust fosters a positive and secure environment for peer-to-peer transactions and is essential for the success of SE. Examining what drives individuals to participate in sharing activities is essential to understanding the dynamics of this evolving economic model. The application of social computing methods enhances this domain, offering valuable insights for platform operators, policymakers and researchers. Fuzzy set qualitative comparative analysis (fsQCA) has demonstrated significant potential in enhancing the understanding of consumer decision-making processes in digital environments. By considering the varying degrees to which certain conditions contribute to consumer behaviours, fsQCA offers a more comprehensive analysis than traditional quantitative methods. This approach enables researchers to capture the heterogeneity of online consumer behaviour, leading to more informed and effective marketing strategies (Kumar *et al.*, 2022; Aref, 2023).

Further, machine learning algorithms can be employed to analyse vast datasets, including user reviews and feedback, to extract patterns and insights related to consumer motivations and trust-building mechanisms. Social network analysis may uncover the intricate relationships and networks within the SE community, shedding light on its diffusion. Further, agent-based modelling helps in capturing the emergent properties and patterns that arise from individual interactions, offering insights into the overall dynamics of the sharing economy.

6. Conclusion

The sharing economy introduced as an innovative player, disrupting various traditional sectors, has been one of the most significant developments in recent years. Leveraged by the advancement of digital technologies, this decentralized business model connects users directly with service providers, driving economic growth and transforming global perspectives on resource utilization. It reshapes the conversion of resources into economic value and influences our understanding of available resources and their utilization. The proper implementation of the sharing economy within a country is advantageous for encouraging optimal resource use, lowering energy consumption and increasing long-term economic development, enhancing both environmental quality and socioeconomic well-being. The sharing economy is a disruptive force that can address the three pillars of sustainability.

The global challenge of achieving SDGs through a sharing economy requires the attention of policymakers and scholarly discussion about whether features of a sharing economy should or should not be encouraged. The disruptive nature of SE has the potential to challenge existing monopolies and possibly generate new ones. The sharing economy is garnering significant attention and emerging as a top priority for governments worldwide, with considerable optimism for its potential contribution to sustainable societal development. Its implementation highlights the importance of data sharing and governance to ensure the sustainability of the new economic model. Researchers benefiting from web mining techniques can understand how the SE contributes to or challenges the SDGs. This data-driven approach allows for evidence-based insights that inform policymaking and promote sustainability.

The dynamic nature of the sharing economy, influenced by technological advancements, societal shifts and economic dynamics, necessitates a sustained commitment to research. Scholars and industry experts must engage in continuous exploration and analysis to inform policymakers, businesses and society at large about the evolving nature of this transformative economic model.

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