

Review

Sustainable Business Model Innovation: An Umbrella Review

Noemi Sinkovics ¹, Denanjalee Gunaratne ¹, Rudolf R. Sinkovics ^{1,2,*} and Francisco-Jose Molina-Castillo ³

¹ Business School, The University of Auckland, Auckland 1010, New Zealand; noemi.sinkovics@auckland.ac.nz (N.S.); dabe314@aucklanduni.ac.nz (D.G.)

² Business School, LUT University, 53850 Lappeenranta, Finland

³ Facultad de Economía y Empresa, University of Murcia, 30100 Murcia, Spain; fjmolina@um.es

* Correspondence: rudolf.sinkovics@auckland.ac.nz

Abstract: The purpose of this paper is to conduct an umbrella review of systematic literature reviews of sustainable business model innovation. Despite its relative novelty, sustainable business model innovation is a multifaceted phenomenon. Our aim is to capture the different manifestations of sustainable business model innovation and organise their antecedents and outcomes into an integrative framework. The Web of Science database was used to identify existing systematic literature reviews. The final sample for analysis comprised 57 review articles published up to March 2021. The qualitative data analysis software NVivo was used to facilitate the analysis.

Keywords: sustainable business model innovation; business model; umbrella review; systematic literature review; sustainability; circular economy; sharing economy; social business; lean business model



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1. Introduction

The objective of this study was to conduct an umbrella review of 57 systematic literature reviews related to sustainable business model innovation. The relatively large number of existing reviews suggests that academic discourse in this area is growing.

The business model concept has been discussed in the literature for more than six decades [1]. Business models outline an organisation's value proposition, value creation and delivery and value capture logic [2,3]. However, developments in the global economy such as technological advances, economic downturns and the sustainable development agenda are shifting the focus of business models to those that are able to address contemporary challenges [4,5]. The concept of business model innovation introduces much-needed dynamism by emphasising the ability of organisations to design new or transform existing business models [6]. Sustainable business model innovation is targeted at integrating sustainability aspects into business model design and implementation [7]. However, as pointed out by several authors, the concept of sustainable business model innovation is a multifaceted phenomenon [6,8,9]. Therefore, depending on the goals and motivations driving the innovation process, sustainable business models may have different manifestations. By extension, they will have different social, environmental and economic outcomes.

To this end, this paper aims to catalogue the various sustainable business model manifestations as well as their antecedents and outcomes and bring them together into an integrative framework. Section 2 provides a conceptual overview of the different manifestations. Section 3 introduces the review methods. Section 4 presents the integrative framework and its dimensions, and Section 5 concludes the paper with a discussion of future research avenues.

2. Conceptualisation of Sustainable Business Model Innovation

Sustainable business model innovation is a complex and multifaceted phenomenon; thus, it is important to understand its various manifestations [8]. Sustainable business models generally aim to integrate economic, social and environmental aspects in their value creation and/or value capture processes [9]. However, these aspects can manifest as

different combinations, and some may be more dominant than others [10]. For example, Bocken, et al. [11] developed eight sustainable business model archetypes according to the type of innovation on which the business model was based; that is, whether the innovation was technological, social or organisational in nature. Further, Lüdeke-Freund, et al. [12] identified 45 sustainable business model patterns that were then assigned by experts to different groups along ecological, social and economic dimensions of sustainability. Thus, sustainable business models may be considered an umbrella category that brings together different manifestations of business models with varying foci on social, environmental and economic aspects cf., [9,11]. In the remainder of this section, we discuss these different manifestations. Table 1 provides an overview of the most frequently used business model types and their definitions.

Table 1. Different types of business models related to the sustainable business model innovation concept.

Sustainable Business Model Manifestations	Definition
Sustainable business model	A business model that aims to increase positive effects and/or significantly reduce negative effects on the environment and society by changing the way in which an organisation and its networks create, deliver and capture value [12].
Base (bottom) of the pyramid business model	A business model that aims to simultaneously alleviate poverty and increase profitability by developing radical innovations to cater to the needs of poor and other vulnerable communities [13].
Circular business model	A business model built on the principles of circular economy that aims to achieve circularity across the business model [14].
Lean and green business model	A business model inspired by the lean philosophy, which aims to maximise customer value by minimising waste [15].
Product–service system	A business model with tangible products and intangible services jointly aimed at maximising customer satisfaction and fostering sustainability [16].
Sharing economy business model	A business model facilitating temporary access to an underutilised product by mediating between resource owners and resource users via a sharing platform [17].
Social business model	A business model that aims to achieve social goals by generating tangible and intangible social value and increasing the relational and mutual interactions among market participants [18].
Integrative business model	An integrative business model that balances all three aspects of sustainability [10].

A base (bottom) of the pyramid business model aims to simultaneously alleviate poverty and increase profitability by developing radical innovations to cater to the needs of poor and other vulnerable communities [13]. Bottom of the pyramid business models mainly operate in developing countries to convert the unaddressed needs of marginalised communities into profitable business opportunities, thus tapping into an unrealised market potential [19]. The value propositions generated by a bottom of the pyramid business model tend to be based on cost-effective solutions [13]. The innovation process related to this type of business model is underpinned by the vision of co-creating solutions by iteratively engaging with communities and other stakeholders [20]. Some frequently cited examples include the Grameen Group, Hindustan Unilever Group, CEMEX, ITC Limited and the Bangladesh Rural Advancement Committee cf., [19,21,22].

A circular business model is built on circular economy principles. As a regenerative system, a circular economy aims to minimise waste and emissions through slow, closed and narrow resource loops. To achieve circularity, it utilises mechanisms such as reduce, reuse, recycle and remanufacture [23]. As a consequence, circular business models aim to create value by relying on production inputs that are reusable, renewable and/or recyclable as well as by extending the life span of outputs. In other words, value proposition, value creation and value delivery are designed to achieve circularity and ecological value [14].

A lean and green business model is built on the tenets of lean philosophy. It aims to maximise customer value by minimising waste [15]. Therefore, it applies lean principles such as waste reduction, quality improvement, continuous learning and continuous product improvement to create value [24]. Additionally, it applies tools such as 5S, Kaizen, total productive maintenance and value stream mapping to facilitate resource efficiency and effectiveness [25]. Originally, lean philosophy was developed to increase productivity in the production and operations function. However, it later became a system-wide approach to maximising customer satisfaction and minimising waste.

A product–service system, also known as a function-oriented business model, aims to create new sources of revenue for organisations by fulfilling customer needs in an integrated and customised way by building customer loyalty and innovating rapidly [16]. A product–service system consists of three broad types of business model: product-oriented, use-oriented and results-oriented business models. Product-oriented business models focus on the sales of products with additional service components such as lifetime warranties and maintenance services. In use-oriented business models, the provider retains ownership of the product, while users merely have access to it. In a results-oriented business model, the provider agrees to provide a result or outcome to the customer rather than a specific product or service [16]. Given that product–service systems promote sharing and circular principles, they are often included in studies on sharing and circular economies [6,26].

A sharing economy business model aims to achieve sustainability by promoting sharing and collaborative consumption and production. It allows temporary access to an underutilised product by mediating contact between a resource owner and a resource user through a sharing platform [17]. Therefore, a sharing economy business model aims to unlock the economic potential of idle, unused and/or underutilised assets by transferring the rights to access and use. This process is facilitated by different forms of sharing such as intimate sharing, compensated sharing, uncompensated sharing and product–service system–based sharing [27]. Driven by technological developments, the operations of sharing economy business models are enhanced by the adoption of online platforms, including peer-to-peer, business-to-customer and business-to-business platforms [28,29].

The social business model, also known as social enterprise, aims to address social goals by increasing the relational and mutual interactions among market participants. Therefore, social business models tend to prioritise the creation of tangible and intangible social value over economic value [18]. These business models are built on trust, and their governance model strives to ensure that the organisation fulfils its responsibilities towards its stakeholders, including society at large as well as the environment [30]. Therefore, social business models combine a social mission with market value to generate a social value proposition for the betterment of people, the planet and profit [31].

An integrative business model balances all three aspects of sustainability [10,12]. Several conceptual approaches are available to help organisations identify trade-offs and areas that need further development [10,22,32]. This is particularly important because prioritising any one of the three aspects of sustainability may lead to serious unintended consequences [33,34].

As outlined at the beginning of this section, all the business model manifestations discussed may be included under the umbrella of sustainable business models. Against this background, we intend to capture existing systematic reviews related to any of these seven archetypes and catalogue the collective knowledge in this area. A special focus is given to the antecedents and consequences of sustainable business models.

3. Review Methods

Given the relatively large number of existing systematic reviews related to the various manifestations of sustainable business models, an umbrella review approach was deemed appropriate.

We followed the protocols by Sinkovics and Reuber [35] adapted from Jones, et al. [36] to conduct the umbrella review. Sinkovics and Reuber [35] utilised a partial pattern-matching logic [37] to derive a thematic inventory from the literature. A partial pattern-

matching logic was also relevant to our study because it facilitated the categorisation and synthesis of themes identified in our sample of systematic literature reviews.

First, we carefully selected keywords related to sustainable business model innovation, including its different manifestations. Next, a search was conducted in the Web of Science database using the search string shown in Appendix A. The text search was conducted in two steps: first, we searched for the document type ‘articles’, and second, we searched for the document type “reviews” (see Appendix A). This two-step process was necessary to capture all relevant systematic literature reviews, which are listed as both articles and reviews in the Web of Science database. We then applied our protocol for selection and exclusion. This process yielded 57 systematic literature reviews for the final analysis, as shown in Appendix B.

Our analysis protocol is presented in Appendix C. We utilised the antecedents–phenomenon–consequences framework [35,38] to organise the themes emerging from the analysis. Under the antecedent category, we included the factors that enable the implementation of sustainable business model innovations. Under consequences, we coded the outcomes generated by sustainable business model innovation along the dimensions of the triple bottom line. Thematic coding was carried out using the qualitative data analysis software NVivo.

4. Findings

Figure 1 provides an overview of our findings in the form of an integrative framework. We organised the identified dimensions according to the antecedents–phenomenon–consequences framework. The central part of the figure represents the phenomenon part of the framework. It lists the different sustainable business model manifestations, namely, base of the pyramid, circular, lean and green, product–service system, sharing, social and integrative models. Underneath the business model manifestations are listed the properties that make up a sustainable business model. These include (a) the different business model components in which sustainable innovation can occur; (b) the degree/type of innovation, which pinpoints the specific area of innovation in the business model component; and (c) the organisational form, which refers to the structural vehicle through which the innovation is delivered. Further, the integrative framework lists the macro-, meso- and micro-level antecedents of sustainable business model innovation as well as their outcomes/consequences. In the remainder of this section, we provide more detail about each section of the framework.

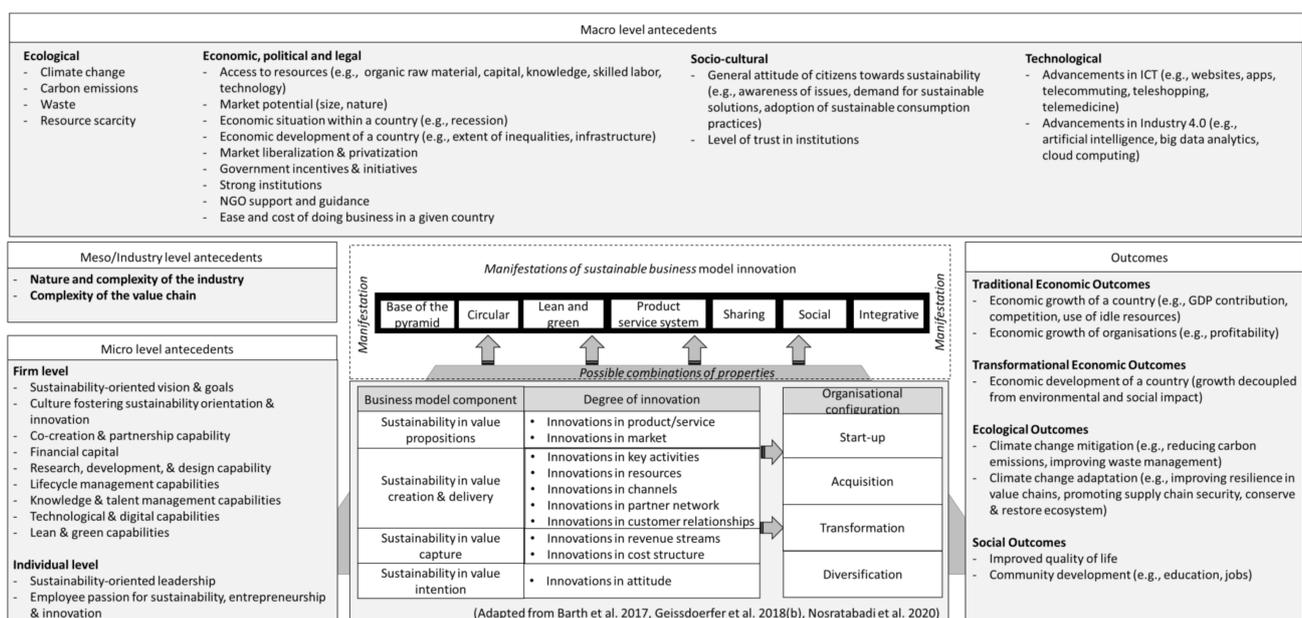


Figure 1. An integrative framework of sustainable business model innovation. Source: Created by the authors based on the umbrella review.

4.1. Phenomenon

The different sustainable business model manifestations were defined in the conceptual background section. These manifestations can be seen as ideal types made up of different combinations of properties cf., [12,39]. The main sustainable business model components include a) the value proposition, b) value creation and delivery, c) value capture and d) value intention [7,40]. Each component can be broken down into building blocks [2]. Innovations targeted at the implementation of sustainability principles can be directed at one or more of these building blocks cf., [41].

The design of sustainable value propositions can involve product/service innovation or market innovation [40,41]. Examples of product/service innovation include recycled products [42], do-it-yourself and do-it-together products [43], green products and services [44] and sustainable service innovation [45]. Market innovation refers to the development of new market segments [46] and market diversification [47].

In terms of sustainable value creation and delivery, innovation is directed at key activities, resources, channels, partner networks and customer relationships. Sustainable innovation in key activities can be targeted at the firm's operations, maintenance or product design and development [48]. Examples include industry symbiosis [49], closed resource loops, slow resource flows [50], reverse logistics [48] and predictive, corrective and preventive maintenance [51]. Resource innovations include the use of renewable [52] and smart inputs [53]. Channel innovations leverage mechanisms such as online platforms [54] to connect with channel partners. Network innovations involve the development of collaborative networks for production and consumption [50] and the development and use of collaborative technology-based tools [55,56]. Innovation in customer relationships includes co-creation mechanisms [20] and elements of consumer education geared towards promoting dematerialisation, sharing and prolonged use [9,57]. Industry 4.0 technologies appear to be central to sustainable value creation and delivery innovation across all five building blocks of this business model component [9].

Innovation in the area of sustainable value capture is targeted at revenue streams and cost structures. Examples of revenue innovations include freemium, novel types of product financing [12], generating revenue from the residual value of products, materials or organic feedstock [9,57], service subscriptions and results-oriented pricing. [9,58]. Cost structure innovations refer to new ways of reducing the cost of input factors. Examples include users being required to bring their own input factors to receive a service, thus reducing the fixed costs of the provider [48].

Sustainable innovation in value intention occurs when there is a change in the attitudes of owner-managers towards sustainability [40]. Decision-makers' attitudes are pivotal to creating an organisational culture that fosters sustainability-oriented innovation. They form the basis of owner-managers' stewardship behaviours [11,40].

Finally, sustainable business model innovation can be delivered through four organisational configurations: startups, acquisitions, transformation and diversification [6,9]. Adopting a startup strategy involves the creation of a completely new organisation based on sustainable business model innovation. If organisations lack the capability or time to create an innovation from scratch, they can identify and acquire an existing, external sustainable business model and subsequently absorb and integrate it. A transformation strategy refers to adapting or reinventing existing business model components in line with sustainability principles. The vehicle of diversification involves the development of a new sustainable business model in addition to the current business model within the boundaries of an existing organisation [6,9].

4.2. Antecedents

In this section, we discuss the factors that the systematic literature reviews in our sample identified as enablers of sustainable business model innovation. We classify these factors into (a) macro-level, (b) meso/industry-level and (c) micro-level antecedents.

4.2.1. Macro-level Antecedents

Within the broader category of macro-level antecedents, our analysis identified four subcategories: (a) ecological, (b) economic, political and legal, (c) sociocultural and (d) technological. National governments' recognition of ecological challenges and their willingness to address them are important antecedents of sustainable business model innovation. This is because transformation is only possible if policymakers align their political and legislative agendas with wider ecological and developmental issues [59]. Examples of widely recognised challenges include climate change, carbon emissions, toxic waste [50] and resource scarcity [59].

Once sustainability challenges are recognised by policymakers and there is a willingness to address them, a number of economic, political and legal conditions must be implemented to enable sustainable business model innovation at a larger scale. Access to resources such as organic and other sustainable raw materials [41], capital [60], knowledge [61], skilled labour [59] and technologies [62] emerged as significant antecedents. The size and nature of existing markets ready to embrace sustainable business model innovations further determine the extent to which they can be scaled up as well as the time frame within which the scaling up can occur [63]. Similarly, the economic situation of a country emerged as an important factor. For example, economic downturns such as the 2007–2008 financial crisis were found to stimulate the creation of alternative business models [26]. Further, the availability and quality of infrastructure [64] and the extent of inequalities in a given country [20] relate to its level of economic development. Related to this the ease and cost of doing business in a given country, which is shaped by factors such as updated and consistent legal frameworks [65], credible government procedures and systems [66], the protection of intellectual property rights [63], the availability of information and the relative stability of markets [60]. Moreover, in certain sectors such as the energy sector, market liberalisation and privatisation appear to be prerequisites for sustainable business model innovation [59].

Connected to the notion of strong institutions and supportive government incentives and initiatives are the conditions necessary to foster sustainable business model innovation. Examples of such incentives and initiatives include environment taxes [25], directives to promote sustainable energy sources [46], efforts to reduce material consumption [11] and initiatives to collaborate and develop strategic relationships with businesses [67]. Further, strong institutions at the supranational level provide incentives to drive transformation. Examples include the United Nation's (UN) Sustainable Development Goals (SDGs) and the European Union's Circular Economy Action Plan [58]. Further, non-government institutions such as the Ellen MacArthur Foundation and the McKinsey Global Institute can offer valuable support and guidance to policymakers and industry actors in this process [44,58].

From a sociocultural perspective, the general attitude of citizens towards sustainability is a significant enabler of the development and adoption of sustainable business model innovation. Favourable attitudes are shaped by an increasing awareness of sustainability issues [68] and continuing education on how individuals can contribute to tackling them [9]. Increasing consumer demand forms the basis of the increasing market potential for solutions such as recycled products, second-hand products, green products [42], shared consumption [26] and fair-trade products [63]. Further, the level of resident and organisational trust in national and supranational institutions emerged as an important enabler of transformation [63]. Although policymakers may have the best of intentions, if they do not succeed in achieving buy-in from all relevant stakeholders, the transformation process will be slow and interventions will be ineffective.

In terms of technological antecedents, advances in information and communication technologies and Industry 4.0 technologies have emerged as another significant enabler of sustainable business model innovation. As mentioned in the previous section, these technological advances may underpin innovation efforts in relation to any of the business model building blocks listed in Figure 1. Examples include the development of

telemedicine [43], telecommuting [27], online sharing spaces [54], the app economy and online volunteering [69]. Examples of Industry 4.0 technologies underpinning sustainable business model innovation include business analytics, robotics, additive manufacturing and virtual reality [56].

4.2.2. Meso/Industry-level Antecedents

Meso/industry-level antecedents of sustainable business model innovation are related to the nature and complexity of a given industry in a country or a region as well as the global distribution of industry activities. For example, agriculture is less complex than construction or car manufacturing. Nevertheless, given environmental degradation and resource scarcity, the long-term resilience of all industries depends on sustainable business model innovation [40,70,71]. The increasing complexity of value chains in terms of both input–output structure and geographical spread increases the risk of supply chain disruptions cf., [50]. Further, a high level of complexity is also paired with governance challenges, especially in the context of global value chains [63].

4.2.3. Micro-level Antecedents

Micro-level antecedents of sustainable business model innovation may be classified into firm-level factors and individual-level factors. At the firm level, a sustainability-oriented vision complemented with clear sustainability-oriented goals has emerged as central to sustainable business model innovation [72,73]. These are the driving forces behind an organisation-wide culture that aims to solve sustainable development challenges [74,75]. Deeply rooted values such as loyalty, consistency, commitment, creativity, respect, reliability and service to others are characteristics of such an organisational culture [76]. Other firm-level antecedents can be placed into two categories: the availability of financial resources [77] and the availability of relevant capabilities.

Life cycle management capabilities enable organisations to regenerate value, extend product life cycles, improve efficiency and minimise the risk of operations and maintenance failures [51]. Related capabilities include the ability to foster the creation and/or take advantage of industry symbiosis [49], the design and implementation of closed resource loops [50], reverse logistics [48] and smart maintenance [53]. Further, organisations need research and development capabilities to identify marketable solutions to sustainability problems. This value ideation process [43] may also require significant co-creation and partnership capabilities because developing meaningful links to stakeholders is key to sustainable business model innovation [20,78]. Knowledge and talent management capabilities enable organisations to develop the necessary expertise and build capacity for business model adaptation or transformation [56,67]. A specific form of capacity building is the development of technological capabilities, including digital capabilities, lean and green capabilities and capabilities related to Industry 4.0 technologies [9,61]. Examples of lean and green methods include 5S, Kaizen, total productive maintenance, value stream mapping and waste flow mapping [25].

At the individual level, sustainability-oriented leadership emerged as an important antecedent of sustainable business model innovation. Sustainability-oriented leaders create a shared vision [79], develop entrepreneurial and innovative competencies [58], drive collaborations with external stakeholders [63] and promote change [42] to transform organisations. Similarly, passionate employees with entrepreneurial and innovative mindsets [67] drive sustainability transformation by actively participating in the decision-making process and the development and implementation of sustainable business model innovations [25,67].

4.3. Consequences/Outcomes

The consequences/outcomes of sustainable business model innovation are organised into three categories: (a) economic, (b) ecological and (c) social. Economic outcomes are further subdivided into traditional economic and transformational economic outcomes.

Traditional economic outcomes include job creation and contribution to a country's GDP [80] and sustained profitability for organisations [9]. Transformational economic outcomes refer to outcomes that aim to decouple economic growth from negative environmental and social impacts. It needs to be noted that different sustainable business models contribute to this overarching goal to varying extents. This is because each manifestation prioritises a different combination of the three sustainability aspects [8]. For example, Hofmann [50] suggests that the majority of innovation efforts driven by ecological factors rely on technological advances that aim to increase efficiencies yet are not sufficiently radical to fundamentally change the way in which ecosystems operate. Additionally, efficiency improvements can lead to the obsolescence of certain jobs [11]. Socially oriented business models may create unintended negative environmental impacts [47]. Further, the fair distribution of social benefits may be negatively affected if the organisation sets inadequate inclusion/exclusion criteria for selecting beneficiaries [63].

Nevertheless, the systematic reviews in our sample identify a number of positive ecological and social outcomes. For example, sustainable business model innovation targeted at the implementation of circularity principles can contribute to the reduction of emissions [81] and waste [25] and improve the efficient and effective use of natural resources [9,82]. Further, some manifestations of sustainable business models can promote sustainable consumption patterns, which in turn contribute to climate change mitigation efforts [80]. Other ecological outcomes include the reduction of supply chain vulnerabilities [56] and contributions to the conservation and restoration of natural resources [70].

In terms of social outcomes, some manifestations of sustainable business models have been found to improve people's quality of life by facilitating access to goods and services that they would otherwise be unable to access [80]. Community development emerged as another social outcome in instances where sustainable business model innovation fosters entrepreneurship [80], education [74], equality [51] and new employment opportunities [54] in the local community.

5. Discussion and Conclusions

The aim of this study was to capture the various manifestations of sustainable business model innovation and integrate their properties, antecedents and outcomes into an ontological framework. Our analysis revealed tensions between the more socially oriented and the more ecologically oriented manifestations in terms of their outcomes. This is in line with existing modelling efforts that show that emphasising social outcomes without considering the environmental impact of solutions will hinder the achievement of the UN SDGs by 2050 [83,84]. Similarly, focusing on the implementation of a circular economy without ensuring a just transition will have a negative effect on socially oriented SDGs [5]. Therefore, future research is needed to identify the conditions that foster the design and implementation of integrative sustainable business model innovation. This business model manifestation balances the social, environmental and economic aspects of sustainability cf., [10,22]. Given that policy plays a pivotal role in enabling sustainable business model innovation and systems change, comparative studies are needed to compare and contrast the effectiveness of interventions.

Further, on reviewing the journal titles in our sample, it is surprising that none of the systematic literature reviews were published in 'mainstream' business and management journals. This suggests that business and management studies are still not paying sufficient attention to sustainable business model innovation. Future research will need to survey the business and management literature to identify which aspects of the ontological framework are discussed and to what extent. Future research will need to identify areas of integration between disciplinary silos. For example, international business and global value chain research are well positioned to widen the scope of investigation to the cross-border implementation of circular economy principles in global industries [5,85].

Further, advances in information and communication technologies as well as Industry 4.0 technologies appear to play a significant role in sustainable business model innovation.

Although the importance of these technologies has been acknowledged in business and management studies, future researchers may wish to examine to what extent they are investigated in relation to sustainability. It is especially important to explore how advanced technologies can contribute to the transformation of global value chains [5,33].

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Appendix A. Protocol for Search, Selection and Exclusion

- A. Criteria for delineating the sustainable business model innovation literature:
- Directly and explicitly recognises business model concept AND concepts of innovation AND concepts of sustainability
 - Directly and explicitly conducts a systematic literature review following explicit protocols for search, selection, exclusion and analysis of journal articles
 - Peer-reviewed journal articles only
 - “Reviews” OR “articles” listed as document types in the Web of Science database
 - Available in English language
 - Studies published from 1990 to 2021.
- B. Exclusion criteria by theoretical relevance:
- Studies only focusing on the business model concept OR the innovation concept
 - Studies not directly connected to the integration of social OR environmental sustainability into a business model
 - Paper has another component (e.g. expert survey, interviews, case study) in addition to a systematic literature review
 - Studies focusing ONLY on supply chains
 - Studies focusing purely on bibliometric studies OR morphological studies OR conceptual reviews without following a systematic literature review
 - Book chapters
 - Peer-reviewed journal articles unavailable electronically or by other reasonable means.
- C. Search strategy and scope:
- Full search of systematic literature reviews without restriction to specific journals or period:
 - (a) Keyword search by topic (TS): ((TS= (“sustainab*” OR “triple bottom line” OR “triple layered” OR “TBL” OR “ecolog*” OR “social” OR “circular*” OR “circular economy” OR “closed-loop” OR “cradle to cradle” OR “resource recircularization” OR “green*” OR “green manufacturing” OR “green production” OR “clean*” OR “clean manufacturing” OR “clean production” OR “sustainable development goals” OR “SDGs” OR “bot-

- tom of the pyramid" OR "base of the pyramid") AND TS= ("business model*" OR "business de-sign*" OR "business practice*" OR "business archetype*" OR "enterpr* model*" OR "en-terpr* design*" OR "enterpr* practice*" OR "enterpr* archetype*" OR "organi* model*" OR "organi* design*" OR "organi* practice*" OR "organi* archetype*" OR "corporat* model*" OR "corporat* design*" OR "corporat* practice*" OR "corporat* archetype*" OR "firm model*" OR "firm design*" OR "firm practice*" OR "firm archetype*" OR "venture model*" OR "venture design*" OR "venture practice*" OR "venture archetype*") AND TS= ("innovat*" OR "value*" OR "transform*" OR "chang*" OR "novel*" OR "new*"))).
- (b) Initial search of document type listed as 'articles' (performed on 22 January 2021) returned 5,810 articles. Initial search of document type listed as 'reviews' (performed on 24 March 2021) returned 502 reviews.
- Download the bibliometric information (title, year, author and abstract) to EndNote reference management software.
 - (a) Manually read the abstracts and applied the predefined inclusion/exclusion criteria.
 - (b) Final sample for full analysis included 10 articles and 47 reviews. In total, 57 systematic literature reviews were selected for the full analysis.

Appendix B. List of Systematic Literature Reviews Analysed

Table A1. Details of the systematic literature reviews selected for the umbrella review.

Author	Name of the Journal	Title	Sustainable Business Model Innovation Types
Alcayaga, Wiener and Hansen [53]	Journal of Cleaner Production	Towards a framework of smart-circular systems: An integrative literature review	Product–service system
Barth, Ulvenblad and Ulvenblad [40]	Sustainability	Towards a conceptual framework of sustainable business model innovation in the agri-food sector: a systematic literature review	Sustainable business model
Bluher, Riedelsheimer, Gogineni, Klemichen and Stark [51]	Sustainability	Systematic literature review—effects of PSS on sustainability based on use case assessments	Product–service system
Bocken, Short, Rana and Evans [11]	Journal of Cleaner Production	A literature and practice review to develop sustainable business model archetypes	Sustainable business model
Bocken, Strupeit, Whalen and Nussholz [55]	Sustainability	A review and evaluation of circular business model innovation tools	Circular business model
Boons and Bocken [27]	Technological Forecasting and Social Change	Towards a sharing economy—innovating ecologies of business models	Sharing economy business model
Bressanelli, et al. [86]	Sustainable Production and Consumption	Circular economy in the WEEE industry: a systematic literature review and a research agenda	Circular business model
Calabrese, Castaldi, Forte and Levialdi [45]	Journal of Cleaner Production	Sustainability-oriented service innovation: an emerging research field	Sustainable business model
Caldera, Desha and Dawes [25]	Journal of Cleaner Production	Exploring the role of lean thinking in sustainable business practice: a systematic literature review	Lean and green model
Camacho-Otero, Boks and Pettersen [68]	Sustainability	Consumption in the circular economy: a literature review	Circular business model

Table A1. Cont.

Author	Name of the Journal	Title	Sustainable Business Model Innovation Types
Centobelli, Cerchione, Chiaroni, Del Vecchio and Urbinati [58]	Business Strategy and the Environment	Designing business models in circular economy: a systematic literature review and research agenda	Circular business model
Cheng [54]	International Journal of Hospitality Management	Sharing economy: a review and agenda for future research	Sharing economy business model
Comin, Aguiar, Sehnem, Yuliza, Cazella and Julkovski [79]	Benchmarking-an International Journal	Sustainable business models: a literature review	Sustainable business model
Curtis and Lehner [26]	Sustainability	Defining the sharing economy for sustainability	Sharing economy business model
De Giacomo and Bleischwitz [87]	Business Strategy and the Environment	Business models for environmental sustainability: contemporary shortcomings and some perspectives	Sustainable business model
de Souza, de Mello and Marx [66]	Sustainability	When is an innovative urban mobility business model sustainable? A literature review and analysis	Sustainable business model
Dhanda and Shrotryia [72]	Qualitative Research in Organizations and Management: An International Journal	Corporate sustainability: the new organizational reality	Sustainable business model
Diaz Lopez, Bastein and Tukker [44]	Ecological Economics	Business model innovation for resource-efficiency, circularity and cleaner production: what 143 cases tell us	Circular business model
Dijkstra, van Beukering and Brouwer [77]	Journal of Cleaner Production	Business models and sustainable plastic management: a systematic review of the literature	Sustainable business model
Engelken, Romer, Drescher, Welpé and Picot [59]	Renewable & Sustainable Energy Reviews	Comparing drivers, barriers, and opportunities of business models for renewable energies: a review	Sustainable business model
Fernandes, Pigosso, McAloone and Rozenfeld [73]	Journal of Cleaner Production	Towards product-service system oriented to circular economy: a systematic review of value proposition design approaches	Product-service system
Galvao, Homrich, Geissdoerfer, Evans, Ferrer and Carvalho [75]	Resources Conservation and Recycling	Towards a value stream perspective of circular business models	Circular business model
Geissdoerfer, Pieroni, Pigosso and Soufani [9]	Journal of Cleaner Production	Circular business models: a review	Circular business model
Geissdoerfer, Vladimirova and Evans [6]	Journal of Cleaner Production	Sustainable business model innovation: a review	Sustainable business model
Goni, Gholamzadeh Chofreh, Estaki Orakani, Klemeš, Davoudi and Mardani [76]	Clean Technologies and Environmental Policy	Sustainable business model: a review and framework development	Sustainable business model
Guzzo, Trevisan, Echeveste and Costa [52]	Sustainability	Circular innovation framework: verifying conceptual to practical decisions in sustainability-oriented product-service system cases	Product-service system
Heesbeen and Prieto [70]	Sustainability	Archetypical CBMs in construction and a translation to industrialized manufacture	Circular business model

Table A1. Cont.

Author	Name of the Journal	Title	Sustainable Business Model Innovation Types
Hestad, Tabara and Thornton [47]	Sustainability Science	The three logics of sustainability-oriented hybrid organisations: a multi-disciplinary review	Sustainable business model
Hofmann [50]	Journal of Cleaner Production	Circular business models: business approach as driver or obstructor of sustainability transitions?	Circular business model
Hossain [80]	International Journal of Hospitality Management	Sharing economy: a comprehensive literature review	Sharing economy business model
Hrustek [56]	Sustainability	Sustainability driven by agriculture through digital transformation	Sustainable business model
Joao-Roland and Granados [67]	Journal of Small Business and Enterprise Development	Social innovation drivers in social enterprises: systematic review	Social business model
Kolk, Rivera-Santos and Rufin [74]	Business & Society	Reviewing a decade of research on the “base/bottom of the pyramid” (BOP) concept	Base (bottom) of the pyramid business model
Kravchenko, Pigosso and McAloone [81]	Journal of Cleaner Production	Towards the ex-ante sustainability screening of circular economy initiatives in manufacturing companies: consolidation of leading sustainability-related performance indicators	Sustainable business model
Kuo and Smith [61]	Journal of Cleaner Production	A systematic review of technologies involving eco-innovation for enterprises moving towards sustainability	Sustainable business model
Lashitew [63]	Journal of Business Ethics	Creating social value for the ‘base of the pyramid’: an integrative review and research agenda	Base (bottom) of the pyramid business model
Lemus-Aguilar, Morales-Alonso, Ramirez-Portilla and Hidalgo [78]	Sustainability	Sustainable business models through the lens of organizational design: a systematic literature review	Sustainable business model
Lewandowski [48]	Sustainability	Designing the business models for circular economy-towards the conceptual framework	Circular business model
Lopes, et al. [88]	Sustainability	Perspective of business models and innovation for sustainability transition in hospitals	Sustainable business model
Nahi [20]	Organization & Environment	Cocreation at the base of the pyramid: reviewing and organizing the diverse conceptualizations	Base (bottom) of the pyramid business model
Nosratabadi, Mosavi and Lakner [41]	Foods	Food supply chain and business model innovation	Sustainable business model
Nosratabadi, Mosavi, Shamshirband, Kazimieras Zavadskas, Rakotonirainy and Chau [43]	Sustainability	Sustainable business models: a review	Sustainable business model
Nussholz [89]	Sustainability	Circular business models: defining a concept and framing an emerging research field	Circular business model

Table A1. Cont.

Author	Name of the Journal	Title	Sustainable Business Model Innovation Types
Oderanti and Li [62]	International Journal of Healthcare Technology and Management	A holistic review and framework for sustainable business models for assisted living technologies and services	Sustainable business model
Pallaro, Subramanian, Abdulrahman, Liu and Tan [71]	Sustainable Production and Consumption	Review of sustainable service-based business models in the Chinese truck sector	Sustainable business model
Pieroni, McAlloone and Pigosso [8]	Journal of Cleaner Production	Business model innovation for circular economy and sustainability: a review of approaches	Circular business model
Reim, et al. [90]	Journal of Cleaner Production	Product–service systems (PSS) business models and tactics—a systematic literature review	Product–service system
Ritter and Schanz [69]	Journal of Cleaner Production	The sharing economy: a comprehensive business model framework	Sharing economy business model
Rosa, Sassanelli and Terzi [49]	Journal of Cleaner Production	Towards circular business models: a systematic literature review on classification frameworks and archetypes	Circular business model
Sahebalzamani and Bertella [82]	Sustainability	Business models and sustainability in nature tourism: a systematic review of the literature	Sustainable business model
Salvador, Barros, da Luz, Piekarski and de Francisco [60]	Journal of Cleaner Production	Circular business models: current aspects that influence implementation and unaddressed subjects	Circular business model
Salvador, Puglieri, Halog, de Andrade, Piekarski and De Francisco [64]	Journal of Cleaner Production	Key aspects for designing business models for a circular bioeconomy	Circular business model
Sarja, Onkila and Makela [65]	Journal of Cleaner Production	A systematic literature review of the transition to the circular economy in business organizations: obstacles, catalysts and ambivalences	Circular business model
Shakeel, Mardani, Chofreh, Goni and Klemeš [7]	Journal of Cleaner Production	Anatomy of sustainable business model innovation	Sustainable business model
Shomali and Pinkse [46]	Journal of Cleaner Production	The consequences of smart grids for the business model of electricity firms	Sustainable business model
Thorisdottir and Johannsdottir [42]	Sustainability	Sustainability within fashion business models: a systematic literature review	Sustainable business model
Upadhyay, et al. [91]	Journal of Manufacturing Technology Management	Investigating “circular business models” in the manufacturing and service sectors	Circular business model

Appendix C. Protocol for Analysis

A. Data organisation:

- Download the PDFs and attach them to the EndNote reference management software
- Import the PDFs to NVivo for analysis
- Organise the articles by case nodes (bottom of the pyramid business models, circular business models, lean and green business models, product–service system business models, sharing economy business models, social business models and sustainable business models)

B. Theme identification and coding:

- Articles to be read and coded inductively:
 - (a) The findings, discussion and conclusion sections of the articles were mainly coded for the analysis.
 - (b) Initial coding included, but was not limited to, the antecedents and consequences of sustainable business model innovation.
 - (c) Main themes were broken down into subthemes, and new themes were added as and when they emerged.
- Conduct quality checks by giving equal attention to articles.
- Compare findings across the case nodes using matrix queries and generate tables for analysis.
- Derive the potential avenues for future research.

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