Transitioning towards sustainability: The 'what', 'why' and 'how' of the integration of sustainable practices into business models

Transición hacia la sostenibilidad: el "qué", "por qué" y "cómo" de la integración de prácticas sostenibles en los modelos de negocio

Ines Diez-Martinez*

Management Department, Universitat Politècnica de València, Camino de Vera, s/n, 46022 Valencia, Valencia, Spain.
indiemar@alumni.upv.es • https://orcid.org/0000-0002-7248-9402

Angel Peiro-Signes

Management Department, Universitat Politècnica de València, Camino de Vera, s/n, 46022 Valencia, Valencia, Spain.
anpeisig@omp.upv.es • https://orcid.org/0000-0002-1549-6972

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* Corresponding Author
Ines Diez-Martinez

Abstract: In today's business ecosystem, sustainability is increasingly becoming a vital element to firms' long-term prosperity. Sustainable considerations have evolved to turn a key element that firms wish to integrate into their business models. This new scenario has left countless companies struggling to adapt to these new times. The integration of sustainable practices is not an easy task. The complex web of stakeholders and interactions between participating actors complicate the identification of mechanisms that foster sustainability. Consequently, this paper explores what is the state-of-the-art of the integration of sustainable practices, including an analysis of why these practices are implemented and how their integration is ultimately effective. Results show that there is a wide variety of research, predominantly focused on the creation of frameworks and brainstorming tools to help companies integrate sustainable practices. Regarding what is the trigger of these sustainable initiatives, existing research expresses that sustainable integration is mainly triggered to fit new upcoming demands of legislation and society. Finally, about how these sustainable practices are integrated, strategies are applied across the entire value chain, on both products and processes. Regarding the relationship between the integration of sustainable practices and economic results, no tendency for a direct correlation was found.

Keyword: Sustainability, sustainability integration, sustainable business model, sustainable transition.

Resumen: En el ecosistema empresarial actual, la sostenibilidad se está convirtiendo cada vez más en un elemento vital para la prosperidad a largo plazo de las empresas. La sostenibilidad está ganando importancia paulatinamente, y actualmente se está convirtiendo en una tendencia imparable en todas las dimensiones de nuestro marco socioeconómico. Por lo tanto, el enfoque de las empresas hacia prácticas sostenibles también ha cambiado. El bajo perfil que tenía el tema de la sostenibilidad hace algunos años ahora está completamente olvidado. Las consideraciones de sostenibilidad han evolucionado para ser uno de los elementos clave que las empresas desean integrar en sus modelos de negocio. Este nuevo escenario ha dejado a innumerables empresas luchando por adaptarse a estos nuevos tiempos. La integración de prácticas sostenibles no es una tarea fácil. La compleja red de actores e interacciones entre entidades complica la identificación de mecanismos para fomentar la sostenibilidad. Consecuentemente, este documento explora cuál es el estado del arte de la integración de prácticas sostenibles, incluido un análisis de por qué se implementan

estas prácticas y cómo su integración es finalmente efectiva. Los resultados muestran que existe una amplia variedad de investigaciones, principalmente centradas en la creación de marcos y herramientas de lluvia de ideas para ayudar a las empresas a integrar prácticas sostenibles. Con respecto al desencadenante de estas iniciativas sostenibles, las investigaciones existentes expresan que la integración sostenible se desencadena principalmente para adaptarse a las nuevas demandas futuras de la legislación y la sociedad. Finalmente, sobre cómo se integran estas prácticas sostenibles, las estrategias se aplican a lo largo de toda la cadena de valor, tanto en productos como en procesos. En cuanto a la relación entre la integración de prácticas sostenibles y los resultados económicos, no se encontró tendencia a una correlación directa.

Palabras clave: Sostenibilidad, integración de la sostenibilidad, modelo de negocio sostenible, transición sostenible.

1. Introduction and research objectives

During the past 30 years, organisations, and governments all around the globe have encouraged the adoption of sustainable practices (Cohen, 2020). Matters such as the rise of global temperature, biodiversity loss, air pollution, or the threat of another health crisis are raising concerns worldwide and creating uncertainties across all dimensions of our society, highlighting the need to change our previous way of working. Sustainability is in the spotlight, along with the threat of an upcoming environmental and social crisis.

Within this context, companies are key stakeholders in the fight against climate change and other existing sustainable challenges. Some companies are at the forefront of the sustainability wave, with new practices that aim to improve their ESG (Environmental, Social and Governance) performance. These are typically highly related to innovation and continuous improvement techniques (Carrascosa López et al, 2012). In recent years, companies have invested time and money in sustainable innovation (Mazzanti, 2018), looking for ways to integrate environmentally friendly practices (e.g., reducing emissions, saving energy) and products (e.g., electric cars, biodegradable plastics).

In general terms, sustainability has become a business imperative across all industries (Schrettle et al, 2014), where environmental proactivity plays a key role in companies' development (Segarra Oña et al, 2012). However, this integration still presents different levels of maturity across industries due to the complexity of the topic. The overall objective of this study is to understand the integration of sustainable business models in firms. This objective is to be achieved by performing a review of the existing literature to help companies and other third-party organisations better understand the current as-is of sustainability integration. Focusing on better understanding enterprises' transition towards more sustainable business models as the research theme is a way to provide context to the current business scenario and help companies position themselves to understand the sustainability challenge.

Looking at the integration of sustainability into business models, one of the first questions that one may ask revolves about the term "business model" and what are its implications when addressing sustainability. As discussed by DaSilva and Trkman (2014), generally, the term "business model" has been misunderstood and misused, being an expression for which there is no clear scope in both theory and practice. Several definitions exist, which integrate a variety of elements from the operational, strategic, economic and revenue models, implying a bundle

of activities. Within this line of thought, a business model could be understood "as a system of interconnected and interdependent activities that determines the way the company "does business" with its customers, partners, and vendors" (Amit and Zott, 2012). As of today, the business model concept remains difficult to understand (Bigelow and Barney, 2021; Prescott and Filatotchev, 2021), and there is still a lack of consensus from both academics and practitioners.

As discussed by Bigelow and Barney (2021), who analysed the view of several authors regarding the use of this term, one thing in which authors agree is that the concept business model is not equivalent to the strategy. However, business model encompasses those elements that contribute to the performance of firms, both through innovation and change, in order to adapt to the market and update strategic plans. As discussed by Iheanachor et al (2021), in general terms, a business model may be defined as the "ability to create and capture value" and has a strong link with innovation. For sustainable business models, creating and capturing value would need to be performed while balancing the three pillars of sustainability, which are: environmental, social and economic (Bautista-Puig et al, 2021; Irsan and Utama, 2019; Barile et al, 2018). Based on this, when adding "sustainability" to the term "business model", it may be considered as the capability of firms to add value while meeting current needs without compromising the ability of future generations to meet theirs, from the environmental, social, and economic perspectives.

Nonetheless, as of today, defining sustainable business models is still considered to be an arduous task. As discussed by Hallin et al (2021) sustainability remains a "contested concept". Yet, for the term "sustainability" there are also well-accepted definitions, such as the definition of the World Commission on Environment and Development (WCED), where sustainability is defined as "the development that meets the needs of the present without compromising the ability of future generations to meet their needs" (World Commission on Environment and Development [WCED], 1987). This holistic definition opens the door for sustainability to a wide spectrum of possibilities. It suggests that, for example, the integration of sustainability can be performed at different stages of the service or production process as well as be integrated into the nature of the interactions between the firm and its clients, providers, and partners.

Overall, a business model is a complex web of activities and actors in which interdependencies may make it difficult to identify what are the sustainable opportunities as well as the challenges that come along sustainability integration. Companies are going green targeting sustainable integration through different perspectives, and with complex triggers evidencing the need for change. In some cases, sustainability integration has become imperative due to regulations, policies, and treaties, such as the Treaty of Lisbon (2007/C 306/01) of the European Union. For example, eco-innovation is evidenced by elements such as environmental certifications (Miret-Pastor et al, 2011). As discussed by Wilson et al (2011), the regulation of the environment is one effective way to introduce sustainable friendly practices in firms, but only when this regulation is understood and properly enforced.

In other cases, firms are taking active roles to integrate sustainable practices motivated by an increasing demand from its customers. Consumers are showing a greater interest in green products and services, and this behaviour may also be acting as a catalyst for the integration of environmental practices. As stated by Darnall et al (2012), consumers are increasingly more knowledgeable about the environment, and this has influenced their decision-making

purchasing criteria. As a result, this demand for green products has translated for companies into new opportunities for economic growth by integrating sustainable principles in their business models, and as a way to remain competitive.

There are occasions in which firms adopt environmentally friendly practices because the technological advancements have organically allowed it. As discussed by Ordieres-Meré et al (2020) a clear example of this phenomena is digitalisation. For example, Tenhunen and Pettinen (2010) show in their study that the movement from paper invoicing to electronic invoicing reduced the carbon footprint of the invoice by more than fifty percent. The use of electronic communications and documents rather than the traditional consumption of paper was heavily established across all firms until computers were an accessible affordable tool for companies. Although these technological advancements may not have had an environmental focus as a primary objective, their availability and implementation resulted in an improvement of the environmental performance of companies.

Moreover, sustainable models may also be the by-product of economic decisions. One example is the case of reducing the distance between different locations of a supply chain to save in transportation costs, which has simultaneously the positive impact of reducing emissions.

Taking all the above into consideration, the integration of sustainable business models may be possible through different tools and respond to a variety of triggers. As discussed by Becker et al. (2016) interrelated dimensions interact, and it is not a response or a single circumstance but a combination of elements that are in place simultaneously. The complexity of this integration could be discouraging to firms considering a transition to a greener model. This review will target the key aspects of sustainable integration to help companies and institutions address this change in their organisation. Considering this high-level of complexity, the first research question (RQ1) that arises is:

- Research question 1 (RQ1): What is the state-of-the-art of the integration of sustainable strategies into the business models of firms?

Linked to this first research question, it is also relevant to investigate the reason behind the need for this integration, especially considering how in the past few decades, globalisation and the access to information have revolutionised all markets, not only from the perspective of the operational and strategic elements of companies, but also from the point of view of new regulations and international standards. On top of this, consumer behaviour is also constantly evolving, where now consumers are increasingly realising that sustainability is a key matter and consumers are also able to understand better the role that they may play with their choices to construct a better society.

As discussed above, there might be several elements that act as a trigger for these sustainable strategies and in a constantly changing environment, it is often difficult to understand what are the triggers that may be influencing this integration. From regulation to consumers, passing through economic performance, many factors could foster companies' active and passive behaviours toward sustainability. Companies are now integrating sustainability while before they were not, as in the past sustainability was often considered a "good to have" and not a "key element" in the decision making of a company. Hence, the second research question (RQ2) that this study addresses is related to the integration of these responsible practices:

- Research question 2 (RQ2): Why do companies integrate sustainability into their business models?

Lastly, it is worth mentioning that even under the umbrella of a single state-of-art and provided that even when companies' triggers and motivations for sustainability are similar, companies may still differ in the way they implement sustainable practices. Consequently, after the "what" and the "why" have been defined, we can explore the "how":

- Research question 3 (RQ3): How do companies effectively integrate sustainability in their business models?

Research question three (RQ3) refers to examining the effective integration of sustainable strategies into business models. This research question will be addressed by exploring the sustainable practices that companies integrate. Also, this analysis will examine the implications that integrating sustainable business models has had for firms.

2. Methodology

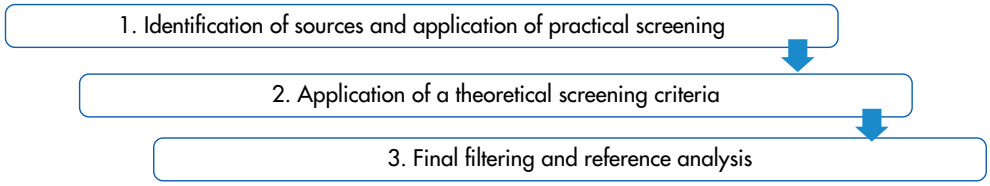
To fulfil the objective of promoting a better understanding of the integration of sustainable practices into business models, the present study consisted of a standalone review and an analysis of existing literature. As described by Okoli (2015), what characterises a rigorous standalone review is the fact that the review follows a methodological approach that could be followed by others reviewing the topic and where the scope is exhaustive and includes all suitable material. Consequently, this type of review leads to more accurate results as bias and chance effects are reduced (Reim et al, 2015). This type of review is also an appropriate method for the object of study, as the topic of sustainable business models has increasingly become more popular over the last years, which leads to a high volume of results.

The first step of the review is to define the object of study and questions to be answered. These questions need to be aligned with the problem statement. In this case, the complexity of companies transitioning to a more sustainable business model, where the "what", "why" and "how" aim to help firms address the change towards sustainability in their organisation, by bringing clarity over the topic of sustainable business model integration.

Once the research questions were identified, it was possible to begin the search for the appropriate literature to answer them. In terms of data sources, as suggested by Aksnes and Sivertsen (2019), Aghaei Chadegani et al. (2013), Scopus is a well-known trusted source that provides comprehensive coverage of the world's scientific and scholarly literature. Therefore, Scopus is selected, although it is worth mentioning that other databases such as Web of Science or Google Scholar may also contain valuable information.

Regarding the search performed, the popularity of the topic guaranteed that numerous results were to be found. This high number of results needed to be further filtered, to avoid processing an overwhelming number of documents. Thus, among all results found, there was a need to review and identify those documents that better fit the aim of the research. The methodology followed to refine the search consists of the three steps proposed by Reim et al. (2015), shown in Figure 1.

Figure 1: Methodology steps followed to refine results.



2.1 Identification of sources and application of practical screening

This first step is focused on the identification of publications to ensure the quality of the review, in this case by aiming at those journals that would be the most relevant for the scope of the search.

Regarding the selection of these journals, they needed to be journals related to the business and management area, as the topic of the review is related to trends in business models and management practices, as well as journals having an environmental component, since the focus is on sustainable business models. Additionally, as the scope of the research objectives includes analysing triggers for the integration of these models and practices, decision-making related sciences were also relevant. The main journals to focus were defined based on the journal list of Scimago (Scimago, n.d.), looking for journals that belong to categories and subcategories displayed in Table 1.

Table 1: Selected Scimago journal categories.

Category	Subcategory
Environmental science	Management, monitoring, policy and law
	Waste management and disposal
Business, Management and Accounting	Strategy and management
Decision Science	Management science and operations research

The pre-selected journals were those in the Scimago list (year 2019) that belong to the categories described above. Additional filtering was performed to select journals: with at least a total of 1000 cites, references vs. documents ratio being over 50 (Ref./Docs >50) and cites vs. docs above 2 (Cites/Docs>2) and an H index above 60 were considered, where the H index refers to "journal's number of articles that have received at least h citations during the whole period" (Scimago, n.d.).

After filtering according to the specified parameters, the remaining top 25 journals for each subcategory were screened (please note that for some categories the number of preselected journals after the filtering is already below 25, so pre-selection includes whatever is the number of journals compliant with the filtering criteria).

The final selection of source journals was made based on the review of the 'Journal Description' in order to select journals aligned with the aim of our research scope. Details of the selection are displayed in Appendix 1. When the same journal appears in more than one

category, both categories are displayed. Considering the above, the final selection of sources to be used for the literature review includes 25 journals. These are displayed in Table 2.

Table 2: Selection of journals aligned with the aim of the research scope.

Title	Publisher
Academy of Management Journal	Academy of Management
Academy of Management Review	Academy of Management
Business Strategy and the Environment	John Wiley and Sons Ltd
Corporate Social Responsibility and Environmental Management	John Wiley and Sons Ltd
Critical Reviews in Environmental Science and Technology	Taylor and Francis Ltd.
Environmental Science and Policy	Elsevier BV
Global Environmental Change	Elsevier Ltd.
International Journal of Management Reviews	Wiley-Blackwell Publishing Ltd
International Journal of Operations and Production Management	Emerald Group Publishing Ltd.
International Journal of Production Economics	Elsevier
International Journal of Production Research	Taylor and Francis Ltd.
International Journal of Project Management	Elsevier BV
Journal of Cleaner Production	Elsevier Ltd.
Journal of Environmental Management	Academic Press Inc.
Journal of Management	SAGE Publications Inc.
Journal of Management Studies	Wiley-Blackwell Publishing Ltd
Journal of Product Innovation Management	Wiley-Blackwell Publishing Ltd
Management Decision	Emerald Group Publishing Ltd.
Management Science	INFORMS
Organization Science	INFORMS
Organization Studies	SAGE Publications Ltd
Production and Operations Management	Wiley-Blackwell
Resources, Conservation and Recycling	Elsevier
Strategic Management Journal	John Wiley and Sons Ltd
Sustainability	MDPI AG

2.2 Application of a theoretical screening criteria

Because the objective of this review is defined by the three research questions, only those articles that could be used to answer one of the previously stated research questions were included in the analysis. Looking into the details, at least one of the three criteria listed below needed to be met for the article to be included:

1. Articles that discuss the state-of-the-art for the integration of sustainable strategies into the business models of firms. Also, articles that analyse this state-of-the-art and explicitly propose new tools to be used for this integration are included.

2. Articles that investigate the reasons why firms decide to integrate sustainable practices, including articles that analyse market trends and provide a comprehensive view on the evolution of the integration of environmental, social and corporate governance practices.

3. Articles that discuss how are these sustainable management practices implemented across industries, for different services and products. Articles that include a discussion on the impact (e.g., economic performance, company growth etc.) that the integration of sustainable practices has had, would also be relevant to answer the third research question.

2.3 Final filter and reference analysis

In this final stage, those articles that met one of the three inclusion criteria were downloaded and read to perform an analysis of their content. A summary of the process is shown in Figure 2.

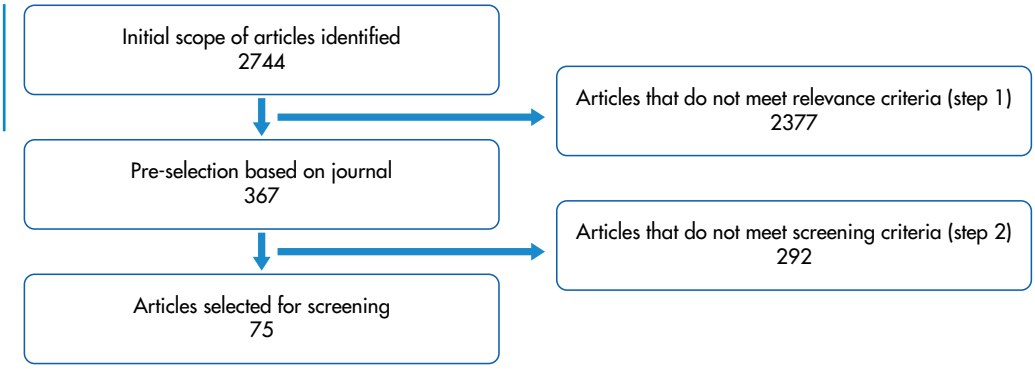


Figure 2: Flow diagram of the review steps.

3. Results

3.1 Initial scope of results: Bibliometric analysis

In this section we are going to analyse the first set of results corresponding to the scope of over 2500 initial articles identified, before applying the screening criteria. Overall, the search showed that the database results are distributed among a set of topics and sources. Firstly, as shown in Table 3, main topics are related to Business, Management and Accounting, aligned with the JCR journal categories and most of the journals found are in the list of selected sources, with the highest number of results being Sustainability (Switzerland) and the Journal of Cleaner Production. When looking into the scope of topic distribution, sustainability integration into business models seems to be the focus. Typically, there is a link with business management and social sciences.

Nevertheless, sustainability integration is also material from a technical perspective, such as in the fields of engineering, computer science, environmental science, and energy. This suggests that sustainable practices have a technological component that cannot be ignored,

which translates into the fact that sustainability integration may have a strong dependency on technology developments. This technical innovation dependency is also evidenced through the source distribution of the integration of sustainable practices, where journals such as the Journal of Cleaner Production or the Resources Conservation and Recycling journal appear as key source material.

Overall sustainability integration seems to be strongly linked to developments in the energy sector (Energies), production and manufacturing (Journal of Cleaner Production, Resources Conservation and Recycling), and computer science (International Journal of Information Management). However, as shown in Table 3, most results (69.2%) belong to sources where the percentage of publications is below 1.1%, which suggest that Sustainability integration is a widespread topic among different sources, present in a wide range of publications.

Table 3: Initial scope of results: Topic and Source distribution.

Topic distibution		Source distribution	
Business, Management and Accounting	25.4%	Sustainability (Switzerland)	10.1%
Social Sciences	15.5%	Journal Of Cleaner Production	8.6%
Engineering	10.4%	Technological Forecasting And Social Change	2.6%
Computer Science	9.2%	IEEE Access	2.0%
Environmental Science	9.2%	International Journal Of Management Reviews	1.8%
Energy	6.8%	Business Process Management Journal	1.3%
Economics, Econometrics and Finance	6.1%	Energies	1.2%
Decision Sciences	5.0%	Industrial Marketing Management	1.1%
Medicine	2.4%	International Journal Of Information Management	1.1%
Arts and Humanities	1.9%	Resources Conservation And Recycling	1.1%
Other	8.1%	Other	69.2%

The view on the split of documents by year, displayed in Figure 3, show an increasing interest in the topic as the volume of articles published is increasing each year. There is an increasing interest in exploring this topic, with an increase in the number of publications within a scope of seven years that amounts to roughly 400%. Therefore, results show that this topic has lately gained relevance for academics.

Regarding the region, in Figure 4, United States of America is the country with the highest number of results, followed by United Kingdom, Italy, Germany, Australia, China, India and Spain. Overall, results suggest a wider popularity of the topic in USA and UK, but these results may be misleading due to the scope of research including English publications but not for example, publications made in languages such as French, Chinese or Italian. Therefore, to study the popularity of the topic across regions, this analysis does not provide trustworthy results as other languages would need to be included.

Figure 3:
Initial scope of results: Documents by year (created using Microsoft Excel).

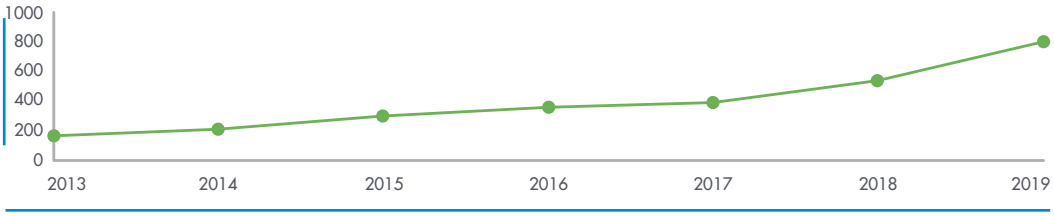
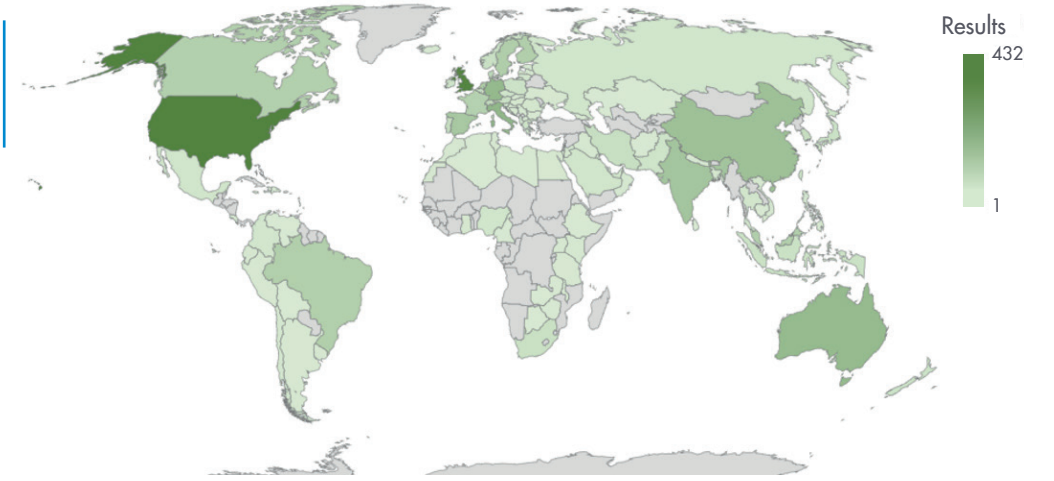


Figure 4:
Initial scope of results: Documents by region (created using Microsoft Excel).



3.2 Selected studies: Analysis of articles selected for screening

Articles included for the analysis are distributed among 16 of the 25 pre-selected journals as shown in Table 4. Journals from which most articles were selected also correspond to the journals with the highest number of articles found in the search.

To complement the table above, Appendix 2 presents the detailed list of selected articles included in the review, disclosing authors, title, year and the journal in which the paper was published. Each of the articles has been given a code (e.g., A-1, A-2, A-3, etc.) to ease the identification of the article throughout the review. Code numbering is given in alphabetical order based on authors' name.

3.2.1 Classification of selected studies

To process the results obtained, articles have been classified based on the three research questions introduced in the first section of this paper. A summary of this classification of results per research question is shown in Table 5, where articles are disclosed by code according to the mapping presented in Appendix 2.

Journal	Percentage
Academy of Management Review	4.00%
Business Strategy and the Environment	10.67%
Corporate Social Responsibility and Environmental Management	4.00%
Environmental Science and Policy	1.33%
International Journal of Management Reviews	5.33%
International Journal of Operations and Production Management	1.33%
International Journal of Production Economics	1.33%
International Journal of Production Research	5.33%
International Journal of Project Management	4.00%
Journal of Cleaner Production	21.33%
Journal of Environmental Management	1.33%
Journal of Management	1.33%
Journal of Product Innovation Management	1.33%
Management Decision	1.33%
Resources, Conservation and Recycling	10.67%
Sustainability (Switzerland)	25.33%

Table 4: Selected articles: Source distribution.

RQ1	A-1 A-3 A-5 A-6 A-9 A-10 A-11 A-13 A-14 A-15 A-17 A-18 A-20 A-24 A-29 A-30 A-31 A-35 A-36 A-39 A-41 A-43 A-44 A-47 A-49 A-51 A-53 A-54 A-57 A-65 A-68 A-69 A-70 A-73
RQ2	A-2 A-4 A-7 A-22 A-25 A-27 A-28 A-32 A-33 A-34 A-37 A-46 A-48 A-50 A-52 A-55 A-61 A-63 A-64 A-66 A-67 A-72 A-75
RQ3	A-8 A-12 A-16 A-19 A-21 A-23 A-26 A-38 A-40 A-42 A-45 A-56 A-58 A-59 A-60 A-62 A-71 A-74

Table 5: Classification of articles based on main research question addressed (mapping details in Appendix 2).

3.3 Answers to the research questions

3.3.1. What is the state-of-the-art of the integration of sustainable strategies into the business models of firms?

Related to the state-of-the-art of the integration of sustainable business models in firms, results typically show approaches based on the creation of frameworks and similar tools to promote brainstorming in companies.

A summary of the main tools found across the review is presented in Appendix 3. Each tool is displayed alongside the corresponding paper code (mapped through Appendix 2), authors, and research area. Additionally, whether the approach of the tool is mainly qualitative or quantitative is also included. Finally, when tools aim to be applicable across different industries and regions, they have been classified as 'generic', whereas those tools specific to a given industry or region have been considered to be 'specific'.

Results show that most of the tools and frameworks are linked to sustainable innovation, production, and supply chain related topics. There is also a strong link with circular economy, which is identified as a key research area of the integration of sustainable practices as it is a model for production and consumption heavily linked to a more efficient use of resources, away from linear economy patterns often based on a "take-make-consume-throw away" philosophy.

3.3.2. Why do companies integrate sustainability into their business models?

Results related to sustainability influence factors and triggers are summarized in Appendix 4. Overall, a total of 33 factors have been identified and summarised in this table. These triggers have been classified based on whether they are external to the firm or coming from aspects related to the internal stakeholders and conditions within the organisation. As defined by Zinovieva et al (2016), enterprise's internal factors are those that depend on the enterprise's operational arrangement, whereas external factors are those external to the companies' operational arrangement, thus, the environment surrounding the firm. A total of 15 of these factors are external to the organisation while 18 elements have been identified as internal. External factors include a competitive environment, customer behaviour and initiative from international organisations among others. Internal factors are mainly those such as firms' strategic positioning and the inclination to co-creation and cooperation, among others. Appendix 4 shows a compilation of these external and internal factors that make companies integrate sustainability. This summary is specified per article selected, indicating the code and authors for each article, which allows the identification of the article using Appendix 2. Alongside these, the rationales for the integration of sustainable practices are classified based on whether the factors are external or internal to the firm.

3.3.3. How do companies apply sustainable business models?

Results related to how firms integrate these business models are shown through exemplary cases in Appendix 5. This table outlines the cases found during the review, stating code and author, which can be linked through Appendix 2 to each of the articles' details. A short description for each case is given. Additionally, the table also states the main characteristics to contextualise these cases, by indicating the industry or research area and the region.

Cases are presented across a wide range of industries. Predominantly, high climate impact industries are found, such as manufacturing, transportation and oil, gas and mining. There is a tendency to target carbon intensive industries, but also other industries are included such as tourism and hospitality, evidencing that the focus goes beyond purely environmental impact areas and focuses on other sustainable matters as a whole, including social goals, and in the case of the airline industry, even specifically targeting the UN Global Development Goals (SDGs).

Among results, there is also a link with circular economy, where the integration of sustainable practices is performed alongside the integration of a circular economy philosophy, which is aligned with the models and state-of-the-art results obtained for the first research question.

4. Discussion

The purpose of this review was to show an overview of the integration of sustainability in business models. To cover the wide scope of research performed about this topic, three research questions linked to the "what", the "why" and the "how" of sustainability integration were posed.

Considering the first research question, related to the state-of-the-art of the integration of these strategies into business models, results showed a variety of approaches. In the majority of cases, such as for Amini and Bienstock (2014), Berkowitz (2018) or Morioka and de Carvalho (2016), the proposal is a generic framework that companies, or institutions could use to brainstorm on sustainable strategies and assess their potential before the investments are made. The integration of sustainable practices is also directly linked with the innovation capabilities of a firm (Adams et al, 2016; Berkowitz, 2018; Boons and Lüdeke-Freund, 2013). Thus, from this connection between sustainable integration and innovation, concepts such as eco-innovation arise directly targeting sustainability through innovation and evidencing the strong link between the two concepts.

This showcases the fact that we are currently in a transition period, in which there is still a need to innovate in order to become sustainable. As of today, companies will not be ready to face the environmental and social challenges unless their product and processes evolve to address the new market needs.

As per the frameworks' baseline, these frameworks are typically focused on the sustainable challenge to overcome and the value proposition of overcoming the challenge, as for example in the case of Morioka and de Carvalho (2016). Sustainable challenges and value propositions are typically identified across different stages within the production process, often targeting a move from the linear economy to a more circular economy-oriented setup. It is possible to find frameworks to integrate sustainability for almost any operational activity, but the most common is through supply chain efficiency initiatives such as proposal to incentivize waste reduction (Bautista-Lazo and Short, 2013).

Additionally, the implementation of these brainstorming-products and procedures to capture value are addressed. As per the question about how to measure the value that a sustainable practice brings, existing literature presents "value" as not only to be measured for the social and environmental dimensions, but in terms of economic returns (Adams et. al, 2016). Economic performance is often presented as a quantitative measure to capture direct value of a given practice, but only after the capabilities and resources are in place. Typically, in parallel to the production process, economic performance is addressed through the concept of circular economy, and how it can be achieved along with environmental quality and social prosperity.

In many cases, instead of the driving factors, the barriers and challenges are analysed such as De Jesus Pacheco et al (2019) or Vezzoli et al (2015) and in others, the focus is on risks (Birkel et al, 2019). These frameworks help sustain the argument that sustainable integration is achievable not only by the presence of triggers, but also due to the absence of barriers that need to be removed prior to a company being able to become more sustainable friendly.

Frameworks that target sustainable enablers and challenges, were also found with a specific focus on a region e.g., (Oberhofer & Fürst 2013; Schraven et al, 2019), industry e.g., (Barth and

Ulvenblad, 2017; Yip & Bocken, 2018) or research area e.g., (Buenk et al, 2019). Targeting a specific set of firms that share common characteristics results in the creation of more tangible frameworks. This is because they can include specific indicators. There is also common ground for standardisation across companies belonging to the same industry and/or being part of the same social and economic scenarios. This addresses one of the key challenges found today, which is the fact that there is a lack of standards to measure and compare environmental and social performance across firms. This sustainable performance monitoring is still very far in maturity compared to the measurement of financial performance indicators and one of the key topics addressed by regulators and institutions today, so that in the short-term future we would be able to measure how sustainable a company is by applying a common terminology (for example, as targeted in Europe through the EU Taxonomy).

Focused on the mechanisms for sustainability, many studies discuss topics related to lean manufacturing, such as waste reduction, as the key towards the integration of sustainable practices (Ansari and Kant, 2017; Bautista-Lazo and Short, 2013; Dieste et al, 2019; Gbededo et al, 2018). However, as discussed by Boons and Lüdeke-Freund (2013), there is sometimes very limited visibility over the implementation and measurement of value for these frameworks. Also, research seems to be mainly theoretical and qualitative.

None of the reviewed authors propose quantitative models. Quantitative models may be difficult to construct since they would need to be based on internal elements of the company, and those indicators are likely to vary across companies. For the development of quantitative models, it would probably be interesting to establish first common measurable indicators within the same sector. At some point, it may even be possible to build quantitative models including cross-sector indicators able to compare different industries. This way, companies with fewer resources (SMEs) would be able to monitor their performance in terms of sustainability. Currently, quantitative measurements, such as numerical and / or letter-based indicators could be quite complex to use. They are often not well known and are impractical for companies that do not produce corporate reports.

Moving on to the second research question, it enquires about why firms decide to apply these sustainable strategies and develop new business models. Sustainability practices seem to be used more and more to complement strategic management decisions as an increasing trend justified by a social conscience adapting to consumers that increasingly have positive bias towards ecologic and socially responsible products (Shao, 2019; Ludeke-Freund and Dembek, 2017). The creation of the sustainable development goals (SDGs), proposed by the United Nations in 2015, is a clear reflection of the emerging social conscience. SDGs were catalysts for companies to innovate and integrate environmental and social considerations to address the different goals (Cordova and Celone, 2019; Eichler and Schwarz, 2019), such as SDG 13 (Climate Action) and SDG 5 (Gender Equality). These goals shed a light of sustainable targets and goals recognised by the international community, facilitating the integration of policies across sectors (Le Blanc, 2015).

Likewise, in the context of the fourth industrial revolution, corporate social responsibility could represent a competitive advantage for organisations. It can act as an enabler for cocreation in an environment in which collaboration between institutions is key for the success of a firm as it is required to maintain competitive value (Adamik and Nowicki, 2019). Overall, companies

applying these strategies do not seem to be a trend or fashion that would eventually disappear. Environmental and social considerations are becoming a fundamental part of any organisation that wants to succeed long-term (Ertz and Leblanc-Proulx, 2018; Ludeke-Freund and Dembek, 2017). Consequently, companies are facing a new socio-economic scenario, in which the concept of hybrid organisations, those that combine enterprise with a social purpose, is increasingly becoming more and more fluid (Doherty et al, 2014).

Also, from the analysis of the results, it can be discussed that both internal and external factors that justify the integration of sustainability within an organisation are interrelated, such as in the research presented by Adamik and Nowicki (2019) or Ertz and Leblanc-Proulx (2018). In these cases, there is a blurred line separating internal and external influences. In the end, internal aspects such as the organisation's vision and goals (Doherty et al, 2014; Singh et al, 2019) are strategic positions reflecting the ethics of stakeholders, who are inherently part of society. Thus, being simultaneously producers and consumers of the same goods, and challenging firms' approach towards sustainability from both external and internal perspectives simultaneously.

About the third research question, sustainable practices are applied through all dimensions of the organisation and involve the entire supply chain. From integrating environmental considerations during products' research and development phase (Guzzo et al, 2019) to the manufacturing phase, such as integrating sustainable manufacturing techniques (Cherrafi et al, 2016). The integration of environmental considerations also goes beyond the manufacturing of products and involves other elements such as logistics with the integration of sustainability overlapping the concept of circular economy in many cases (e.g., Guzzo et al., 2019; Ingemarsdotter et al,2019; Schraven et al., 2019). When looking into existing frameworks, such as the "Circular Model Navigator" of the Business Model Innovation Lab (Business Model Innovation [BMI] Lab, 2021), use cases are linked to the main dimensions presented in its circular canvas: make, use and recover. The implementation of circular strategies typically integrates these elements and includes these dimensions, which would be the case for the use cases presented in Appendix 5, such as the practices stated by Guzzo et al. (2019). Practices also cover the four dimensions presented in BMI's canvas: product design, metrics, financing, packaging and logistics, not only integrating circular economy elements through the application of lean and six sigma, but also leveraging on new technologies such as the use of internet of things (IoT) to foster sustainability.

Regarding the integration of sustainable practices across industries, it seems to be specially consolidated in sectors such as manufacturing, automotive, consumer goods and transportation. Additionally, as discussed in the study of the stat-of-the-art, innovation is directly linked to sustainable integration, and this is playing a key role in new emerging sectors. A clear example is how IoT (Internet of Things) of things is an enabler to trigger new and more sustainable business models that reinforce circular economy (Ingemarsdotter et al., 2019).

Similarly, the use cases found prove that sustainable business practices are applied all around the globe (Guzzo et al., 2019), despite countries having differences about the external factors surrounding the firm, such as governmental legislation or consumer's culture. Emerging economies seem to also be realising that sustainability as one of the keys for success (Banihashemi et al, 2017; Wieczorek, 2018).

When looking into the measurement of value proposed in conceptual frameworks, it seems that one of the key indicators included, economic returns, is not a tangible outcome of the

implementation of these strategies. Performing a deep dive analysis into the implications of these practices' implementation, cases such as the one presented by Rotondo et al (2019), show in their example of the low-cost airline industry that the relationship between the integration of social sustainable practices and the improvement of firm's economic results seems to be neither automatic nor direct. Overall, there seems to be limited visibility over the tangible economic returns that the integration of these practices has. It seems to be difficult to differentiate between the benefits obtained as a result of the integration of the practices and those due to other strategic actions. Perhaps by working on the measurable indicators as proposed before, it is possible to later evaluate that impact. In any case, as discussed by Gong et al (2018) there are many proposed metrics that discuss environmental and social implications. Also, it could be argued that the exact calculation of how much the implementation of these practices entail is probably not so important. What would be key is effectively identifying a continuous trend towards a more sustainable business.

5. Conclusions

This systematic review shows that the research area related to the integration of sustainable business models that target improvement on the companies' ESG performance is a widely studied topic in which there is an emerging interest. This review included the analysis on the state-of-the-art of the integration of these practices (what), the rationale behind them (why) and the implication of the implementation of these sustainable initiatives (how), answering the previously stated research questions.

- Research question 1 (RQ1): What is the state-of-the-art of the integration of sustainable strategies into the business models of firms? Regarding the state-of-the-art, most tools are qualitative frameworks and there are limited quantitative tools that can be used by firms. Thus, there are limited examples of KPIs and metrics that companies can use to measure the sustainability impact of a given practice or business model. Consequently, a research gap identified is the lack of frameworks that include quantitative metrics to measure the level of impact of the integration of these practices and business models. Related to this, there are research opportunities linked to the development of ways to capture the direct value of these business models using quantitative indicators.

Additionally, most tools found during the research are generic, typically providing a holistic view, which could potentially create difficulties when firms try to use them, as they would have to tailor the framework to the characteristics of their industry. Therefore, there would be a research opportunity in tailoring some of these generic models for a set of industries or applications.

- Research question 2 (RQ2): Why do companies integrate sustainability into their business models?

When analysing why companies apply these sustainable business models, several external and internal factors are identified. They are all factors that catalyse sustainability for an organisation. Additionally, many studies also show how external factors (e.g., government policies, customer's view) help trigger some of the internal factors that foster the integration

of sustainable business models, such as the changes in the companies' vision/mission and organisational structure. However, there is limited study on those factors that are internal to the organisation and also contribute and influence external agents thus promoting sustainable business models both externally and internally to the organisation. In the end, this is creating a chicken-and-egg dilemma and there are research opportunities to further study this situation in which firm's internal triggers ultimately act as a catalyst of sustainable business models through influencing stakeholders in their external systems.

- Research question 3 (RQ3): How do companies effectively integrate sustainability in their business models?

Related to the use cases of the third research question, selected articles allowed the review of concrete examples of how sustainable business models integration could be performed through a wide scope of targets, sectors and regions. Over the different cases, there are some common challenges, especially when it comes to measuring the success of the integration and capturing value. There seems to be a general lack of visibility of the economic impact of sustainable strategies and there are many possibilities to continue research and ultimately being able to standardise the measurement of the success of these integrations across industries.

Regarding the conclusions for institutions and governments, as described in Appendix 4, initiatives from international organisations and Government initiatives are two key triggers identified as factors on which sustainability integration is thriving. Therefore, it would make sense for these institutions and governments to continue progressing on the development of further initiatives and regulate as they seem to have a positive effect on sustainability integration for companies.

For practitioners, one of the key aspects is that a competitive environment is also a key factor to trigger innovation, thus, triggering sustainability innovation. Regarding the internal factors, firm's vision and mission, and its strategy, seem to be key to trigger sustainability integration. These have a focus on firm's management practices and its inclination towards cooperation and co-creation. Thus, cooperation and co-creation seem to be necessary elements to navigate through markets that become more competitive by the day. In these scenarios, it seems to be difficult for a single company to excel without partnering with other organisations.

For academics, research should continue to better understand sustainability integration and to continue standardizing the language used across the topic. Considering other challenges encountered throughout the study, it is worth to comment on the lack of consistency regarding sustainability terminology. Also, some relevant studies may have not been identified during the search process due to the constraints on the sources, defined scope, and preselection of results. Other methodological possibilities could be considered to extend the systematic review along with the classification of findings. Despite of the previously mentioned challenges and limitations, the objective of the search was met. Answers to the three research questions presented were given. Insightful information was found for all research questions, enabling an analysis of existing literature and the identification of current trends, gaps and opportunities for future research

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APPENDIX

Title	SJR	H index	Total Cites (3years)	Cites / Doc. (2years)	Ref. / Doc.	Category	Selected
Academy of Management Journal	11,190	304	3254	9.32	102.34	Business, Management and Accounting: Strategy and management	Yes
Academy of Management Review	7,482	260	1226	10.15	90.34	Business, Management and Accounting: Strategy and management	Yes
Applied Energy	3,607	189	53715	10.15	56.67	Environmental science: Management, monitoring, policy and law	No
Biomass and Bioenergy	1,110	169	3847	3.98	53.73	Environmental science: Waste management and disposal	No
Biotechnology for Biofuels	1,522	84	4941	5.1	60.53	Environmental science: Management, monitoring, policy and law	No
Business Strategy and the Environment	1,828	94	1717	6.16	77	Business, Management and Accounting: Strategy and management; Environmental science: Management, monitoring, policy and law	Yes
Climate Policy	1,889	62	1143	4.31	58.73	Environmental science: Management, monitoring, policy and law	No
Corporate Social Responsibility and Environmental Management	0,974	66	1043	5.31	75.5	Environmental science: Management, monitoring, policy and law	Yes
Critical Reviews in Environmental Science and Technology	2,074	97	1264	8.95	183.09	Environmental science: Waste management and disposal	Yes
Ecological Engineering	1,122	118	6260	3.84	54.33	Environmental science: Management, monitoring, policy and law	No
Ecotoxicology	0,764	86	1189	2.63	57.16	Environmental science: Management, monitoring, policy and law	No
Energy Policy	2,168	197	11957	5.81	56.31	Environmental science: Management, monitoring, policy and law	No

Appendix 1: Selection of journals aligned with the aim of the research scope.

Appendix 1: Selection of journals aligned with the aim of the research scope (Continuation).

Environmental Impact Assessment Review	1,234	87	1186	4.53	68.5	Environmental science: Management, monitoring, policy and law	No
Environmental Science and Policy	1,823	105	3636	5.23	61.42	Environmental science: Management, monitoring, policy and law	Yes
Fish and Fisheries	3,001	100	1613	7.17	115.59	Environmental science: Management, monitoring, policy and law	No
Food Policy	2,189	95	1556	4.59	54.06	Environmental science: Management, monitoring, policy and law	No
Forest Ecology and Management	1,249	166	6476	3.36	71.46	Environmental science: Management, monitoring, policy and law	No
Forest Policy and Economics	1,127	64	1572	3.51	63.35	Environmental science: Management, monitoring, policy and law	No
Global Environmental Change	4,304	162	3855	11.5	81.03	Environmental science: Management, monitoring, policy and law	Yes
Human Relations	2,519	124	1264	5.42	79.75	Business, Management and Accounting: Strategy and management	No
Industrial Management and Data Systems	1,390	96	2053	4.79	60.7	Business, Management and Accounting: Strategy and management	No
Information Processing and Management	1,192	94	1534	6.9	60.17	Decision Science: Management science and operations research	No
International Biodeterioration and Biodegradation	1,172	92	3755	4.46	55.81	Environmental science: Waste management and disposal	No
International Journal of Applied Earth Observation and Geoinformation	1,623	86	2905	5.04	57.66	Environmental science: Management, monitoring, policy and law	No
International Journal of Hospitality Management	2,217	106	3189	8.43	76.16	Business, Management and Accounting: Strategy and management	No
International Journal of Management Reviews	3,482	96	1181	12.27	152.04	Business, Management and Accounting: Strategy and management	Yes
International Journal of Operations and Production Management	2,187	129	1794	6.83	84.94	Business, Management and Accounting: Strategy and management	Yes

Appendix 1: Selection of journals aligned with the aim of the research scope (Continuation).

International Journal of Production Economics	2,379	172	6779	7.02	62.05	Decision Science: Management science and operations research	Yes
International Journal of Production Research	1,776	125	7754	6.39	57.95	Decision Science: Management science and operations research; Business, Management and Accounting: Strategy and management	Yes
International Journal of Project Management	2,659	134	2839	8.87	85.11	Environmental science: Management, monitoring, policy and law	Yes
Journal of Chemical Technology and Biotechnology	0,661	111	3067	2.89	50.16	Environmental science: Waste management and disposal	No
Journal of Cleaner Production	1,886	173	72709	8.3	59.05	Business, Management and Accounting: Strategy and management	Yes
Journal of Corporate Finance	1,566	91	1710	3.29	65.19	Business, Management and Accounting: Strategy and management	No
Journal of Environmental Management	1,321	161	18044	6.24	60.17	Environmental science: Management, monitoring, policy and law; Environmental science: Waste management and disposal	Yes
Journal of Environmental Quality	0,884	160	1606	2.25	55.8	Environmental science: Management, monitoring, policy and law; Environmental science: Waste management and disposal	No
Journal of Financial Economics	11,999	240	2726	6.79	51.03	Business, Management and Accounting: Strategy and management	No
Journal of Hazardous Materials	2,010	260	23676	9.52	51.17	Environmental science: Waste management and disposal	No
Journal of International Business Studies	4,994	184	1781	10.28	103.01	Business, Management and Accounting: Strategy and management	No
Journal of Knowledge Management	1,752	106	1912	7.25	96.76	Business, Management and Accounting: Strategy and management	No
Journal of Management	6,982	208	3784	11.42	105.7	Business, Management and Accounting: Strategy and management	Yes
Journal of Management in Engineering - ASCE	1,255	62	1169	3.93	67.5	Decision Science: Management science and operations research	No

Appendix 1:
Selection of journals aligned with the aim of the research scope (Continuation).

Journal of Management Studies	4,608	172	1273	6.69	99.71	Business, Management and Accounting: Strategy and management	Yes
Journal of Product Innovation Management	3,128	135	1043	6.43	85.87	Business, Management and Accounting: Strategy and management	Yes
Land Use Policy	1,479	103	6848	4.18	63.62	Environmental science: Management, monitoring, policy and law	No
Landscape and Urban Planning	1,740	149	3819	6.15	65.92	Environmental science: Management, monitoring, policy and law	No
Management Decision	0,862	91	1463	3.7	74.51	Decision Science: Management science and operations research	Yes
Management Science	5,439	237	3854	4.57	51.69	Business, Management and Accounting: Strategy and management; Decision Science: Management science and operations research	Yes
Marine Policy	1,295	86	3719	3.47	56.83	Environmental science: Management, monitoring, policy and law	No
Ocean and Coastal Management	0,822	77	2346	2.77	66.7	Environmental science: Management, monitoring, policy and law	No
Omega	2,579	131	2581	7.28	53.07	Business, Management and Accounting: Strategy and management; Decision Science: Management science and operations research	No
Organization Science	5,557	224	1014	3.98	92.58	Business, Management and Accounting: Strategy and management	Yes
Organization Studies	2,967	140	1232	5.54	74.84	Business, Management and Accounting: Strategy and management	Yes
Production and Operations Management	2,843	102	1577	3.83	55.82	Decision Science: Management science and operations research	Yes
Production Planning and Control	1,394	70	1700	5.59	79.38	Business, Management and Accounting: Strategy and management; Decision Science: Management science and operations research	No

Research Policy	3,246	224	3837	6.91	80.99	Business, Management and Accounting: Strategy and management; Decision Science: Management science and operations research	No
Resources Policy	1,204	64	1946	4.54	55.74	Environmental science: Management, monitoring, policy and law	No
Resources, Conservation and Recycling	2,215	119	7538	8.98	59.98	Environmental science: Waste management and disposal	Yes
Science of the Total Environment	1,661	224	66632	7.14	64.48	Environmental science: Waste management and disposal	No
Strategic Management Journal	8,430	269	3584	7.08	79.9	Business, Management and Accounting: Strategy and management	Yes
Sustainability	0,581	68	26822	2.97	60.56	Environmental science: Management, monitoring, policy and law	Yes
Tourism Management	3,068	179	6900	9.66	74.85	Business, Management and Accounting: Strategy and management	No
Transportation Research Part A: Policy and Practice	2,109	120	4271	5.05	55.41	Decision Science: Management science and operations research	No
Transportation Research Part E: Logistics and Transportation Review	2,302	103	3008	6.18	52.05	Decision Science: Management science and operations research	No
Transportation Research, Part C: Emerging Technologies	3,342	116	7044	8.36	52.01	Decision Science: Management science and operations research	No
Water Research	2,932	285	25602	9.7	58.06	Environmental science: Waste management and disposal	No

Appendix 1: Selection of journals aligned with the aim of the research scope (Continuation).

Appendix 2:
List of selected articles.

Code	Authors	Title	Year	Journal
A-1	Aarseth et al	Project sustainability strategies: A systematic literature review	2017	International Journal of Project Management
A-2	Adamik and Nowicki	Pathologies and paradoxes of co-creation: A contribution to the discussion about corporate social responsibility in building a competitive advantage in the age of Industry 4.0	2019	Sustainability (Switzerland)
A-3	Adams et al.	Sustainability-oriented Innovation: A Systematic Review	2016	International Journal of Management Reviews
A-4	Adjei-Bamfp et al	The role of e-government in sustainable public procurement in developing countries: A systematic literature review	2019	Resources, Conservation and Recycling
A-5	Amini and Bienstock	Corporate sustainability: An integrative definition and framework to evaluate corporate practice and guide academic research	2014	Journal of Cleaner Production
A-6	Ansari and Kant	Exploring the Framework Development Status for Sustainability in Supply Chain Management: A Systematic Literature Synthesis and Future Research Directions	2017	Business Strategy and the Environment
A-7	Athwal et al	Sustainable Luxury Marketing: A Synthesis and Research Agenda	2019	International Journal of Management Reviews
A-8	Banihashemi et al.	Critical success factors (CSFs) for integration of sustainability into construction project management practices in developing countries	2017	International Journal of Project Management
A-9	Barros et al	Selection of tailored practices for supply chain management	2013	International Journal of Operations and Production Management
A-10	Barth and Ulvenblad	Towards a conceptual framework of sustainable business model innovation in the agri-food sector: A systematic literature review	2017	Sustainability (Switzerland)
A-11	Bautista-Lazo and Short	Introducing the All Seeing Eye of Business: A model for understanding the nature, impact and potential uses of waste	2013	Journal of Cleaner Production
A-12	Benos et al	Harnessing a 'currency matrix' for performance measurement in cooperatives: A multi-phased study	2018	Sustainability (Switzerland)
A-13	Berkowitz	Meta-organizing firms' capabilities for sustainable innovation: A conceptual framework	2018	Journal of Cleaner Production

Appendix 2: List of selected articles (Continuation).

A-14	Birkel et al.	Development of a risk framework for Industry 4.0 in the context of sustainability for established manufacturers	2019	Sustainability (Switzerland)
A-15	Boons and Lüdeke-Freund	Business models for sustainable innovation: State-of-the-art and steps towards a research agenda	2013	Journal of Cleaner Production
A-16	Brès et al	Pluralism in Organizations: Learning from Unconventional Forms of Organizations	2018	International Journal of Management Reviews
A-17	Bressanelli et al	Challenges in supply chain redesign for the Circular Economy: a literature review and a multiple case study	2019	International Journal of Production Research
A-18	Buenk et al.	A framework for the sustainability assessment of (Micro) transit systems	2019	Sustainability (Switzerland)
A-19	Butler and Szromek	Incorporating the value proposition for society with business models of health tourism enterprises	2019	Sustainability (Switzerland)
A-20	Büyüközkan and Karabulut	Sustainability performance evaluation: Literature review and future directions	2018	Journal of Environmental Management
A-21	Caldera et al	Exploring the characteristics of sustainable business practice in small and medium-sized enterprises: Experiences from the Australian manufacturing industry	2018	Journal of Cleaner Production
A-22	Charlo et al	Financial performance of socially responsible firms: The short- and long-term impact	2017	Sustainability (Switzerland)
A-23	Cherrafi et al.	The integration of lean manufacturing, Six Sigma and sustainability: A literature review and future research directions for developing a specific model	2016	Journal of Cleaner Production
A-24	Cherrafi et al	A framework for the integration of Green and Lean Six Sigma for superior sustainability performance	2017	International Journal of Production Research
A-25	Cillo et al	Understanding sustainable innovation: A systematic literature review	2019	Corporate Social Responsibility and Environmental Management
A-26	Cioca et al	Sustainable development model for the automotive industry	2019	Sustainability (Switzerland)
A-27	Cordova and Celone	SDGs and innovation in the business context literature review	2019	Sustainability (Switzerland)
A-28	Crane	Modern slavery as a management practice: Exploring the conditions and capabilities for human exploitation	2013	Academy of Management Review

Appendix 2: List of selected articles (Continuation).

A-29	de Jesus Pacheco et al.	State of the art on the role of the Theory of Inventive Problem Solving in Sustainable Product-Service Systems: Past, Present, and Future	2019	Journal of Cleaner Production
A-30	de Jesus Pacheco et al.	Overcoming barriers towards Sustainable Product-Service Systems in Small and Medium-sized enterprises: State of the art and a novel Decision Matrix	2019	Journal of Cleaner Production
A-31	Dieste et al.	The relationship between lean and environmental performance: Practices and measures	2019	Journal of Cleaner Production
A-32	Doherty et al.	Social enterprises as hybrid organizations: A review and research agenda	2014	International Journal of Management Reviews
A-33	Eichler and Schwarz	What sustainable development goals do social innovations address? A systematic review and content analysis of social innovation literature	2019	Sustainability (Switzerland)
A-34	Ertz and Leblanc-Proulx	Sustainability in the collaborative economy: A bibliometric analysis reveals emerging interest	2018	Journal of Cleaner Production
A-35	Foucrier and Wiek	A process-oriented framework of competencies for sustainability entrepreneurship	2019	Sustainability (Switzerland)
A-36	Gbededo et al.	Towards a Life Cycle Sustainability Analysis: A systematic review of approaches to sustainable manufacturing	2018	Journal of Cleaner Production
A-37	Ghadimi et alA	Sustainable supply chain modeling and analysis: Past debate, present problems and future challenges	2019	Resources, Conservation and Recycling
A-38	Gong et al.	Inside out: The interrelationships of sustainable performance metrics and its effect on business decision making: Theory and practice	2018	Resources, Conservation and Recycling
A-39	Govindan and Hasanagic	A systematic review on drivers, barriers, and practices towards circular economy: a supply chain perspective	2018	International Journal of Production Research
A-40	Guzzo et al.	Circular innovation framework: Verifying conceptual to practical decisions in sustainability-oriented product-service system cases	2019	Sustainability (Switzerland)
A-41	Hahn, Preuss, Pinkse, and Figge	Cognitive frames in corporate sustainability: Managerial sensemaking with paradoxical and business case frames	2014	Academy of Management Review
A-42	Ingemarsdotter et al.	Circular strategies enabled by the internet of things-a framework and analysis of current practice	2019	Sustainability (Switzerland)

Appendix 2: List of selected articles (Continuation).

A-43	Kalmykova, Sadagopan and Rosado.	Circular economy - From review of theories and practices to development of implementation tools	2018	Resources, Conservation and Recycling
A-44	Kumar, Sezersan, Garza-Reyes, Gonzalez, and Al-Shboul,	Circular economy in the manufacturing sector: benefits, opportunities and barriers	2019	Management Decision
A-45	Lake, Acquaye, Genovese, Kumar, and Koh	An application of hybrid life cycle assessment as a decision support framework for green supply chains	2015	International Journal of Production Research
A-46	Leitão, de Brito, and Cubico	Eco-innovation influencers: Unveiling the role of lean management principles adoption	2019	Sustainability (Switzerland)
A-47	Liu, Bai, Liu and Wei	A framework of sustainable service supply chain management: A literature review and research agenda	2017	Sustainability (Switzerland)
A-48	Lüdeke-Freund and Dembek	Sustainable business model research and practice: Emerging field or passing fancy?	2017	Journal of Cleaner Production
A-49	Luthra, Govindan and Mangla	Structural model for sustainable consumption and production adoption—A grey-DEMATEL based approach	2017	Resources, Conservation and Recycling
A-50	Machado, Pinheiro de Lima, Gouvea da Costa, Angelis, and Mattioda	Framing maturity based on sustainable operations management principles	2017	International Journal of Production Economics
A-51	Martens and Carvalho	Key factors of sustainability in project management context: A survey exploring the project managers' perspective	2017	International Journal of Project Management
A-52	Melander	Achieving Sustainable Development by Collaborating in Green Product Innovation	2017	Business Strategy and the Environment
A-53	Morioka and de Carvalho	A systematic literature review towards a conceptual framework for integrating sustainability performance into business	2016	Journal of Cleaner Production
A-54	Muñoz and Cohen	Sustainable Entrepreneurship Research: Taking Stock and looking ahead	2018	Business Strategy and the Environment

Appendix 2: List of selected articles (Continuation).

A-55	Nave and Ferreira	Corporate social responsibility strategies: Past research and future challenges	2019	Corporate Social Responsibility and Environmental Management
A-56	Oberhofer and Fürst	Sustainable development in the transport sector: Influencing environmental behaviour and performance	2013	Business Strategy and the Environment
A-57	Prieto-Sandoval, Jaca, Santos, Baumgartner, and Ormazabal	Key strategies, resources, and capabilities for implementing circular economy in industrial small and medium enterprises	2019	Corporate Social Responsibility and Environmental Management
A-58	Ranjbari, Morales-Alonso, and Carrasco-Gallego	Conceptualizing the sharing economy through presenting a comprehensive framework	2018	Sustainability (Switzerland)
A-59	Rizzi, Bartolozzi, Borghini, and Frey	Environmental Management of End-of-Life Products: Nine Factors of Sustainability in Collaborative Networks	2013	Business Strategy and the Environment
A-60	Rotondo et al.	The social side of sustainable business models: An explorative analysis of the low-cost airline industry	2019	Journal of Cleaner Production
A-61	Sahamie, Stindt, and Nuss	Transdisciplinary Research in Sustainable Operations - An Application to Closed-Loop Supply Chains	2013	Business Strategy and the Environment
A-62	Schraven et al.	Circular transition: Changes and responsibilities in the Dutch stony material supply chain	2019	Resources, Conservation and Recycling
A-63	Shao	Sustainable consumption in China: New trends and research interests	2019	Business Strategy and the Environment
A-64	Singh et al.	Stakeholder role for developing a conceptual framework of sustainability in organization	2019	Sustainability (Switzerland)
A-65	Stephan, Patterson, Kelly, C., and Mair,	Organizations Driving Positive Social Change: A Review and an Integrative Framework of Change Processes	2016	Journal of Management
A-66	Stewart and Niero	Circular economy in corporate sustainability strategies: A review of corporate sustainability reports in the fast-moving consumer goods sector	2018	Business Strategy and the Environment
A-67	Susur, Hidalgo, and Chiaroni,	A strategic niche management perspective on transitions to eco-industrial park development: A systematic review of case studies	2019	Resources, Conservation and Recycling

Appendix 2: List of selected articles (Continuation).

A-68	Tirabeni, De Bernardi, Forliano, and Franco,	How can organisations and business models lead to a more sustainable society? A framework from a systematic review of the industry 4.0	2019	Sustainability (Switzerland)
A-69	Vezzoli et al.	New design challenges to widely implement 'Sustainable Product-Service Systems'	2015	Journal of Cleaner Production
A-70	Watson, Wilson, Smart, and Macdonald,	Harnessing Difference: A Capability-Based Framework for Stakeholder Engagement in Environmental Innovation	2018	Journal of Product Innovation Management
A-71	Wieczorek	Sustainability transitions in developing countries: Major insights and their implications for research and policy	2018	Environmental Science and Policy
A-72	Wry and York	An identity-based approach to social enterprise	2017	Academy of Management Review
A-73	Yip and Bocken	Sustainable business model archetypes for the banking industry	2018	Journal of Cleaner Production
A-74	Yun et al.	Metallurgical and mechanical methods for recycling of lithium-ion battery pack for electric vehicles	2018	Resources, Conservation and Recycling
A-75	Zhao, Chang, Hwang, and Deng	Critical factors influencing business model innovation for sustainable buildings	2017	Sustainability (Switzerland)

Appendix 3:
Results related to the integration of sustainability in business models.

Code	Authors	Tool	Research area	Approach	Generalization level
A-1	Aarseth et al.	Sustainability strategies to be used project organisation, its host, or both in collaboration	Sustainable production	Qualitative	Generic
A-3	Adams et al.	Sustainability-oriented innovation model	Sustainable innovation	Qualitative	Generic
A-5	Amini and Bienstock	Framework for corporate sustainability	Corporate sustainability	Qualitative	Generic
A-6	Ansari and Kant	Framework for sustainability in supply chain management	Sustainability in supply chain	Qualitative	Specific
A-9	Barros et al.	Practices to reduce waste	Waste management	Qualitative	Generic
A-10	Barth and Ulvenblad	Framework for sustainable business models in the agri-food sector	Sustainability in agri-food sector	Qualitative	Specific
A-11	Bautista-Lazo and Short	Waste-related approach model	Waste management	Qualitative	Generic
A-13	Berkowitz	Framework for meta-organizing firm's capabilities for sustainable innovation	Sustainable innovation	Qualitative	Generic
A-14	Birkel et al.	Sustainability risk framework for established manufacturers	Sustainability risk analysis	Qualitative	Specific
A-15	Boons and Lüdeke-Freund	Analysis of technological, social and organisational innovation	Sustainable innovation	Qualitative	Generic
A-17	Bressanelli et al.	Levers to overcome challenges in circular economy	Sustainability in supply chain	Qualitative	Generic
A-18	Buenk et al.	Framework for the sustainability assessment of (micro)transit systems	Sustainable transportation	Qualitative	Specific
A-20	Büyüközkan and Karabulut	Analysis of sustainable performance frameworks	Performance reporting	Qualitative	Generic
A-24	Cherrafi et al.	Framework for the integration of Green and Lean Six Sigma	Lean manufacturing	Qualitative	Generic

Appendix 3: Results related to the integration of sustainability in business models (Continuation).

A-29	de Jesus Pacheco et al.	Model for sustainable product-service systems	Inventive problem solving	Qualitative	Generic
A-30	de Jesus Pacheco et al.	Decision matrix to enhance Sustainable Product-Service Systems in Small and Medium-sized enterprises	Sustainable Product-Service Systems	Qualitative	Generic
A-31	Dieste et al.	Model to connect lean and environmental performance	Lean manufacturing	Qualitative	Generic
A-35	Foucrier and Wiek	Framework for sustainability entrepreneurship	Entrepreneurship	Qualitative	Generic
A-36	Gbededo et al.	Model for life cycle sustainability analysis	Sustainable manufacturing	Qualitative	Generic
A-39	Govindan and Hasanagic	Practices towards circular economy	Circular economy	Qualitative	Generic
A-41	Hahn et al.	Business case frames in corporate sustainability	Corporate sustainability	Qualitative	Generic
A-43	Kalmykova et al.	Implementation tools for circular economy	Circular economy	Qualitative	Generic
A-44	Kumar et al.	Opportunities for circular economy in manufacturing	Circular economy	Qualitative	Specific
A-47	Liu et al.	Framework of sustainable service supply chain management	Supply chain management	Qualitative	Generic
A-51	Martens and Carvalho	Factors of sustainability in project management	Project management	Qualitative	Generic
A-53	Morioka and de Carvalho	Framework for sustainability performance	Sustainability performance	Qualitative	Generic
A-54	Muñoz and Cohen	Practices to overcome challenges related to sustainable entrepreneurship	Sustainable innovation	Qualitative	Generic
A-57	Prieto-Sandoval et al.	Set of strategies to help SMEs implement circular economy	Circular economy	Qualitative	Specific
A-65	Stephan et al.	Framework for Positive Social Change Strategies	Corporate sustainability	Qualitative	Generic

A-68	Tirabeni et al.	Sustainability framework	Industry 4.0	Qualitative	Generic
A-69	Vezzoli et al.	Model of design challenges to widely implement 'sustainable product-service systems'	Sustainable design	Qualitative	Generic
A-70	Watson et al.	Framework addressing stakeholder engagement in environmental innovation	Sustainable innovation	Qualitative	Generic
A-73	Yip and Bocken	Model of sustainable business model archetypes for the banking industry	Sustainable banking	Qualitative	Specific

Appendix 3: Results related to the integration of sustainability in business models (Continuation).

Appendix 4:
Factors fostering the integration of sustainability practices.

Code	Authors	External factors	Internal factors
A-2	Adamik and Nowicki	- Competitive environment - Economic and social tensions	- Inclination towards co-creation and collaboration with other organisations
A-4	Adjei-Bamfp et al.	N/A	- Deployment of electronic and internet technologies
A-7	Athwal et al.	- Customer behaviour - Social tensions	- Firm's organisation concerns
A-22	Charlo	- Societal changes - Customer behaviour	- Firm's strategic positioning
A-25	Cillo et al.	- Customer behaviour - Initiatives from international organisations	- Firm's strategic positioning - Inclination towards co-creation and collaboration with other organisations
A-27	Cordova and Celone	- Initiatives from international organisations	N/A
A-28	Crane	- Initiatives from international organisations	- Internal policies
A-32	Doherty et al.	- Social policies (e.g., Fairtrade)	- Firm's vision and mission definition - Firm's organisational form
A-33	Eichler and Schwarz	- Societal changes - Initiatives from international organisations	N/A
A-34	Ertz and Leblanc-Proulx	- Competitive environment	- Inclination towards co-creation and collaboration with other organisations
A-37	Ghadimi et al.	N/A	- Profitability
A-46	Leitão et al.	N/A	- Firm's management system
A-48	Ludeke-Freund and Dembek	- Customer behaviour - Authoritative institutions research	- Firm's vision and mission definition - Pricing models
A-49	Luthra et al.	- Government initiatives - Initiatives from international organisations - Competitive environment	- Firm's strategic positioning

A-50	Machado et al.	N/A	- Firm's strategic positioning - Performance management system - Internal policies
A-52	Melander	N/A	-Innovation -Inclination towards co-creation and collaboration with other organisations
A-55	Nave and Ferreira	N/A	- Firm's strategic positioning - Altruistic motivations
A-61	Sahamie et al.	- Academic research agenda	- Inclination towards co-creation and collaboration with other organisations
A-63	Shao	- Customer behaviour	N/A
A-64	Singh et al.	- Government initiatives - Customer behaviour	- Cost-saving / Economic returns - Firm's vision and mission definition (social value)
A-66	Stewart and Niero	- Government policies	- Cost-saving
A-67	Susur et al.	N/A	- Firm's strategic positioning
A-72	Wry and York	N/A	- Firm's vision and mission definition (social value)
A-75	Zhao et al.	- Environmental policies and legislations - Technology innovation - Market demands - Social and cultural standards	- Entrepreneurship - Organisational learning

Appendix 4:
Factors fostering the integration of sustainability practices.

Appendix 5
Cases reflecting the integration of sustainable business models.

Code	Authors	Case description	Industry/ Research area	Region
A-8	Banihashemi et al.	Critical success factors for sustainability integration into project management practices	Construction	Developing countries
A-12	Benos et al.	Development of agricultural cooperatives and performance measurement	Agriculture	Not specific
A-16	Brès et al.	Management of pluralism and tensions related to hybrid organisations	Not specific	Not specific
A-19	Butler and Szromek	Actions to complement existing business models and give them the characteristics of a sustainable business model	Health tourism	Not specific
A-21	Caldera et al.	Establishment of what constitutes a sustainable business practice for day-to-day operations	Manufacturing	Australia
A-23	Cherrafi et al.	Achieving sustainability through lean and six sigma integration tools and techniques	Manufacturing	Not specific
A-26	Cioca et al.	Actions to address sustainability and SDGs	Automotive	Not specific
A-38	Gong et al.	Sustainable measurements: Use of metrics to report on sustainable performance	Aerospace, Building Materials, Automotive, Technology, Plastic, Engineering Food, Beverage, Tobacco Chemical, Medical, Pharmacy Mining, Oil, Gas, Natural Stone Consumer goods	Not specific

A-40	Guzzo et al.	Practices for circular economy (e.g., key partners, key activities, product features, customer relationships, channels)	Farming Built environment Clothing Consumer goods Industrial machinery Maritime industry Medical devices Mobility Oil, gas and mining Waste management	Spain Australia, China, France, Italy, Sweden Austria, Sweden Austria, Brazil, France, Iran, South Korea Greece*, Sweden Denmark* Italy* China, Europe, North America, South Korea Chile, China Sweden (*inferred)
A-42	Ingemarsdotter et al.	Circular strategies enabled through IoT	Car sharing and transportation Consumer goods Office management systems	Not specific
A-45	Lake et al.	Application of hybrid life cycle assessment as a decision support framework	Steel industry	Not specific
A-56	Oberhofer and Fürst	Implementation of environmental management	Road freight transport	Austria

Appendix 5
Cases reflecting the integration of sustainable business models (Continuation).

A-58	Ranjbari et al.	Application of a sharing economy framework	Car sharing and transportation Lodging hospitality	Not specific
A-59	Rizzi et al.	Extended producer responsibility (EPR) implementation	Automotive	Not specific
A-60	Rotondo et al.	Enhancing the social side of sustainable business models	Low-cost airline	Not specific
A-62	Schraven et al.	Circular transition in supply chain	Stony material	Netherlands
A-71	Wieczorek	Sustainability transitions	Not specific	Developing countries
A-74	Yun et al.	Recycling of components	Automotive	Not specific

Appendix 5
Cases reflecting the integration of sustainable business models (Continuation).