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THE RELATIONSHIP BETWEEN CONTINUOUS IMPROVEMENT AND SUSTAINABLE PERFORMANCE: BIBLIOMETRIC ANALYSIS AND LITERATURE REVIEW

Abstract: *External demand for achieving sustainability goals increases rapidly, nowadays. At the same time, companies face internal and external demands in terms of increasing performance which includes social and environmental questions. Continuous improvement (CI) system seems to be an inexpensive way for companies to achieve incremental improvements and improve overall company performance. Recent papers indicate that CI can be an appropriate concept for achieving companies' sustainable goals. Therefore, the purpose of the paper is to analyse the research field of continuous improvement (CI) and its connection to sustainable performance. A bibliometric analysis and literature review were conducted. The papers were selected from database Scopus using the search phrase ("continuous improvement") AND ("sustainable performance" AND "sustainability"). The aim of this paper is to conduct a literature and bibliometric review and to present an up to date analysis of the research and to provide theoretical attempt to highlight the role of continuous improvement in achieving sustainable performance. There are not many studies that explore the influence of CI on sustainability, so this research contributes to strengthening the awareness of organization about the role of CI in achieving sustainable goals. The results of the analysis indicate that continuous improvement is needed in the practice of companies to achieve sustainable goals. Therefore, this research adds to current understanding of continuous improvement, providing evidence about using CI as a good approach on the path to sustainability.*

Keywords: *continuous improvement, sustainable performance, sustainability, bibliometric analysis, literature review*

1. Introduction

Continuous improvement (CI) implies an organizational inter-related, planned and systematic processes of constant change (Jurburg et al. 2017). This concept has been

around more than 35 years introduced by Masaaki Imai into management and quality practice under the name kaizen (Imai, 1986). Since then it has developed under different management techniques such as TQM, Lean, Six Sigma, Lean Six Sigma (Carnerud et al.

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2018). The whole concept is focused on involving all people in the organization to achieve more efficient and effective tasks and processes (Jurburg et al. 2017). This concept is internally oriented and organizations use it primarily on operational level, to continuously improve their processes. However, this concept has to be implemented strategically as a concept that helps to change organizational culture, a culture oriented toward continual improvements influencing overall performance of the company.

On the other hand, pressures made by external factors regarding sustainable development has brought new challenges to business environment. In 2015, a plan was designed to end poverty (and 16 more sustainable goals) with global partnership including all developed and developing countries under the name 2030 Agenda for sustainable development (UN, 2022, <https://sdgs.un.org/goals#history>). More than ever before companies are pressured by internal and external factors to improve their corporate sustainability performance. To be able to do that they should “manage sustainable operations and have a performance measurement system (PMS) that is able to measure sustainability performance” (Morioka & Carvalho, 2016). In such context, CI can be perceived as a concept that can help managers on the road to achieve sustainability goals.

The aims of the paper are to conduct a literature and bibliometric review and to present an up to date analysis of the research and to provide theoretical attempt to highlight the role of continuous improvement in achieving sustainable performance.

First part of the paper represents the review of the literature explaining the term continuous improvement, sustainable development and sustainability. The second part presents the methodology of conducting the bibliometric and systematic literature review, and research results. In the final part

of the paper conclusion was done.

2. Literature review

Our body of interest is oriented toward analysing the literature in the field of continuous improvement and to see how many papers analyse the relation between continuous improvement and sustainable performance and sustainability.

2.1. Continuous improvement

As mentioned before CI is “a planned, organised, and systematic approach to improving organisational performance” (according to González-Aleu & Van Aken, 2016; Granerud & Rocha, 2011 in Bernal-Torres et al. (2021: 771). In the eastern literature it is called Kaizen and is a practiced mostly under concepts like lean, six sigma, quality control circles, total quality management and employee idea systems (Bernal-Torres et al., 2021, Carnerud et al. 2018). A prominent characteristic of CI is that involves all people at all organizational levels (Imai, 1987, Garcia-Arca and Prado-Prado, 2011, Carenrud et al. 2018). About how to sustain the CI system, still represents a big problem for many practitioners. Lleo et al. (2021: 1) groups CI success antecedents into those related with “the company’s strategy and definition of policies and processes”, and the importance of managers leadership style in practicing CI concentrating on middle management level.

Therefore, its success depends on a great support from managers (Jurburg et al. 2016) guided by logic that by showing a good example in terms of CI, employees would follow their representatives.

2.2. Sustainable development and sustainability

Sustainability and sustainable development have been used in existing literature, most often as synonyms (Ruggerio, 2021). The

idea of sustainable development started in 1970's when exploitation of resources and consequently, environmental pollutions in the West indicated no bright future for basic resources (Meadows et al, 1972, Ruggerio 2021). Figure 1. represents three pillars of sustainable development that has become

omnipresent and represents a multidimensional concept of more “inclusive model which aims to achieve a symbolic relationship among desirable economic, social, and environmental systems for both present and future generations” (Dhahri & Omri, 2018, p.4).

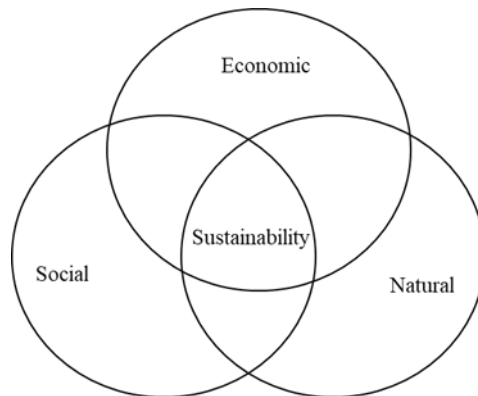


Figure 1. Pillars of sustainable development

Source: Rogers et al. (2012, p. 20)

Sustainable development is based on the” concept of development (socio-economic development in line with ecological constraints), the concept of needs (redistribution of resources to ensure the quality of life for all) and the concept of future generations (the possibility of long-term usage of resources to ensure the necessary quality of life for future generations)” (Klarin, 2018, p. 68). Those three pillars represent a holistic concept of sustainable development which is very hard to achieve in practice since we all witness disruption in global supply chains, food, materials and labor market as high volatility on the market. The latest report on sustainable development goals indicate that “the 2030 Agenda for Sustainable Development is in grave jeopardy” due to the recent years events and crisis rising from those events (UN, 2030: 3).

“Sustainable development should provide a solution in terms of meeting basic human needs, integrating environmental development and protection, achieving

equality, ensuring social self-determination and cultural diversity, and maintaining ecological integrity” Klarin, 2018: 87).

Sustainable development is linked to green economy (Wanner, 2015; Kovilage, 2021) and circular economy (Schroeder et al., 2019) in recent years but companies have problems achieving these sustainable goals in practice.

One of the approaches to achieve sustainability in companies is through the support of CI practice in companies where Bernal-Torress et al. (2021) presented the connection of CI and business sustainability. In his work employee involvement, human talent maintenance, training, and evaluation accompanied by feedback where critical factors of CI that impacted social, environmental, operational and financial dimension of sustainability.

Therefore, with this paper author attempts to analyse prominent scientific literature to search evidence about the connection between CI and sustainability.

3. Research approach and the results

To analyse the influence of continuous improvement on sustainable performance of companies. The systematic literature review was conducted in order to summarize findings in the research field. The search was limited to five years period from 2018-2022.

Figure 2 represents the methodological approach for the systematic literature review.

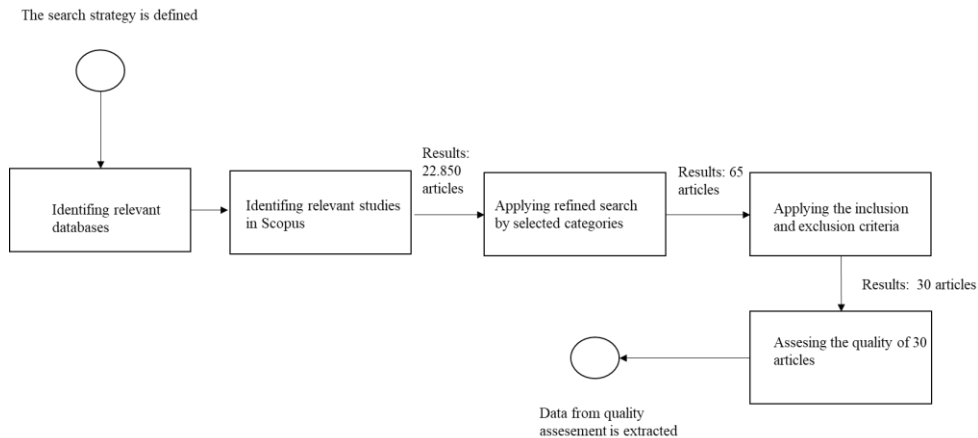


Figure 2. The selection process for the literature review (Author’s work)

In the second stage of the search the main focus was on all open access, articles in journals in English language in the last 5 years. Since different scientific research areas analyse continuous improvement and

sustainable performance, we limited our research to papers published in the fields of business, management and accounting. This resulted in 64 papers (Table 1).

Table 2. Scopus search strategy (2019-2022) (Author’s own elaboration)

Search strategy	Hits	Time span	Indexes
(TITLE-ABS-KEY (“continuous improvement”)	22.850	All years	Scopus
TITLE-ABS-KEY (sustainable AND performance AND sustainability) AND AND (LIMIT-TO (OA , "all")) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018)) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")	64	2019-October, 2022	64

In the third stage of the analysis we reviewed abstracts and keywords of all 64 papers and eliminated papers that did not report the description of continuous improvement and sustainable performance or sustainability. 34 papers in Scopus did not include both continuous improvement and sustainability in abstract, therefore in the final step the following criterion for selecting the paper for the final analysis was that papers cover the continuous improvement and sustainable performance. That is finally 30 papers were used for detail analysis.

For a bibliometric analysis we present relevant papers according to authors, title, year of publication, continuous improvement and sustainable performance.

3.1. Research results

The figure 3 represents the number of all 64 papers before applying the inclusion and exclusion criteria to analyse which subject area analyses this connection between continuous improvement and sustainable performance. As can be seen 36,6% of published paper are in the area of Business, Management and Accounting.

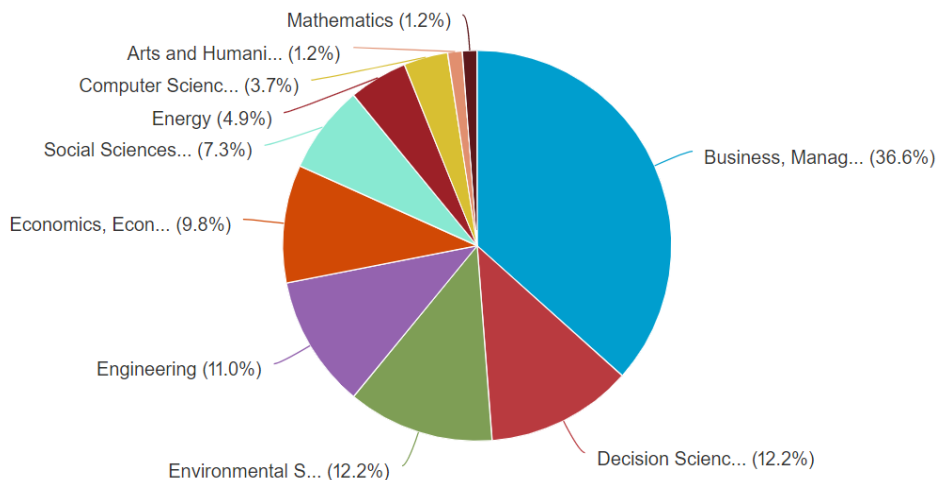


Figure 3. Analysis of published papers by subject area in Scopus in the 2018-2022 period (Author's work based on Scopus search)

Further detailed analyses were done based on the final 30 papers. Figure 4 represents the number of published papers in the period from 2018-2022.

There is a trend visible about the increased paper publishing in the field of continuous improvement and sustainable performance where in 2020, 8 papers were published in the field. Year 2021 represents the biggest number of published papers during a five-year period.

Considering year 2022, there are total of 4 papers published until October 2022. The results of the research indicate that in pandemic period the interest about continuous improvement and sustainability increased.

Further, United Kingdom has the most published papers in this field (5 papers), then Spain (4 papers), and 11 papers in other countries from 2018-2021 (Figure .).

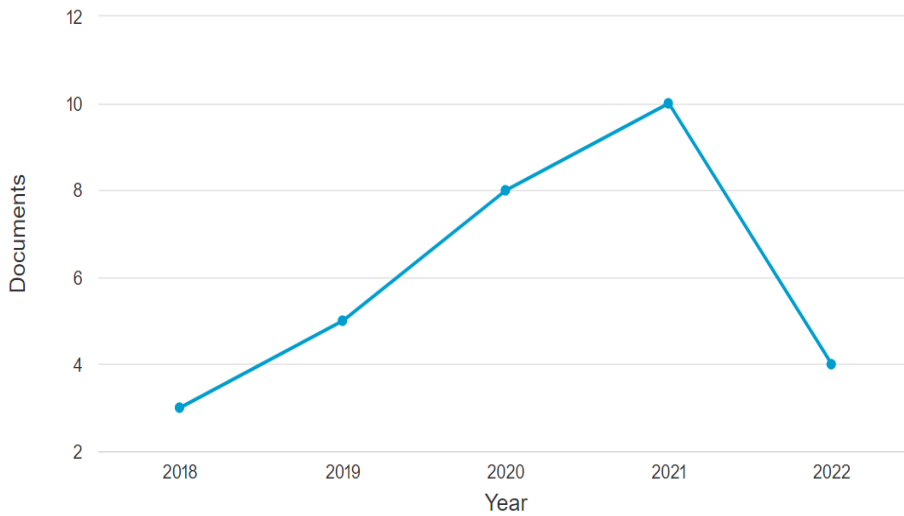


Figure 4. Analysis of published papers by subject area in Scopus in the 2018-2022 period (Author's work based on Scopus search)

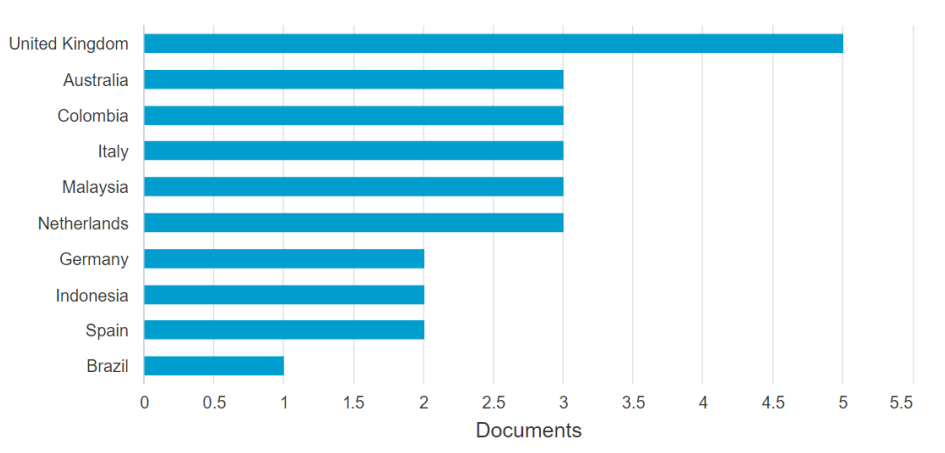


Figure 5. Number of papers published by country from 2018-2022 period (Source: Author's work based on Scopus search)

The objective of this literature review was i) to explore the field of continuous improvement and its influence on sustainable performance and ii) to provide an overview of the research literature in these areas. After detail reading of the papers we eliminated articles which do not address CI and sustainability rather sustainability with other themes like health care and gender medicine (Donofrio et al. 2021) or the competing role

of organisational culture in organisational change towards sustainability (Wijethilake et al., 2021), etc. This applies also to other five papers. Therefore, finally 23 papers matched the set objective and are present in detail in the form of tables. Table 3 presents the work of authors who did a quantitative research, the analysed relation, as well as the aim and main results of the study.

Table 3. Analysis of quantitative research papers (Author’s own elaboration)

Authors, year	Independent variable	Mediator variable	Dependent variable	Scope	Results
Lim et al. (2022)	Workplace Learning (Embedded System (ES), System Connections, Support Leadership	Continuous improvement (CI)	Sustainable Lean Implementation	Explore the mediating role of continuous improvement on the relationship between learning dimensions (embedded systems, system connections and support leadership) at the workplace and sustainable Lean implementations.	Integration of ES with CI initiatives was a source of competitive advantage that contributed towards the sustainment of Lean.
Syahidun and Nawangsari (2022)	Green Human Capital, Green Structural Capital, Green Relational Capital	Green Environmental Management (Y1)	Company sustainability	This study explores the influence of green human resources and capital on corporate stewardship by managing green environmental administration	CI is only mentioned as a project that is carried out to support green innovation in implementing green technology in resource utilization and preserving the environment while still involving external parties.
Bazrkar and Moshiripour (2021)	Green HR management components; green recruitment and selection, green training and development, green empowerment, green payment and reward, green performance management and appraisal	Employee environmental knowledge	Environmental performance	This study seeks to evaluate the effect of green human resources management measures through the impact of environmental knowledge upon environmental performance (SME companies in Iranian oil and gas industry)	Four practices of green human resources management have a positive and significant impact upon performance due to environmental knowledge.
Soewarno and Tjahjadi (2020)	Eco-oriented Culture	Innovation strategy, eco-oriented continuous improvement on	Corporate Financial Performance	Investigates the mediating effect of innovation strategy and eco-oriented continuous improvement on the relationship between eco-oriented culture and corporate financial performance.	Reveals that innovation strategy and eco-oriented continuous improvement partially mediate the relationship between EOC and corporate financial performance.

Authors, year	Independent variable	Mediator variable	Dependent variable	Scope	Results
Bernal-Torres et al (2021)	Continuous improvement system		Business Sustainability	Purpose: the impact of continuous improvement (system and teams) on business sustainability dimensions (social, environmental, operational, and financial) as a competitive strategy to create value for all stakeholders in emerging economy context.	Confirmed impact of CI systems and work teams on each BS dimension in emerging markets and specify four key categories that make a significant contribution to BS (employee involvement, human talent maintenance, training, and evaluation accompanied by feedback).
Karman and Savanevičienė (2021)	Dynamic capabilities	Ambidexterity, Sustainability practices	Sustainable Competitiveness	The research is aimed at elaborating a model in which dynamic capabilities affect sustainable competitiveness via organisational sustainability practices and the mediating role of organisational ambidexterity.	The results confirm the relationships between sensing and reconfiguring capabilities and sustainability practices, but reject them for scanning capabilities. They also confirm the impact of sustainability practices on some of the pillars of sustainable competitiveness. The research disclosed that ambidexterity was a mediator between dynamic capabilities and sustainable competitiveness.
Sales and DeCastro (2020)				Aims to present a method for strategic planning and implementation processes in health care based on lean management. Present the ten steps of a kaizen project, which enable lean transformation over a period of time. The study is underpinned by a literature review of enablers and barriers and an implementation case in a tertiary care hospital	Key points and possible contingency issues are presented for each of the steps, and a successful lean tools intervention is illustrated by examples of improvement projects of the surgical process

Authors, year	Independent variable	Mediator variable	Dependent variable	Scope	Results
Kovilage (2021)	Continuous improvement system		Business Sustainability (BS)	Explore the interactions among the lean, green management practices and organizational sustainable performance measures and explore the possibility of simultaneous implementation of these concepts for improving the organizational sustainable performance.	Results of the ISM-based structural model which consisted of eight levels indicated that primarily lean practices influences the green practices and afterward green practices affect the sustainable performance measures.
Honyenuga et al. 2019	Management innovation (MI)	HPO framework (CI and renewal, workforce quality, Long term orientation)	Organisational performance	This study investigates the relationship between Management Innovation and Organisational Performance with the High-Performance Organisation (HPO) factors of Continuous Improvement and Renewal, Workforce Quality and Long-term Orientation as mediator in an emerging market context.	Management innovation (MI) has a direct influence on organisational performance. The HPO factors, generate a synergy between MI and organisational performance.

Only one research analysed in his paper both, mediator and moderator variable, and is not included in Table 3 due to a nicer display of the result. This was the research of Halbusi et al. (2022) who did a research on 281 Iraq executives. They applied green core competence theory in their work. The results indicate that green product and process innovation performance increased with green core competence. This happened only when organization invested in R&D and where top

management adopted sustainable practice. In the research mediator variable was green innovation performance (green product and process innovation) and moderator variable (R&D and top management support).

Table 4 analyses papers of authors that used a case study method or did a conceptual research addressing CI and sustainability. Total of 14 authors with paper scope and results of the research were presented.

Table 4. Analysis of quantitative research papers (Author’s own elaboration)

Authors, year	Scope of the paper	Results
Busch et al. (2022)	Corporate environmental performance (CEP) is considered to be an indication of well-managed firms. Examines whether continuous CEP improvement is reflected in aggregated environmental scores provided by sustainability rating agencies. Explore the association of continuous CEP improvement with corporate financial performance.	Results show that continuous CEP improvement is not associated with aggregated environmental scores provided by three major rating agencies. However, continuous improvement is positively associated with accounting as well as market-based CFP.

Authors, year	Scope of the paper	Results
Rajnoha et al. (2021)	They state that continuous improvement of the quality of life should also be essential for sustainable economic development so they evaluate the development of 26 quality of life indicators from selected 6 categories in the V4 countries (Slovak Republic, Poland, Hungary and Czech Republic and Austria as a research benchmark country between 2010-2019 and to identify the impact of the level of GDP on these indicators.	Research confirmed that the GDP growth had a positive effect on the improvement of the quality of life within these variables. However, comparing to Austria as a highly developed country, a significant sustainable development gap can be still observed in V4 countries.
Lameijera et al. (2021)	Purpose is to review and aggregate the guidance for continuous improvement (CI) implementation from existing implementation models. 27 implementation models are integrated with one holistic metamodel, providing a detailed account of the existing CI deployment guidance to date.	This metamodel identified knowledge gaps about implementation processes as well as detailed needs for future research are presented. Thereby, repeated scholarly calls for better and more scientifically proven implementation guidance is addressed.
Wijethilake et al. (2021)	Explores the competing role of organisational culture in organisational change towards sustainability.	Study finds that organisational culture tends to play a proactive role by going beyond the compliances and regulatory requirements in organisational change towards sustainability. They proposed a framework for sustainability organisational culture where one of the pillars is growth-oriented changes (e.g. sustainability innovations, continuous improvements, community engagement)
Reyeys- Rodriguez et al. (2020)	Authors explore the influence of organisational and IS/IT resources and capabilities on the adoption of proactive environmental practices as well as the ultimate effect on environmental performance.	Organisational and IS/IT resources shape the development of capabilities for continuous improvement, stakeholder management, IS/IT support to general functional activities and IS/IT support to environmental management. Findings support the relevance of IS/IT resources and capabilities in driving pro-environmental behaviour in firms.
Vallejo et al. (2020)	Paper aims to develop a practical, user-friendly and accurate LSS (Lean Six Sigma) roadmap for a Scottish manufacturing Small and Medium Enterprise (SME).	This study complements current literature on LSS roadmaps and corroborates LSS CSFs as crucial for successful LSS implementation and sustainability, regardless of the type of company and/or culture.
Campbell-Johnston et al. (2020)	The paper analyses this Dutch tyre EPR system (extended producer responsibility) and reflects on how it can be improved from a systemic CE perspective.	They recommend the continuous improvement of recovery and sustainability targets beyond a single product life cycle, a more transparent and inclusive governance system, as well as a greater focus on sufficiency strategies, e.g. design for durability and a broader transformation of transport models.

Authors, year	Scope of the paper	Results
Souza et al. (2020)	The main objective of this work is to present how can continuous improvement be successfully applied and contribute to an organizational learning.	Results suggest that repetitive use of QC story along with the presented procedure of lessons-learned contributes to improving processes performance over long periods. It is also concluded that this company using the presented procedure exhibit characteristics of a learning organisation.
Paipa-Galeano et al. 2020	This paper analyses the success factors and barriers of sustainable continuous improvement practices in terms of company's maturity level. They made comparison between the factors identified from the literature review and the practice of the continuous improvement programs in four large successful companies located in Bogota, Colombia applying Bessant's maturity mode	The results identified five success factors and three barriers that companies should consider while implementing sustainable continuous improvement programs. The key success factors are availability of resources; management commitment; employee participation in improvement task identification; clear and realistic objectives; and, finally, existence of a leader. The major barriers are lack of alignment between organizational and continuous improvement objectives; lack of motivation in the team; and, resistance to change. The results confirm that, in spite the high maturity, it is necessary to align the organizational and continuous improvement objectives.
Choudhary et al. 2019	To develop strategies and framework for continuous improvement in its operations and environmental performance Green Integrated Value Stream Mapping. Through a systematic methodology and a novel tool called Green Integrated Value Stream Mapping (GIVSM), integrates both paradigms in a case study on a U.K. packaging-manufacturing SME.	Applying the GIVSM demonstrates that simultaneous deployment of lean and green paradigms have synergistic effect for improving both operational efficiency and environmental performance. In addition, continuous improvement framework with sustainable procurement is proposed to overcome the lean-green misalignments.
Costa et al. (2019)	Authors explore the role played by the human factor in fostering the establishment of a Sustainable Continuous Improvement (SCI) environment. They proposed the Decision-Making Trail and Evaluation Laboratory (DEMATEL) analysis applied to soft practices of SCI, that provides an innovative understanding of the relevant soft practices which foster SCI by showing cause-effect association among them.	Results show that the key for a SCI is represented by a full engagement of the workforce, which must be triggered and supported by Top Management with the use of some leverages such as an effective communication, training and use of Kaizen events.

Authors, year	Scope of the paper	Results
Kiefer et al. (2019)	This paper aims to fill this gap in the literature by analysing the role of resources, competences, and dynamic capabilities (RCCs) as determinants (drivers and barriers) of different eco-innovation (EI) types. This paper has analysed the role of RCCs as determinants of different EI types, with a survey of 197 industrial SMEs in Spain which eco-innovated in the observed period.	The comparative results of the MNLR between the drivers and barriers for the baseline of continuous improvement EIs and for the other EI types show the existence of clear differences. Among the drivers/barriers for all types, there are some similarities between radical and systemic EIs on the one hand, and continuous improvement and eco-efficient EIs on the other, which confirms the suitability of combining them together in the hypotheses. Also, the MNLR does not identify any differences in the drivers and barriers for the baseline and externally driven EIs. Continuous improvement EIs are the result of the daily operations of the firm (i.e., without a specific motivation). In contrast, any specific motivation leads to higher probabilities of introducing systemic/radical EIs
Karlsdottir et al. (2021)	Authors applied thematic analysis, value stream mapping, flow analysis and Kaizen ideology in order to identify gaps in best practice and opportunities to transition to exemplar standards in order to standardise processes and generate improvements in the case of Icelandic fisheries.	Although this study has decidedly practical connotations for small boat fishers, its outcomes are also likely to be of interest to academics, particularly those focused on the organisational management of natural resources and general applications of the project management methodology and applied research methods as a means of solving practical problems in everyday life
Cazeri et al. (2018)	The aim was to evaluate the integration between CSR (corporate social responsibility) practices and management systems in companies in Brazil based on experts' perceptions. Authors used conceptual model covering how stakeholder demands are incorporated in organizational practices using a continuous improvement approach, and by surveying experts in the area and identifying the best and least integrated practices superficially implemented, affecting CSR performance.	.Results revealed opportunities for improvements in all CSR practices evaluated, most of which were considered by the experts to have been implemented only superficially. In a comparative analysis, two practices stood out in relation to the others: reporting of CSR results to stakeholders and evaluation of the performance of CSR activities using pre-established indicators. Practices associated with planning of CSR activities are the most superficially implemented, adversely affecting CSR performance.

Authors Syahidun and Nawangsari (2022) researched the influence of green human capital, green structural capital and green relation capital on company's sustainability where the key to maintaining the sustainability lies in continuous improvement activities that are practiced in the observed organization. The focus of CI is

on "supporting green innovation in implementing green technology in resource utilization and preserving the environment" (Syahidun and Nawangsari, 2022: 168). Also, Lim et al. (2020:273) state that "probability of achieving successful implementations of Lean intervention was higher with the existence of CI together with

the establishment of positive learning environments at work”. According to Bush et al. (2022) there are no papers analysing continuous CEP improvement (corporate environment improvement) and contribute to the literature of CI on how to achieve sustainability through organizational capabilities. Also, the study of Sales and de Castro (2020: 1) gives a sound evidence that by forming improvement teams in hospitals and using process map to find places where improvements are needed, implementing those improvements and checking them “makes the project self-sustaining and open to long-term continuous improvement”.

4. Discussion

Most of the analysed papers deals and explores the effect of continuous improvement on sustainability. In the context of emerging countries results indicate that development of the human factors in CI influences business excellence which indicates that CI is a good way to achieve business excellence. This includes employee’s participation, investing in human talent and training as well as giving feedback. Also, a great need is perceived to improve organizational processes in terms of assuring environmentally friendly products since this is a recent requirement coming from interested parties, therefore CI can be a perceived as a good way for building a culture that is ecologically conscious. Further, to operate more environmental friendly and to decrease costs, organizing lean practice and green improvements under one functional unit is proposed in one paper. Analysis identified shortage of papers regarding continuous corporate environmental performance (CEP) however there is one evidence that CEP improvement

influences ROA and market performance indicator.

5. Conclusion

The aim of the paper was twofold, i) to explore the field of continuous improvement and its influence on sustainable performance and ii) to provide an overview of the research literature in these areas.

We limited our search to the last five years (2018-2022), which seems to be an appropriate timeline since rise of paper publications in this area has been the highest in 2021.

Some limitations of the paper can be noted. For the systematic literature only one notable databases (Scopus) was chosen, which excluded other papers in other databases. Also, english language papers were taken into consideration, so this criterion automatically excluded works written in other languages. Also, we focused on Business, Management and Accounting subject areas, which eliminated other disciplines.

Overall, this field of study seems to be underdeveloped and based on this research, a deficiency of research papers considering the five-year period, has been identified. However, there is an indication about the rise of the research area in year 2021 compared to earlier years. This literature review may stimulate awareness in deeper analysing the continuous improvement concept as a strong element for achieving sustainable goals in the organization, from both practical and scientifically point of view.

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