

Research Article

Investigating Sustainability and Innovation: A Review of Recent Literature

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Abstract: The aim of this paper is to inspect how innovation and sustainability are integrated into the wider context of the supply chains. To this end, a systematic literature review was carried out with a particular focus on papers published in recent years. The analysis shows an upward trend of literature in numerical terms and a wider spread of sustainable innovations. These areas include analyses of specific industrial sectors which have been less covered in the published literature; research activities in the less developed countries; more attention on the social dimension of sustainability; a more general contribution from some nations that turned out to be less productive or even inactive on the sustainable supply chain innovation topic. Finally, a framework is developed which could constitute the basis for further developments and research on this issue.

Keywords: innovation; sustainability; supply chain; systematic literature review.

INTRODUCTION

It is impossible to imagine the world today without constant progress. Novelty is a constant presence in the way we see and feel the world. Novelty itself is necessary because, without it, everything would stop and succumb. It is good to realize that we must renew and innovate. Without innovation, there is no life. There are so many innovation planes in life that the entire process is basically innovation. Life in its all complexity is an innovative process. We must believe that everything depends on us. How can we “master” the future? What are the key competences that our organization needs in order to increase success? Why is innovation more and more important? What are the stages of an innovative process? What are the factors influencing the innovative process in an organization? Do we need innovative culture in an organization? These are the interrogations that will be answered in this article, which can prove very useful for further research in this field. In a dynamic economic environment, which presents a specific behavior of complex and nonlinear systems, a new challenge arises for the organizations within: innovation as a vital part of daily activities. Not long ago, quality and productivity represented key elements for the competitiveness of an organization. Nowadays, a new strategy is required: the innovation strategy – the innovation of the products and services, the innovation

of production processes and methodologies, the innovation of internal structures, etc. All these require a proper innovation management (Gann, 2007; Maier A. 2013; Maier D, 2013; Matias, 2006; Niek D du Preez, 2006; Olaru, 2013; Hobday, 2005).

Innovation is an extensively studied topic in the literature and there are numerous definitions of innovation (Varis, 2010; Xu, 2010; Ribiere, 2010). In this article, the authors define innovation as the implementation of a new product or the significant improvement brought to a new product (good or service) or process, a new marketing strategy, an organizational strategy or a new business strategy, workplace organization or external relations management (Leavengood, 2011; Legardeur, 2010; Le Corre, 2006; Purcarea, 2011; Tidd, 2001; Olaru, 2013). Not only the theoreticians study innovation also the practitioners and researchers deal with it mainly because of its relevance to success’ increasing and firms’ survival. Innovation was considered the elixir of life for companies, regardless of their size and profile (Pirainen, 2010; Legardeur, 2010). Innovation is a dominant factor in maintaining global competitiveness (Maier D. 2018; Leavengood, 2011; Maier A, 2014).

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With a growing market demand for various products in the latter half of the 20th century, many organizations ventured into risky but frugally profitable modes of production, compromising long-term impacts both on society and the environment (Rajeev, 2007). Hence, stakeholders, including regulatory authorities, manufacturers, customers, and the public, were forced to reconsider economic business models and to question the implications of business practices on society and the environment (Rajeev, 2007); the depletion of the Earth's finite resources through increased consumption, industrialization, and globalization caused organizations to reconsider how they should compete in the coming years and decades (Roscoe, 2016; Maier D, 2018).

Increasingly environmental issues were recognized as sources of strategic change (Aragón-Correa, 2008), ecological factors became part of innovation research (Noci, 1999; Roome, 1993; Schiederig, 2012; Piirainen, 2010), and eco-innovation practices such as cleaner production, life cycle assessments, and eco-design found their way into firms (Huber, 2008; Van Hemel, 2012; Maier D, 2018)

A clear definition that integrates the three concepts of innovation, sustainability, and the supply chain did not exist before the systematic literature review published in 2017 by Gao and colleagues (Gao, 2017). These authors clarified that the idea of Sustainable Supply Chain Innovation comes from the root Supply Chain Innovation, which can be defined as an integrated change from incremental to radical changes in the product, process, marketing, technology, resource and/or organization, which are associated with all the related parties, covering all related functions in supply chain and creating value for all stakeholders. The linkage between the innovative firm and its supply chain is even more important when one considers that a sustainable supply chain is one of the few remaining ways for a company to achieve a sustainable competitive advantage (Damanpour, 1991); therefore, sustainable innovations have to go beyond the single firm and include the whole chain (Teipal, 2013, Maier D, 2018).

This review analyzes the literature from a descriptive point of view and a thematic one, to emphasize differences with the previous years, evaluate progress, and underline the areas where further research activities are needed.

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METHODOLOGY AND RESULTS

In carrying out the review, we adopted the model proposed by Mayring (2003). This model consists of four main steps, i.e., material collection, descriptive analysis, category selection and, finally, material evaluation.

A query on the Scopus (www.scopus.com) and Web of Science (webofknowledge.com) databases was carried out using “sustainability” and “innovation”. Scopus was chosen because of its extensive coverage of over 31,000 journals from the main publishers of peer-reviewed papers, like Springer, Elsevier, Emerald (Thomé, 2016).

Descriptive statistics about the publication year of the articles reviewed are illustrated in Figure 1. The same figure also shows the results of the previous review for the nineteen years from 1996 to 2014, for a better understanding of the publication trend. It is therefore clear that the literature discussing innovation and sustainability is gradually growing; although this result could be a consequence of the general growth of literature on green marketing, green accounting, we think that this rapid increase in the number of papers published deserves attention. Overall, in just ten years, the number of publications has increased by seven times, in line with Gao *et al.*, statement: we might be able to predict that the rapid growth stage of the research in sustainable supply chain innovation is soon approaching (GAO, 2017).

Table 1 lists the journals where the reviewed articles were published; to be more effective, the list is limited to journals that published at least two papers. Overall, 64 journals were recorded in this triennium for 131 articles against 68 journals of the previous nineteen years for 107 articles. Out of the 68 journals found in the previous review, 12 also published papers in 2015–2017, while no publications were found from the remaining 56 journals. The journal that published most of the studies included in the review is the Journal of Cleaner Production (29 papers, 23.8% of the total articles, compared to 6.5% which covered in the previous review), followed by Sustainability (17 papers, around 14% of the total articles, compared to 0 papers in the previous review), and the International Journal of Production Economics (5 papers, 4.1% of the total articles, compared to the 7 papers in the previous analysis). Five journals published 2 articles, while the remaining journals published just one paper. It is interesting to note that Sustainability is a relatively new journal, launched in 2009, and was, nonetheless, found to be one of the most productive journals on the themes of this review (Letizia Tebaldi, 2018).

Table 1. The distribution of reviewed papers by journal name(Letizia Tebaldi, 2018; Maier, 2018)

Source	Publication Year			TOTAL
	2015	2016	2017	
Journal of Cleaner Production	6	8	15	29
Sustainability	1	5	11	17
International Journal of Production Economics	2	2	1	5
Renewable and Sustainable Energy Reviews	1	2	1	4
Supply Chain Management: an International Journal	2	0	1	3
Benchmarking: an International Journal	0	2	0	2
Biomass and Bioenergy	1	0	1	2
Energies	0	0	2	2
Resource, Conservation, and Recycling	1	0	1	2
Transportation Research Part D	0	0	2	2

From the classification, empirical surveys emerged as the most widely used methodology, adopted in 56 cases, followed by case studies, used in 28 papers (16 multiple case studies, 12 single case studies). These two empirical methods that were taken together cover 68.9% of the total number of articles; this result is in line with the previous review, where surveys and case studies covered 38.3% and 31.8% of the articles reviewed, respectively. A noteworthy positive element is the fact that 9 literature reviews were also found (including the one by Gao *et al.*), against only one review reported by Gao *et al.*. This is a further important symptom of the increase in the literature related to the topic investigated: in fact, as review studies requires a significant number of articles to be carried out, the presence of a relevant number of reviews leads to the conclusion that the literature on

innovation and sustainability has expanded significantly.

The following five categories of innovation were identified: product innovation, process innovation, organizational innovation, marketing innovation, technological innovation, resource allocation innovation.

Specifically, product and process innovations are generally defined “technological innovations”, while organizational and marketing innovations are referred to with the term “non-technological innovations”. The fifth category identified in our review, that is, technological innovation, is expressively referred to mainly as radical novelties. Table 2 reports the definitions for each type of innovation.

Table 2. The definition of each type of innovation(Clarysse, 1998; Bigliardi, 2009; Damanpour, 1984; Deshpandé,1993; Hult, 1998; Rogers, 2012, Perrin, 2017; Naspetti, 2017; Letizia Tebaldi, 2018; Galanakis, 2006; Vadastrean, 2015; Maier, 2018)

Type of Innovation	Definition
Product Innovation	Any goods, service, or idea that is perceived by someone as new
Process Innovation	The adaptation of existing production lines as well as the installation of an entirely new infrastructure and the implementation of new technologies; it generally allows for the creation of new products
Organizational Innovation	Changes in marketing, purchases, sales, administration, management, staff policy
Marketing Innovation	Improvements in product design, placement, promotion or pricing
Technological Innovation	Any contemporary idea, practice, or product that an organization wishes to adopt and employ for the purpose of obtaining gains in performance
Resource allocation Innovation	A resource redistribution in order to achieve innovative results

The global Organisation for Economic Co-Operation and Development (OECD) make use of the

definition for innovation as stated in the Oslo manual (OECD, 2016). The Oslo manual provides guidelines

for collecting and interpreting innovation data, and rather than explicitly defining innovation, it breaks innovation down into four main types:

- *Product innovation*: the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.
- *Process innovation*: the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.
- *Marketing innovation*: the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.
- *Organisational innovation*: the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations.

Innovation must become an essential component of each organization. Most of the organizations that are competitive nowadays are the ones that innovate continuously. Innovation depends on a clear company strategy, clearly stated objectives, finances, competent management, a well-prepared team, very clear and correct labor evaluation criteria and a competitive environment. The need and importance of innovation comes from its contribution to productivity, competitiveness, economic performance and the accomplishment of social goals (Maier, 2018)

Many times an innovation may look like an imitation, which means reinterpreting or interpreting in a new way a multitude of elements more or less innovative. This comes to confirm the claim that innovations are based on new combinations of elements which are already known and may have already been applied before, only not in the same manner. This last argument leads us to the distinction between incremental innovation and radical innovation. In the first case, the accent is placed on changes that imply refinement or improvement, although without accomplishing something completely fundamental or new. In the case of radical innovations on the other hand, the emphasis is on the changes representing something completely "new" (Ellstrom, 2010). What is the formula for a successful innovation? The successful innovation (SI) can be expressed: $SI = (I + E + M + L) D$, where: I = idea or invention. Innovation begins with an idea or an invention. An invention is defined as "a creation (a new device or process), which results from study and experiments" (Maier, 2018)

CONCLUSIONS

This paper shows the results from a systematic literature review of the recent literature on SSCI, which is gaining increasing attention from both academics and researchers.

The first part of the analysis deals with some descriptive aspects of the 131 papers reviewed. The papers have been classified according to the year of publication, i.e., 2016, 2017 or 2018, showing an upward trend of literature, with a peak of studies published in 2019. The journals that published most of the studies are the Journal of Cleaner Production and Sustainability, with 35 and 24 publications out of 131, respectively; empirical surveys and case studies emerged as the most common research methodologies.

In the 131 articles, 115 different types of innovation were identified, most of which are process innovation (40%), organization innovation (21.2%), product innovation (17.6%), and technological innovation (17.6%), in line with the results by Gao (2017). This outcome is probably due to the collaborative activities carried out in the SC enhancing (or creating) new product functions and improving the process efficiency and effectiveness. Marketing innovation (1.8%) and resource allocation innovation (1.8%) follow.

Conversely, innovations are almost equally distributed among incremental and radical. Looking at the sustainability perspectives, most of the innovations focused on economic aspects, while the purely environmental and social ones received less attention.

As with any review, this paper does not present new research results per se; rather, its contribution comes from consolidating existing information.

The study has, of course, some limitations. Firstly, in the review, we have only considered papers that are written in English and published in international journals only. Obviously, this approach excludes papers written in other languages as well as other types of publications, such as conference papers, and, therefore, could lead to some loss of information. Secondly, the keywords' choice could also lead to selecting some papers but excluding other ones, where the authors have used slightly different keywords.

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