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Research Article

Sustainable development in the Spanish media: content analysis and case study

El desarrollo sostenible en los medios de comunicación españoles: análisis de contenido y caso de estudio

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Abstract:
Introduction: Sustainability is a field of research that concerns today's society. This research has three objectives. Firstly, to analyse the main thematic lines published in the Spanish press on innovation, technology, and their impact on sustainability during the 2014-2019 period. Second, to identify emerging discourses on disruptive technologies and their applicability. Third, from the media representation of the analysed news, build a case study that allows a deep understanding of these technologies' impact on sustainable development. **Methodology**: News gathering is done using Factiva®, a tool by Dow Jones & Company ©. A sample of 12,647 news items has been obtained. Content analysis is done with T-Lab software. **Results:** The results suggest that the press uses heterogeneous discourses to construct Spanish public opinion on sustainable development. Blockchain is presented as a disruptive technology for innovations aimed at sustainability. **Discussions:** Integrating blockchain in food distribution chains transforms traditional business models into more sustainable models. **Conclusions:** This technology improves food safety risk management and promotes local consumption models.

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Keywords: sustainability; socio-technical transition; blockchain; technology; media; press; content analysis; case study.

Resumen:
Introducción: La sostenibilidad es un campo de investigación que preocupa a la sociedad actual. Esta investigación tiene tres objetivos: analizar las principales líneas temáticas publicadas en la prensa española sobre innovación, tecnología y su impacto en la sostenibilidad durante el periodo 2014-2019; identificar los discursos emergentes sobre las tecnologías disruptivas y su aplicabilidad; a partir de la representación mediática de las noticias analizadas, construir un estudio de caso que permita una comprensión profunda del impacto de estas tecnologías en el desarrollo sostenible. **Metodología**: La recopilación de noticias se realiza utilizando Factiva®, una herramienta de Dow Jones & Company ©. Se ha obtenido una muestra de 12.647 noticias. El análisis de contenido se realiza con el software T-Lab. **Resultados:** Los resultados sugieren que la prensa muestra discursos heterogéneos para la construcción de la opinión pública española sobre el desarrollo sostenible. Blockchain se presenta como una tecnología disruptiva para las innovaciones orientadas a la sostenibilidad. **Discusión**: La integración del blockchain en las cadenas de distribución alimentaria permite transformar los modelos de negocio tradicionales en modelos más sostenibles. **Conclusiones**: Esta tecnología mejora la gestión de riesgos de seguridad alimentaria y fomenta modelos de consumo de proximidad.

Palabras clave: sostenibilidad; transición sociotécnica; *blockchain*; tecnología; medios de comunicación; prensa; análisis de contenido; caso de estudio.

1. Introduction

Sustainable development is a new model for human relations with the environment. Society is more aware of sustainability problems (Moore, 2005). Since 2014, Spanish citizens' concern for the environment and sustainability has tripled (Centro de Investigaciones Sociológicas, [CIS], 2019; 2014).

There is a causal relationship between the priority issues of the media and the importance of social problems in citizenship (Kiousis & McCombs, 2004). The media are essential in structuring the social fabric and confining public opinion (Mcquail, 2000). They provide citizens with information that integrates different versions of reality (refracted reality) (Lippmann, 2003). Framing is constructing public discourse on issues of general interest in which certain factors of reality are chosen and given greater importance (Entman, 1993). Thus, the media have an essential role in constructing the frames of reference used to interpret topics of public interest (Scheufele, 1999). In the media, more and more information about new sustainability models appears. Similarly, the increase in technological and scientific development and concern for the environment is reflected in the media. The media constitute a central "interpretive system" of modern societies (Schmidt *et al*., 2013). In the process of socializing sustainability and technology, the media build a public image of these aspects (Fernández Reyes, 2004).

Audiences demand content that delves into the causes and consequences of events, which leads to the emergence of journalistic specialization to respond to the needs of users and provide quality information (Fernández del Moral & Esteve, 1993). This arises from techno-scientific journalism linked to the information generated by science and technology, energy journalism that addresses energy models, and ecopolitical journalism focused on environmental issues from a political perspective. All of them are included in sustainable journalism (Fernández Reyes, 2004). Thus, the speech in the press introduces the impact of technology and innovation as socio-technical factors of sustainable transitions in companies.

Society is in a strong process of sustainable transition (Markard *et al*., 2012; Safarzyńska *et al*., 2012); the spatial perspective (Coenen *et al*., 2012) shows the importance of innovation and technology (Kern *et al*., 2019; Slayton & Spinardi, 2016) for the socio-technical transition (Markard *et al*., 2012; Garud & Gehman, 2012). Understanding multidimensional interactions within socio-technical transitions (Rosenbloom *et al*., 2016) helps to understand the pathways (Geels *et al*., 2016) and the impact of emerging policy (Diercks *et al*., 2019; Huang, 2019). The governance of sustainability transitions impacts business models (Bolton & Hannon, 2016; Abdelkafi & Hansen, 2018; Špaček & Vacík, 2016), the strategy (Singla *et al*., 2018; Bohnsack, 2018), and the technological innovation systems (Frishammar *et al*., 2019; Haley, 2018; Isabelle, 2016).

Innovation is an essential means of impacting business growth and long-term economic development. Innovation can be radical or incremental. Technological disruption is an outstanding path to create radical innovation. It involves implementing product improvements, redefining its attributes, or designing new products and services. Innovation contributes to sustainability (Pezzey & Toman, 2002; Schaltegger & Wagner, 2011).

Concern for the human environment has evolved and spread to society for half a century (United Nations, 1972). Sustainable development merges three viewpoints, which serve as a basis for sustainability-driven innovations (SOIs): economic, ecological, and social (Kuhlman & Farrington, 2010; World Commission on Environment and Development [WCED],1987).

Environmental concerns are acknowledged as pioneers in innovation strategies (Orlitzky *et al*., 2011), crafting new business models (Stubbs & Cocklin, 2008; Joyce & Paquin, 2016), and directing strategic transformations (Aragón-Correa *et al*., 2008). The transformation of business models based on technology allows companies to understand customers' needs and desires better and facilitates a dynamic adaptation to market preferences (Usai *et al*., 2020).

The innovation paradigms are based on Total Innovation Management (TIM) (Xu *et al*., 2007), which provides flexibility and agility (Menke *et al*., 2007). These core dynamic capabilities are essential for the development of SOIs. Technology transfer processes drive socio-technical transformations and impact employees and the community (Uusitalo & Lavikka, 2021). In this sense, companies create value for their stakeholders through four consecutive strategies (Nidumolu *et al*., 2009): perceiving compliance as an opportunity, ensuring sustainability in value chains, creating eco-friendly products and services, and formulating new business models.

For their part, certification processes stimulate organizational learning and become critical disruptors of innovation processes (Pesonen, 2001). Collaboration in the supply chain and stakeholders is recognized as a unifying thread towards sustainability (Roome, 2012).

The triple-bottom-line approach to organizational sustainability (Elkington, 1994) includes new or improved processes (Huber, 2008), new organizational forms and industrial symbiosis (Paquin *et al*., 2015), new products (Hart & Milstein, 2003; Van Hemel & Cramer, 2002) or technologies and management systems that are beneficial to the environment (Rennings *et al*., 2006). Value creation integrates the three original spheres proposed by Brundtland Report (WCED, 1987): economic, environmental, and social.

Sustainable core business is based on analysis of product life cycle and technology opportunities. Collaboration and interaction between multiple actors (Hartono & Holsapple, 2004) allow for solving sustainability problems (Lozano, 2007). As a change vector, radical innovations transform the sustainable development of whole industries (Hoffrén & Apajalahti, 2009).

Companies that consider their impacts outside core operations focus on their supply chain. Social impact increases with inclusive sourcing and cooperative ownership-based business models. Some business models with environmental impact are closed-loop production, physical-to-virtual models, produce-on-demand, rematerialization, and circular economy (Clinton & Whisnant, 2019). Blockchain technology has shown a moderating impact on companies' life cycle stages, affecting corporate social responsibility (CSR) performance and accelerating the economic consequences of engaging in certain types of CSR activities (Ezzi *et al*., 2022).

2. Materials and Methods

The objectives of this research are as follows: (1) Analyse the main thematic lines published in the Spanish press on innovation and technology and their impact on sustainability during the 2014-2019 period. (2) Identify emerging discourses on disruptive technologies and their applicability. (3) Design a case study that allows a deep understanding of these technologies' impact on sustainable development and socio-technical transition.

For this, a qualitative-quantitative textual analysis of the news that appeared in national media and Spanish language, including references to the terms “sustainability,” “innovation,” and “technology,” was carried out between January 1, 2014, and December 31, 2019.

Publications were searched using the Factiva® tool. This information database belongs to Dow Jones & Company© and provides access to more than 33,000 premium and reputable sources worldwide. In Spain, it allows online access to 264 national newspapers.

The period analysed begins on January 1st, 2014, with the beginning of Spain's recovery after the economic crisis and ends on December 31st, 2019, before the COVID-19 crisis. An initial screening of the results enabled us to acquire 12,647 news items. Next, the information was examined using T-LAB Plus 2020, a software that provides statistical and content analysis tools by detecting word patterns.

The extraction of information from our research with T-LAB was based on two types of textual units: elemental contexts and lexical units. Elementary contexts are proportions of the corpus text corresponding to syntagmatic units of one or more sentences. They are the result of the segmentation of the linguistic corpus carried out by T-LAB to analyse the computation of co-occurrences. On the other hand, each linguistic unit constitutes a register containing two types of information: word and lemma. The word is displayed and enumerated as it appears in the corpus. At the same time, the lemma constitutes the label attributed to the lexical units grouped and classified according to custom dictionaries. These semantic categories include

terms with the same meaning for research or linguistic criteria (lemmatization).

The initial automatic normalization supplied by T-LAB for the database provides 2,280 lexical units. T-LAB calculates the frequency threshold to select words or lemmas and guarantees statistical data reliability. The size of the linguistic corpus determines that, during the preprocessing phase, the minimum frequency threshold was set to 10. Finally, 455 lexical units (lemmas or keywords) were selected. Based on these quantitative characteristics, clusters or thematic groups were classified. This tabulation allowed us to determine what topics were covered in the news, their relationship, and the frequency of their media appearances. The corpus was examined to classify the content into significant thematic groups or clusters, which constituted elementary groupings characterized by the same patterns in terms of lemmas.

The process was carried out through the T-LAB software's unsupervised "clustering" method (bisecting k-averages algorithm), which first performs a co-occurrence analysis and, subsequently, a comparative analysis.

The elemental contexts analysed were 170,694, of which 139,925 (81.97%) were classified. The partition of 3 clusters was selected due to its adherence to the sample. Three clusters related to the following contexts were identified: "technology in supply chains," "innovation in the university," and, finally, "tourism, city and mobility." Since this study focuses on analysing the impact of technology and innovation on sustainability, the first cluster was chosen to design a case study. In the "Technology in distribution chains" group, emerging discourses on disruptive technologies and their applicability were identified. Furthermore, the academic literature confirms that the blockchain is disruptive for SOI (Hall, 2002; Paech, 2007), specifically in the agri-food supply chain. Furthermore, Carrefour is the company that appeared most frequently in this cluster (Table 1). For this reason, news linked to blockchain, Carrefour and SOIs were chosen (Schaltegger & Wagner, 2011). Its detailed review allows for constructing a case study based on the digital transformation of the agri-food supply chain.

3. Results

The case study is constructed by combining academic knowledge with refracted reality (Lippmann, 2003) broadcast by the media. It is observed that the contents of blockchain technologies have more presence in the media than other technologies, such as AI, Big Data, and Cloud computing, among others. On the other hand, the results show that the information published in the media about blockchain is aimed at disseminating and generating debates about socio-technical and sustainable societal transitions. The news analysed does not delve into specific technical aspects related to platforms, protocols, software/hardware, technical specifications, etc.

This case study is structured in three parts: description of the context, application of blockchain technology, and analysis of its effects on the agri-food system and society. The presentation of the results follows the following structure: (1) identification with T-Lab of the main statistically significant lemmas that constitute the clusters; (2) design and analysis of the case study.

3.1. Cluster analysis

The cluster analysis identifies three thematic groups: "technology in supply chains," "innovation in the university," and "tourism, city, and mobility."

Cluster 1. "Technology in supply chains": this cluster includes statistically significant lemmas ($p < 0.05$) associated with companies, investments, and competitive conditions derived from

the digitalization strategy and food distribution chains (Table 1). It is observed that blockchain and Carrefour stand out as relevant fields for the case study design. Blockchain technology constitutes a data structure based on a network transaction that facilitates the secure transfer of information through the Internet without intermediaries (Marsal-Llacuna, 2018). For its part, Carrefour is a multinational distribution chain of French origin. It is considered the leading European distribution group, and its Spanish subsidiary is listed on the IBEX-35.

Table 1.

Cluster "technology in supply chains"

Original Lemma (Spanish)	Lemma	In Clu	In Tot	Chi²	p-value
empresa	Company	30,725	36,868	16,678,070	0.000
mercado	Market	9,791	10,702	7,320,991	0.000
cliente	Client	6,867	7,277	5,678,623	0.000
negocio	Business	7,892	8,785	5,525,007	0.000
inversión	Investment	7,916	9,604	3,988,180	0.000
digitalización	Digitization	10,266	13,676	3,385,839	0.000
transformación	Transformation	3,449	4,816	874,197	0.000
líder	Leader	3,305	4,623	829,144	0.000
cadena	Chain	1,969	2,697	554,541	0.000
business intelligence	business intelligence	1,189	1,483	527,914	0.000
distribución	Distribution	1,298	1,707	450,847	0.000
automatización	Automation	1,217	1,598	425,893	0.000
competitividad	Competitiveness	3,552	5,713	320,485	0.000
alimentación	Feeding	4,299	7,055	317,542	0.000
supermercado	Supermarket	359	425	197,813	0.000
fruta	Fruit	534	732	149,453	0.000
blockchain	Blockchain	696	1,004	144,456	0.000
ciberseguridad	Cybersecurity	447	601	138,664	0.000
Carrefour	Carrefour	162	190	92,569	0.000
productor	Producer	718	1,222	34,443	0.000

In Clu: total number of elementary contexts that include that same lemma
In Tot: number of elementary contexts that include a specific lemma
Chi2: Chi-squared test
p-value: the probability that the calculated chi-squared test value is possible given one null hypothesis. The required significance value has been set to $p<0.05$.

Source: Own elaboration (2024).

Cluster 2. "Innovation in the university": this cluster shows statistically significant lemmas associated with different research areas and the interaction between university-business. It summarizes the heterogeneous nature of the Spanish university system (Pérez & Aldás, 2019), especially in research and knowledge transfer activities.

Cluster 3. "Tourism, city, and mobility": this cluster includes lemmas associated with aspects of tourism, mobility, and the city related to the environment and sustainability.

The complete analysis of the three clusters can be consulted by Castelló-Sirvent and Roger-Monzó (2024).

3.2. Carrefour Case Study

As explained previously, this work focuses on analyzing the impact of technology and innovation on sustainability, so the cluster "technology in distribution chains" constitutes the basis of the case study. Specifically, the implementation of blockchain in Carrefour is analyzed. In this way, the case study contributes to expanding knowledge of blockchain in the green agri-food supply chain (Fu *et al*., 2020; Guerra & Boys, 2022).

The birth of blockchain took place in the field of Bitcoin (Nakamoto, 2008), and it is presented as a promising technology with the potential necessary to facilitate the exchange of data in a decentralized, secure, and consensual way (Scott *et al*., 2017). This system provides transparency and security since it records any transaction, from the product's origin to the point of sale, and the information can be verified at any time (Borrero, 2019).

The information derived throughout the process is immutable (Adams *et al*., 2017; Cai & Zhu, 2016). Thus, blockchain provides total transparency since it allows access to the complete traceability of the data. Currently, the processes of supply chains in centralized traceability systems are usually complex and opaque, which can generate distrust of the possibility of falsifying information (Borrero, 2019).

3.2.1. Context description

The food distribution sector includes players such as Mercadona, Lidl, Consum, or Eroski. It is a highly concentrated sector in which distribution chains based on other products try to expand their customer base in the food area. The sector's high competitiveness encourages the creation of strategies to capture value and retain customers.

The diversity of supply chains, often of international origin, adds an additional level of difficulty to monitoring the value creation process in food transformation and distribution. Furthermore, the complexity of the value chains, the multiple agents involved, and their geographical distribution represent risks for controlling food security.

In the summer of 2019, there was an outbreak of listeriosis in Andalusia, whose origin was processed meat (Larrinaga & Moreno, 2019). This public health crisis affected more than 200 people (Serrano, 2019; 20minutos, 2019). Food safety risk management is slow because it is based on often unknown, inaccurate, and unreliable data.

Food security problems (Trienekens & Zuurbier, 2008) erode consumer confidence (Trienekens *et al*., 2012). There is a greater awareness of food safety and sustainability, and more information is required on the agri-food chain (Borrero, 2019). Therefore, various measures have been taken to guarantee transparency in its distribution chain (Akkerman *et al*., 2010).

Blockchain applications can be used in any supply chain context and promise to transform current business models. They are already reshaping relationships between clients and organizations (Queiroz *et al*., 2019).

Carrefour has recently implemented this technology to improve the integrity of the food supply chain, which translates into remodeling product safety, thanks to the access to traceability knowledge.

Food brands adjust their business models, seeking efficiency and building emotional bonds with consumers to raise long-term loyalty. In this sense, technology can show the direction that distribution chains must follow in their strategy of creating sustainable value that is emotionally linked to their customers.

Commercial blockchain applications to the agri-food sector are still in their infancy (Lin *et al*., 2017). In any case, blockchain is presented as a solution that adapts to the needs of the traceability system and the agri-food supply chain, providing transparency and trust between the agents involved (Ge *et al*., 2017).

3.2.2. Blockchain technology application

In the context description, emerging themes are detected in the Spanish media agenda that defines the digitization process in commercial distribution (Álvarez, 2019; Fernández, 2016). The digital transformation of Carrefour's business model aims to improve customer connection by developing omni-channel strategies. With the impulse of e-commerce and the design of product traceability systems, the customer can follow his process anytime, from before buying to after-sales service.

In this way, Carrefour simplifies its organization and broadens its digital focus (Europa Press, 2018). The "Carrefour 2022" plan implements blockchain technology to improve the traceability of fresh products such as chicken, meat, milk, eggs, oranges, and cheese (González, 2019). This technology is integrated into Carrefour's omnichannel strategy. A QR code on the product label lets us know the origin and production conditions. All traceability is reliable, offering information on intermediaries and transformation conditions. The customer can access this information using their smartphone. Therefore, information about the breeding place of a free-range chicken and the type of feeding or treatments received are easily accessible (e.g., without antibiotics) (Europa Press, 2018).

In the case of hake, the blockchain allows you to consult all the details related to the product's production, transformation, and distribution. It is possible to know which boat made the catch, the coordinates of the fishing area, the fishing technique, the exact location of the fish market where it was landed, how the product has been conditioned, and the date of delivery to the supermarket (ABC, 2019).

Similarly, applying this technology to the fruit sector allows acquiring information about the origin, the agents that have intervened throughout the value chain, the growing conditions, and the environmental impact.

3.2.3. Effects of blockchain technology

The adoption of blockchain allows the creation of important competitive advantages in a highly concentrated sector (Europa Press, 2018; El Español, 2018; Europa Press, 2019). Blockchain allows the generation of new business models oriented to sustainability. Sustainability implies balancing the economic, social, and environmental spheres, and blockchain is a technology that produces changes in these three dimensions.

In the economic dimension, the main benefits of blockchain technology are transparency and traceability (Queiroz *et al*., 2019; Kshetri, 2018; Francisco & Swanson, 2018). The social dimension contemplates benefits such as the generation of consumer confidence and information security (Cole *et al*., 2019; Kamble *et al*., 2020).

Lastly, the environmental dimension focuses mainly on the benefits of identifying and verifying compliance with criteria and certifications of the origin and treatment of products (Saberi *et al*., 2019) and resource-optimized use (Treiblmaier, 2018; Wang *et al*., 2019).

With its technological intervention, Carrefour improves the sector's environmental sustainability. By applying its technology to fish, poultry (chickens), fruits, and vegetables, Carrefour offers its consumers a certification of origin and processes, as well as ecological products, including pesticides used for production and the carbon footprint generated until reaching the final consumer.

In the case of hake fishing, the blockchain solution implemented by Carrefour allows for the identification of the catches made with the "longline gear." This fishing technique is selective, clean, and sustainable and consists of launching a line with thousands of hooks at different depths, which contributes to conserving the ecosystem (ABC, 2019). This technology can reduce information asymmetry. Consequently, increased competition can provide greater social welfare. However, collusion risks can cause an irreducible distribution of information (Cong & He, 2019). Therefore, blockchain technology improves trust in companies and institutions and generates a better commitment (Carayannis *et al*., 2022).

4. Discussion

The refracted reality shown by the media in Spain is heterogeneous. The discourse on innovation, technology, and its impact on sustainability during the 2014-2019 period suggests different thematic lines focused on SOIs and new business models, the importance of the University for the transfer of innovation, tourism, and mobility. Multi-dimensional discursive interactions and struggle to frame innovations using narrative work and the landscape is socially constructed (Rosenbloom *et al*., 2016). These complex and multi-dimensional shifts are necessary to adapt societies and economies to sustainable modes of production and consumption (Coenen *et al*., 2012).

The case study focuses on the cluster that links emerging technologies, SOIs, and the agri-food supply chain. It allows for identifying actions that improve business models and sustainability. Emerging technologies and new business models improve the ecosystem's ability to monetize market-driven SOIs (Good *et al*., 2020). The diversity of regulations of international supply chains and their asymmetric, inaccurate, and centralized information raises difficulties in exercising effective control and offering transparency to society.

The media representation of the link between innovation, technology, and sustainability suggests multiple debates. In multi-dimensional interactions within socio-technical transitions, actors use language to build or erode the legitimacy of socio-technical innovations, maintaining a discursive focus to take advantage of their niches within transitional episodes (Rosenbloom *et al*., 2016).

Implementing blockchain technology in food distribution chains offers essential possibilities for transforming their traditional business models into more sustainable models, focusing on all stakeholders (Joyce & Paquin, 2016). In contexts characterized by highly competitive sectors, blockchain allows the generation of new business models for sustainability. This

opportunity is geared towards creating value for all stakeholders. The application of blockchain technology is a mechanism that generates economic, social, and environmental change. This approach is aligned with the Triple Bottom Line (TBL) perspective (Savitz, 2013). Sustainability involves balancing these three dimensions (Seuring *et al*., 2018). In addition, Total Innovation Management (TIM) facilitates the market orientation of TBLs (Cunningham *et al*., 2017).

Consequently, the agri-food system can evolve in the different lines of action that are explained below:

1. Improve food traceability systems

Blockchain technology allows access to a reliable, secure, and block-distributed database that contains the history of all actors in the food supply chain and their exchanges during product creation and distribution. This performance impacts customer trust and improves the company's Corporate Social Responsibility (CSR). Blockchain technologies extend their effects as a "motor of creative destruction" (Kivimaa & Kern, 2016), enhancing and accelerating the socio-technical transition. This technological disruption aids in expanding corporate social responsibility performance, both from an approach oriented at the micro level and from developing the theory from the meso and macro level of policy design. Thus, blockchain improves the understanding of intrasectoral dynamics and makes it possible to identify the moderating effects of this technological disruption on the industry's life cycle, particularly in mature life cycle stages (Carayannis *et al*., 2022).

2. Raise food security in the supply chain

The critical points of each intermediary are identified, from the producer to the final consumer, with the improvement of accountability throughout the entire distribution chain. In the event of cross-contamination, food fraud, or disease transmission, blockchain technology allows to locate precisely and in seconds the affected batch of products and their geographical location. Consequently, the costs of tracing and withdrawing products are reduced. The novelties presented by the Common Agricultural Policy of the European Union (EU) are based on sustainable agriculture that guarantees producer incomes (Common Agricultural Policy, 2020). Blockchain technology modifies existing socio-technical trajectories. This dynamic of transformation increases the viability of the sustainability transition pathways (Turnheim & Nykvist, 2019).

3. Offer a 360º vision for all participants in the value chain

The different stakeholders that participate in the value creation chain in the food production, transformation, and distribution stages increase the control of the interdependence of processes. The generation of a comprehensive ecosystem of transparency allows suppliers to solve previously unsolvable problems, offering improvements in their reputation and the quality control of their products. The competitive position of the small producer is improved. New business models for sustainability increase interactions between individuals and groups inside and outside companies in a complex and dynamic reality (Roome & Louche, 2016). This case study's findings are consistent with previous research reporting success in digital transformation strategies, disrupting strategic change from three dimensions: infrastructure, development, and business (Naimi-Sadigh *et al*., 2022).

4. Increase consumer confidence and commitment

Information management is transparent through independent data. Blockchain technology prevents counterfeiting and allows quick access for the consumer through a label with a QR code. The consumer may know important information for responsible consumption. Among others, the carbon footprint generated by the product and its transformation and distribution, the certification of organic product, or the payment made to the farmer at origin. In addition, in recent years, the debate regarding payment to local producers has raised public awareness of the asymmetric allocation of profits from the food trade (EFE, 2018). Variety in territorial sensitivity, global networks, and local nodes, actor strategies, and resources across involve diversity in transition processes (Coenen *et al*., 2012).

5. Improve efficiency and sustainability in the use of natural resources

Blockchain promotes an intelligent and efficient use of groceries since it offers fast and reliable information on supply, demand, stocks, and expiration times. Blockchain technology helps prevent food waste, increasing sustainability in using scarce natural resources. Sustainability transitions involve the development of policies aimed at a broader change in the socio-technical system (Kivimaa & Kern, 2016) and generate the socio-technical system shape the evolution of the policy mix (Edmondson *et al*., 2019).

6. Promote the development of ecological ecosystems

The transparency and traceability offered by blockchain technology allow for verifying compliance with eco-production certifications. Incentives are created for sustainable agricultural production. Ecological and socially beneficial niche models empower small farmers. Improving sustainability transforms the sustainability of markets (Schaltegger *et al*., 2016). However, the challenges of blockchain are flexibility, transparency, traceability, trust, and privacy (Sternberg & Baruffaldi, 2018). This finding is consistent with the results of Giget (1997) by linking the social acceptability of innovation with the driving elements of the total innovation strategy. Blockchain technologies are decisively involved in managing R&D and innovation processes and are market-oriented to transform the ecosystem and communities of local producers (Demestichas *et al*., 2020). Blockchain favors the design of sustainable business models in the agri-food industry (Tiscini *et al*., 2020) and supply chain (Rana *et al*., 2021).

5. Conclusions

This article examines the social perception of sustainability, innovation, and technology by analysing news published in the print media to identify emerging discourses on disruptive technologies and their applicability. Analyzing media representations from a socio-technical transitions perspective focuses on how reality is reshaped and how sustainability is socially constructed. Based on the representation of the analysed news media, a case study is designed to allow a deep understanding of these technologies' impact on sustainable development. In this case, the news linked to the blockchain, Carrefour, and SOIs are chosen.

The omnichannel consumer is increasingly informed and committed to the environment. Their concern about using pesticides and phytosanitary products, fertilizers, and transgenic seeds reflects a growing trend toward the sustainability of natural resources.

The analysis of consumption impact becomes an important aspect for customers of socially responsible food distribution chains. Strategic orientations of the sustainability transition are complex and may be intermeshed. Blockchain technology allows the effects of the carbon

footprint to be identified throughout the entire supply chain, from origin to final consumption. In addition, the blockchain allows for determining the producer's profits at source, promoting proximity consumption models and the development of small local communities. The rural environment and organic farming matter to the consumer.

Blockchain technology enables better value capture for the consumer, increasing their bargaining power against the provider. This is an essential incentive for developing value propositions based on organic and seasonal production, especially for small farms and animals. Food safety is increasingly vital to a connected and knowledgeable consumer. Blockchain technology optimizes responsiveness and improves food security risk management by all stakeholders. However, blockchain presents some essential economic, social, and environmental challenges. Future research should explore these connecting factors to expand understanding of sustainable socio-technical systems.

Future works should offer an integrating perspective of the different sectors that may adopt this technology and its long-term effects on sustainability. This case study's novelty is based on a design that integrates academic knowledge and social reality that the press shows as a reflection of public opinion. In addition, this work allows us to deepen the analysis of socio-technical transition pathways and the effects of blockchain on sustainability.

6. References

20minutos (2019, August 31). Aumenta el número de hospitalizados por listeriosis en Andalucía, entre ellos un recién nacido. https://bit.ly/4b2oT5x

ABC (2019, May 3). Carrefour lanza un sistema de «blockchain» para que el consumidor conozca el origen del pescado fresco. *ABC*. https://bit.ly/3KGXknR

Abdelkafi, N., & Hansen, E. G. (2018). Ecopreneurs' creation of user business models for green tech: an exploratory study in e-mobility. *International Journal of Entrepreneurial Venturing*, *10*(1), 32-55. https://doi.org/10.1504/IJEV.2018.10007848

Adams, R., Parry, G., Godsiff, P., & Ward, P. (2017). The future of money and further applications of the blockchain. *Strategic Change*, *26*(5), 417-422. https://doi.org/10.1002/jsc.2141

Akkerman, R., Farahani, P., & Grunow, M. (2010). Quality, safety and sustainability in food distribution: a review of quantitative operations management approaches and challenges. *OR Spectrum*, *32*(4), 863-904. https://doi.org/10.1007/s00291-010-0223-2

Álvarez, J. I. (2019, March 3). *Carrefour, digitalización y multiformato para ser líderes*. elEconomista.es. https://bit.ly/3Vr8n9u

Aragón-Correa, J. A., Hurtado-Torres, N., Sharma, S., & García-Morales, V. J. (2008). Environmental strategy and performance in small firms: A resource-based perspective. *Journal of Environmental Management*, *86*(1), 88-103. https://doi.org/10.1016/j.jenvman.2006.11.022

Bohnsack, R. (2018). Local niches and firm responses in sustainability transitions: The case of low-emission vehicles in China. *Technovation*, 70, 20-32. https://doi.org/10.1016/j.technovation.2018.02.002

Bolton, R., & Hannon, M. (2016). Governing sustainability transitions through business model innovation: Towards a systems understanding. *Research Policy*, *45*(9), 1731-1742. https://doi.org/10.1016/j.respol.2016.05.003

Borrero, J. D. (2019). Sistema de trazabilidad de la cadena de suministro agroalimentario para cooperativas de frutas y hortalizas basado en la tecnología Blockchain. *CIRIEC-España, Revista de Economía Pública, Social y Cooperativa*, 95, 71-94. https://bit.ly/4cSEEwT

Cai, Y., & Zhu, D. (2016). Fraud detections for online businesses: a perspective from blockchain technology. *Financial Innovation*, *2*(1), 1-10. https://doi.org/10.1186/s40854-016-0039-4

Carayannis, E. G., Christodoulou, K., Christodoulou, P., Chatzichristofis, S. A., & Zinonos, Z. (2022). Known unknowns in an era of technological and viral disruptions—implications for theory, policy, and practice. *Journal of the Knowledge Economy*, *13*(1), 587-610. https://doi.org/10.1007/s13132-020-00719-0

Castelló-Sirvent, F. & Roger-Monzó, V. (2024). *Cluster analysis of sustainability narratives in the Spanish press during the period 2014-2019*. Repositorio Institucional UPV. https://m.riunet.upv.es/handle/10251/207103

Centro de Investigaciones Sociológicas. (2014). *Barómetro de noviembre 2014*. https://www.cis.es/documents/d/cis/es3045marpdf

Centro de Investigaciones Sociológicas. (2019). *Barómetro de noviembre 2019*. https://www.cis.es/documents/d/cis/es3267marpdf

Clinton, L., & Whisnant, R. (2019). Business model innovations for sustainability. En G. G. Lenssen & N. C. Smith (Eds.), *Managing Sustainable Business* (pp. 463-503). Springer.

Coenen, L., Benneworth, P., & Truffer, B. (2012). Toward a spatial perspective on sustainability transitions. *Research Policy*, *41*(6), 968-979. https://bit.ly/47fERJt

Cole, R., Stevenson, M., & Aitken, J. (2019). Blockchain technology: implications for operations and supply chain management. *Supply Chain Management: An International Journal*, *24*(4), 469-483. https://doi.org/10.1108/SCM-09-2018-0309

Common Agricultural Policy. (2020). *The Common Agricultural Policy (CAP)*. https://bit.ly/3VKX5yw

Cong, L. W., & He, Z. (2019). Blockchain disruption and smart contracts. *The Review of Financial Studies*, *32*(5), 1754-1797. https://doi.org/10.1093/rfs/hhz007

Cunningham, J. A., Menter, M., & Young, C. (2017). A review of qualitative case methods trends and themes used in technology transfer research. *The Journal of Technology Transfer*, *42*(4), 923-956. https://doi.org/10.1007/s10961-016-9491-6

Demestichas, K., Peppes, N., Alexakis, T., & Adamopoulou, E. (2020). Blockchain in agriculture traceability systems: A review. *Applied Sciences*, *10*(12), 4113. https://doi.org/10.3390/app10124113

Diercks, G., Larsen, H., & Steward, F. (2019). Transformative innovation policy: Addressing variety in an emerging policy paradigm. *Research Policy*, *48*(4), 880-894. https://doi.org/10.1016/j.respol.2018.10.028

Edmondson, D. L., Kern, F., & Rogge, K. S. (2019). The co-evolution of policy mixes and socio-technical systems: Towards a conceptual framework of policy mix feedback in sustainability transitions. *Research Policy*, *48*(10).

EFEAGRO (2018, January 2). En marcha la simplificación de las normas de la PAC. *EFE*. https://www.efeagro.com/noticia/simplificacion-normas-pac-reglamento-omnibus/

El Español (2018, November 20). Carrefour usa blockchain para saber si el pollo es campero. https://bit.ly/3M3DV0S

Elkington, J. (1994). Towards the sustainable corporation: Win-win-win business strategies for sustainable development. *California Management Review*, *36*(2), 90-100. https://doi.org/10.2307/41165746

Entman, R. (1993). Framing: Towards clarification of a fractured paradigm. En D. McQuail (Ed.), *McQuail's Reader in Mass Communication Theory* (pp. 390-397). SAGE Publications.

Europa Press (2018, March 6). Carrefour aplica la tecnología blockchain en el sector alimentario para conocer su trazabilidad. https://bit.ly/4bZqJWl

Europa Press (2019, March 11). Carrefour diferenciará productos ecológicos certificados en C-LM dentro de sus supermercados tras un convenio con Junta. *Europa Press*. https://bit.ly/4bWUSW8

Ezzi, F., Jarboui, A., & Mouakhar, K. (2022). Exploring the Relationship Between Blockchain Technology and Corporate Social Responsibility Performance: Empirical Evidence from European Firms. *Journal of the Knowledge Economy*, 1-22. https://doi.org/10.1007/s13132-022-00946-7

Fernández del Moral, J., & Esteve Ramírez, F. (1993). *Fundamentos de la información periodística especializada*. Editorial Síntesis.

Fernández Reyes, R. (2004). Periodismo ambiental y periodismo sostenible. *Ámbitos. Revista Internacional de Comunicación*, 12, 311-317. https://bit.ly/46Z8TBf

Fernández, J. (2016, December 9). Carrefour no pierde dinero con el comercio electrónico. *Expansión*. https://bit.ly/4epg8Wo

Francisco, K., & Swanson, D. (2018). The supply chain has no clothes: Technology adoption of blockchain for supply chain transparency. *Logistics*, *2*(1), 2.

Frishammar, J., Söderholm, P., Hellsmark, H., & Mossberg, J. (2019). A knowledge-based perspective on system weaknesses in technological innovation systems. *Science and Public Policy*, *46*(1), 55-70. https://doi.org/10.1093/scipol/scy037

Fu, H., Zhao, C., Cheng, C., & Ma, H. (2020). Blockchain-based agri-food supply chain management: Case study in China. *International Food and Agribusiness Management Review*, *23*(5), 667-679. https://doi.org/10.22434/IFAMR2019.0152

Garud, R., & Gehman, J. (2012). Metatheoretical perspectives on sustainability journeys: Evolutionary, relational and durational. *Research Policy*, *41*(6), 980-995. https://doi.org/10.1016/j.respol.2011.07.009

Ge, L., Brewster, C., Spek, J., Smeenk, A., Top, J., van Diepen, F., Klaase, B., Graumans, C., & Ruyter de Wildt, M. (2017). *Blockchain for agriculture and food: Findings from the pilot study*. Wageningen Economic Research.

Geels, F. W., Kern, F., Fuchs, G., Hinderer, N., Kungl, G., Mylan, J., Neukirch, M., & Wassermann, S. (2016). The enactment of socio-technical transition pathways: a reformulated typology and a comparative multi-level analysis of the German and UK low-carbon electricity transitions (1990–2014). *Research Policy*, *45*(4), 896-913. https://doi.org/10.1016/j.respol.2016.01.015

Giget, M. (1997). Technology, innovation and strategy: recent developments. *International Journal of Technology Management*, *14*(6-8), 613-634. https://doi.org/10.1504/IJTM.1997.002583

González, D. (2019, June 4). *Carrefour aumenta sus ventas en algunos productos gracias al uso del seguimiento digital de blockchain*. Criptotendencias. https://bit.ly/3VnpeKo

Good, M., Knockaert, M., & Soppe, B. (2020). A typology of technology transfer ecosystems: how structure affects interactions at the science–market divide. *The Journal of Technology Transfer*, *45*(5), 1405-1431. https://doi.org/10.1007/s10961-019-09745-w

Guerra, K. K., & Boys, K. A. (2022). A new food chain: Adoption and policy implications to blockchain use in agri-food industries. *Applied Economic Perspectives and Policy*, *44*(1), 324-349. https://doi.org/10.1002/aepp.13163

Haley, B. (2018). Integrating structural tensions into technological innovation systems analysis: Application to the case of transmission interconnections and renewable electricity in Nova Scotia, Canada. *Research Policy*, *47*(6), 1147-1160. https://doi.org/10.1016/j.respol.2018.04.004

Hall, J. (2002). Sustainable development innovation; a research agenda for the next 10 years. *Journal of Cleaner Production*, *10*(3), 195-196. https://bit.ly/3Xulqjv

Hart, S. L., & Milstein, M. B. (2003). Creating sustainable value. *Academy of Management Perspectives*, *17*(2), 56-67. https://doi.org/10.5465/ame.2003.10025194

Hartono, E., & Holsapple, C. (2004). Theoretical foundations for collaborative commerce research and practice. *Information Systems and E-business Management*, *2*(1), 1-30. https://doi.org/10.1007/s10257-003-0025-z

Hoffrén, J., & Apajalahti, E. L. (2009). Emergent eco-efficiency paradigm in corporate environment management. *Sustainable Development*, *17*(4), 233-243. https://doi.org/10.1002/sd.387

Huang, P. (2019). The verticality of policy mixes for sustainability transitions: A case study of solar water heating in China. *Research Policy*, *48*(10). https://doi.org/10.1016/j.respol.2019.02.009

Huber, J. (2008). Technological environmental innovations (TEIs) in a chain-analytical and life-cycle-analytical perspective. *Journal of Cleaner Production*, *16*(18), 1980-1986. https://doi.org/10.1016/j.jclepro.2008.01.014

Isabelle, D., & Westerlund, M. (2016). *Business incubation and business model innovation*. In Proceedings of the 4th International Conference on Innovation and Entrepreneurship: ICIE2016 (pp. 95-102). Academic Conferences and Publishing International Limited.

Joyce, A., & Paquin, R. L. (2016). The triple layered business model canvas: A tool to design more sustainable business models. *Journal of Cleaner Production*, 135, 1474-1486. https://doi.org/10.1016/j.jclepro.2016.06.067

Kamble, S. S., Gunasekaran, A., & Sharma, R. (2020). Modeling the blockchain enabled traceability in agriculture supply chain. *International Journal of Information Management*, 52. https://doi.org/10.1016/j.ijinfomgt.2019.05.023

Kern, F., Rogge, K. S., & Howlett, M. (2019). Policy mixes for sustainability transitions: New approaches and insights through bridging innovation and policy studies. *Research Policy*, *48*(10), 103832. https://doi.org/10.1016/j.respol.2019.103832

Kiousis, S., & McCombs, M. (2004). Agenda-setting effects and attitude strength: Political figures during the 1996 presidential election. *Communication Research*, *31*(1), 36-57. https://doi.org/10.1177/0093650203260205

Kivimaa, P., & Kern, F. (2016). Creative destruction or mere niche support? Innovation policy mixes for sustainability transitions. *Research Policy*, *45*(1), 205-217. https://doi.org/10.1016/j.respol.2015.09.008

Kshetri, N. (2018). 1 Blockchain's roles in meeting key supply chain management objectives. *International Journal of Information Management*, 39, 80-89. https://doi.org/10.1016/j.ijinfomgt.2017.12.005

Kuhlman, T., & Farrington, J. (2010). What is sustainability?. *Sustainability*, *2*(11), 3436-3448. https://doi.org/10.3390/su2113436

Larrinaga, N. & Moreno, S. (2019, August 19). Ochenta intoxicados por listeriosis y 15 embarazadas hospitalizadas en Sevilla. *El Mundo*. https://bit.ly/4geix7e

Lin, Y. P., Petway, J. R., Anthony, J., Mukhtar, H., Liao, S. W., Chou, C. F., & Ho, Y. F. (2017). Blockchain: The evolutionary next step for ICT e-agriculture. *Environments*, *4*(3), 50. https://doi.org/10.3390/environments4030050

Lippman, W. (2003). *La opinión pública*. Langre.

Lozano, R. (2007). Collaboration as a pathway for sustainability. *Sustainable Development*, *15*(6), 370-381. https://doi.org/10.1002/sd.322

Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy*, *41*(6), 955-967. https://bit.ly/3ZadKxm

Marsal-Llacuna, M. L. (2018). Future living framework: Is blockchain the next enabling network?. *Technological Forecasting and Social Change*, 128, 226-234. https://doi.org/10.1016/j.techfore.2017.12.005

McQuail, D. (2000). *Introducción a la teoría de la comunicación de masas*. Paidós.

Menke, M., Xu, Q., & Gu, L. (2007). An analysis of the universality, flexibility, and agility of total innovation management: a case study of Hewlett–Packard. *The Journal of Technology Transfer*, *32*(1), 49-62. https://doi.org/10.1007/s10961-006-9005-z

Moore, J. (2005). Barriers and pathways to creating sustainability education programs: policy, rhetoric and reality. *Environmental Education Research*, *11*(5), 537-555. https://doi.org/10.1080/13504620500169692

Naimi-Sadigh, A., Asgari, T., & Rabiei, M. (2022). Digital transformation in the value chain disruption of banking services. *Journal of the Knowledge Economy*, 13, 1212-1242. https://doi.org/10.1007/s13132-021-00759-0

Nakamoto, S. (2008). *Bitcoin: a peer-to-peer electronic cash system 2008*. Bitcoin. www.bitcoin.org/bitcoin.pdf

Nidumolu, R., Prahalad, C. K., & Rangaswami, M. R. (2009). Why sustainability is now the key driver of innovation. *Harvard Business Review*, *87*(9), 56-64. https://bit.ly/4e28Nes

Orlitzky, M., Siegel, D. S., & Waldman, D. A. (2011). Strategic corporate social responsibility and environmental sustainability. *Business & Society*, *50*(1), 6-27. https://doi.org/10.1177/0007650310394323

Paech, N. (2007). Directional certainty in sustainability-oriented innovation management. En M. Lehmann-Waffenschmidt (Ed.), *Innovations Towards Sustainability: Conditions and Consequences* (pp. 121-139). Physica-Verlag HD.

Paquin, R. L., Busch, T., & Tilleman, S. G. (2015). Creating economic and environmental value through industrial symbiosis. *Long Range Planning*, *48*(2), 95-107. https://doi.org/10.1016/j.lrp.2013.11.002

Pérez, F. & Aldás, J. (2019). *Indicadores sintéticos de las universidades españolas*. U-Ranking Fundación BBVA-IVIE. https://bit.ly/4ejyWWN

Pesonen, H. L. (2001). Environmental Management of Value Chains. *Greener Management International*, 33, 45-58. http://www.jstor.org/stable/greemanainte.33.45

Pezzey, J., & Toman, M. A. (2002). *The economics of sustainability: A review of journal articles*. Resources for the Future. Discussion Paper 02-03. https://bit.ly/3XfWdkU

Queiroz, M. M., Telles, R., & Bonilla, S. H. (2019). Blockchain and supply chain management integration: A systematic review of the literature. *Supply Chain Management: An International Journal*, 25, 241-254. https://doi.org/10.1108/SCM-03-2018-0143

Rana, R. L., Tricase, C., & De Cesare, L. (2021). Blockchain technology for a sustainable agri-food supply chain. *British Food Journal*, *123*(11), 3471-3485. https://bit.ly/4dNyYWd

Rennings, K., Ziegler, A., Ankele, K., & Hoffmann, E. (2006). The influence of different characteristics of the EU environmental management and auditing scheme on technical environmental innovations and economic performance. *Ecological Economics*, *57*(1), 45-59. https://doi.org/10.1016/j.ecolecon.2005.03.013

Roome, N. (2011). Looking back, thinking forward: Distinguishing between weak and strong sustainability. En A. J. Hoffman & P. Bansal (Eds.), *The Oxford handbook of business and the natural environment* (pp. 620-629). Oxford University Press.

Roome, N., & Louche, C. (2016). Journeying toward business models for sustainability: A conceptual model found inside the black box of organisational transformation. *Organization & Environment*, *29*(1), 11-35. https://bit.ly/3MuJk1r

Rosenbloom, D., Berton, H., & Meadowcroft, J. (2016). Framing the sun: A discursive approach to understanding multi-dimensional interactions within socio-technical transitions through the case of solar electricity in Ontario, Canada. *Research Policy*, *45*(6), 1275-1290. https://doi.org/10.1016/j.respol.2016.03.012

Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research*, *57*(7), 2117-2135. https://doi.org/10.1080/00207543.2018.1533261

Safarzyńska, K., Frenken, K., & Van Den Bergh, J. C. (2012). Evolutionary theorizing and modeling of sustainability transitions. *Research Policy*, *41*(6), 1011-1024. https://doi.org/10.1016/j.respol.2011.10.014

Savitz, A. (2013). *The triple bottom line: how today's best-run companies are achieving economic, social and environmental success-and how you can too*. John Wiley & Sons.

Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: categories and interactions. *Business Strategy and the Environment*, *20*(4), 222-237. https://doi.org/10.1002/bse.682

Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2016). Business models for sustainability: A co-evolutionary analysis of sustainable entrepreneurship, innovation, and transformation. *Organization & Environment*, *29*(3), 264-289. https://bit.ly/47gGciZ

Scheufele, D. A. (1999). Framing as a theory of media effects. *Journal of Communication*, *49*(1), 103-122. https://doi.org/10.1111/j.1460-2466.1999.tb02784.x

Schmidt, A., Ivanova, A., & Schäfer, M. S. (2013). Media attention for climate change around the world: A comparative analysis of newspaper coverage in 27 countries. *Global Environmental Change*, *23*(5), 1233-1248. https://bit.ly/4edbcTE

Scott, B., Loonam, J., & Kumar, V. (2017). Exploring the rise of blockchain technology: Towards distributed collaborative organizations. *Strategic Change*, *26*(5), 423-428. https://doi.org/10.1002/jsc.2142

Serrano, M. (2019, August 30). Más de 250 afectados se alían para demandar a la empresa responsable del brote de listeriosis. *Público*. https://bit.ly/3VGyRoL

Seuring, S., Sarkis, J., Müller, M., & Rao, P. (2018). Sustainability and Supply Chain Management - An Introduction to the Special Issue. *Journal of Cleaner Production*, 16, 1545-1551. https://doi.org/10.1016/j.jclepro.2008.02.002

Singla, A., Ahuja, I. S., & Sethi, A. S. (2018). Validation of demand pull strategies for accomplishing sustainable development in manufacturing organizations through structural equation modeling. *Management Decision*, 56, 1135-1156. https://doi.org/10.1108/MD-08-2017-0722

Slayton, R., & Spinardi, G. (2016). Radical innovation in scaling up: Boeing's Dreamliner and the challenge of socio-technical transitions. *Technovation*, 47, 47-58. https://doi.org/10.1016/j.technovation.2015.08.004

Špaček, M., & Vacík, E. (2016). Design of an Innovative Business Model for Mobile Virtual Network Operators. *Quality Innovation Prosperity*, *20*(2), 69-88. https://doi.org/10.12776/qip.v20i2.772

Sternberg, H. & Baruffaldi, G. (2018). *Chains in chains-logic and challenges of blockchains in supply chains*. In Proceedings of the 51st Hawaii International Conference on System Sciences. Hawaii, USA.

Stubbs, W., & Cocklin, C. (2008). Conceptualizing a "sustainability business model". *Organization & Environment*, *21*(2), 103-127. https://bit.ly/3MSQ0GV

Tiscini, R., Testarmata, S., Ciaburri, M., & Ferrari, E. (2020). The blockchain as a sustainable business model innovation. *Management Decision*, *58*(8), 1621-1642. https://doi.org/10.1108/MD-09-2019-1281

Treiblmaier, H. (2018). The impact of the blockchain on the supply chain: a theory-based research framework and a call for action. *Supply Chain Management: An International Journal*, 23, 545-559. https://doi.org/10.1108/SCM-01-2018-0029

Trienekens, J. H., Wognum, P. M., Beulens, A. J., & van der Vorst, J. G. (2012). Transparency in complex dynamic food supply chains. *Advanced Engineering Informatics*, *26*(1), 55-65. https://doi.org/10.1016/j.aei.2011.07.007

Trienekens, J., & Zuurbier, P. (2008). Quality and safety standards in the food industry, developments and challenges. *International Journal of Production Economics*, *113*(1), 107-122. https://doi.org/10.1016/j.ijpe.2007.02.050

Turnheim, B., & Nykvist, B. (2019). Opening up the feasibility of sustainability transitions pathways (STPs): Representations, potentials, and conditions. *Research Policy*, *48*(3), 775-788. https://doi.org/10.1016/j.respol.2018.12.002

United Nations (1972). United Nations conference on the human environment. United Nations Assembly Doc. A/RES/27/2994. http://www.worldlii.org/int/other/UNGA/1972

Usai, A., Porcheddu, D., Scuotto, V., & Susini, J. P. (2020). Converting Shelf-Based Scarcity into Innovation by Adopting Customer-Focused Innovation Approach. *Journal of the Knowledge Economy*, *11*(1), 70-83. https://doi.org/10.1007/s13132-018-0536-y

Uusitalo, P., & Lavikka, R. (2021). Technology transfer in the construction industry. *The Journal of Technology Transfer*, *46*(5), 1291-1320. https://doi.org/10.1007/s10961-020-09820-7

Van Hemel, C., & Cramer, J. (2002). Barriers and stimuli for ecodesign in SMEs. *Journal of Cleaner Production*, *10*(5), 439-453. https://doi.org/10.1016/S0959-6526(02)00013-6

Wang, Y., Singgih, M., Wang, J., & Rit, M. (2019). Making sense of blockchain technology: How will it transform supply chains? *International Journal of Production Economics*, 211, 221-236. https://doi.org/10.1016/j.ijpe.2019.02.002

World Commission on Environment and Development - WCED (1987). Report of the World Commission on Environment and Development: "Our Common Future". General Assembly document A/42/427. https://bit.ly/3VIO1Ku

Xu, Q., Zhu, L., Zheng, G., & Wang, F. (2007). Haier's Tao of innovation: a case study of the emerging Total Innovation Management model. *The Journal of Technology Transfer*, *32*(1), 27-47. https://doi.org/10.1007/s10961-006-9008-9

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