

Sustainable public procurement for supply chain resilience and competitive advantage

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Abstract: Public procurement plays a crucial role in national economies, as it represents a significant share of public spending. Governments can thus use this considerable purchasing power to promote environmental sustainability, social responsibility, and economic efficiency, while encouraging the supplier market to innovate and adopt more sustainable practices to remain competitive, and to generate more resilient supply chains. Given the interdisciplinary nature of the subject of sustainable public procurement (SPP), the documentation is abundant and diverse, hence the need for an updated literature review especially in the aftermath of the COVID-19 crisis period. This article consists of a systematic literature review focusing on articles with an empirical approach. The results reveal, among other things, 8 main research themes subdivided into 19 sub-themes, with a dominance of literature on the obstacles and incentives related to the implementation of SPP, while those concerning e-procurement and the analysis of the social life cycle remain relatively limited. The study also underscores the role of local economies and SMEs in public procurement strategies. It highlights a trend towards geographical diversification, indicating the global significance of SPP, with noticeable differences in adoption between developed and developing countries. The review calls for future research to focus on developing practical frameworks and tools for integrating sustainability more comprehensively in public procurement. The findings illuminate the pivotal role of SPP as a mechanism steering societies towards a sustainable, resilient, and equitable future, particularly in a post-pandemic world.

1 Introduction

The COVID-19 crisis represents one of the rare instances of supply chain disruptions that have devastated the global economy. The pandemic surge led to border closures, restrictions in air transport networks, limited raw material supplies, and the shutdown of several production units. Therefore, increased vigilance and adaptability are required in the future to reduce the risk of potential supply chain disruptions and to mitigate their consequences. This involves designing more resilient supply chains, less vulnerable to disturbances, and capable of adapting their behaviour to enable companies within them to respond to disruptions quickly and cost-effectively, for a return to normal functioning or possibly to superior performance. This is particularly crucial for supply chains involving the public sector, as it is often the largest procurer within a country. Consequently, the COVID-19 pandemic has imposed additional responsibilities on public procurement (PP) actors to ensure the continuity of public services and citizens' wellbeing, as well as responding to growing demands for increased resilience, fostering innovation, and promoting sustainability.

Sustainable public procurement (SPP) refers to the practice of public bodies acquiring goods, services, and

works, while considering the environmental, social, and economic impacts associated with them. This adds complexity to the traditional procurement process in the public sector, which is based on selecting the lowest bid, especially when significant importance is given to non-monetary criteria. Then, it is particularly pertinent to conduct an updated literature review on SPP, especially in the aftermath of the COVID-19 pandemic period. This approach would allow an examination of whether and how the *intellectual territory* in this field has evolved in response to the new parameters and challenges imposed by the crisis.

The present paper involves conducting a state-of-the-art review of the theme of SPP, by answering the research questions: RQ1: What research has been conducted on SPP? RQ 2: What issues have been raised? RQ 3: How has the COVID-19 crisis impacted the literature on SPP research? RQ 4: What conclusions can be drawn regarding the exploration of opportunities for future research?

This article stands as a novel contribution to the nexus of knowledge on SPP, as it embodies the most current and comprehensive effort to synthesize existing literature on the topic to date, offering a fresh and deeply enriched view. The originality lies in the capacity to encompass numerous

facets, which are often treated in isolation, to form a structured body of knowledge that is easily navigable for researchers, practitioners, and policymakers grappling with the recent challenges of SPP.

The development of the article unfolds in a methodical sequence, beginning with a literature review, followed by a detailed exposition of the methodology. The article progresses by presenting the results and engages in a discussion that critically examines the implications and nuances of the findings within the context of existing knowledge and practice in SPP. The article culminates with a conclusion that synthesizes the insights gained and offers reflections on the broader impacts of the study.

2 Literature review

According to the World Trade Organization, PP accounts for an average of 10 to 15% of a country's GDP. This underscores the role of the PP process as a strategic tool for fostering sustainable and inclusive growth. Given the pivotal importance of PP in advancing sustainability, it is imperative to delve into the subject of SPP to grasp how it has been approached in scholarly discussions, spot gaps revealing themes and questions that have not yet been sufficiently explored, and ensure the originality and

relevance of future work, which is beneficial in avoiding redundancy in studies, and also in enriching the body of knowledge on SPP.

In order to ensure objectivity and rigor in the development of the bibliographic synthesis, the literature review conducted is a systematic literature review (SLR). It differs from the narrative literature review by using systematic, clear, and reproducible [1] methods to identify, select, and critically evaluate relevant research related to a specific research question, as well as to collect and analyse data from the studies included in the review [2]. Given its relevance, the SLR was initially adopted by medical research in the 1970s, before its application was expanded to other academic fields such as management, computer engineering, international development specialties, and supply chain management.

The present SLR is conducted in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. It is a set of guidelines established in 2009 by a team of clinicians, scientific journal editors, systematic literature review specialists, and methodologists, with the aim of helping authors improve the reporting quality of their systematic reviews. It consists of a list of 27 recommendations, spread over four stages as detailed in the flow diagram (Figure 1).

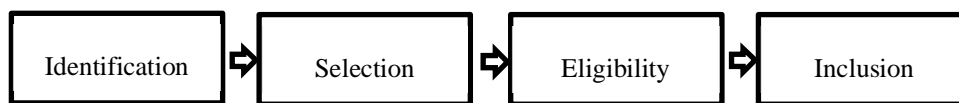


Figure 1 PRISMA flow diagram

3 Methodology

The goal is to establish the state of the art of SPP based on a clear and structured analysis of the available literature, in order to identify the various research axes related to this theme.

3.1 Bibliography identification

Keywords used are « Sustainable public procurement », « Sustainable public purchas* », « government sustainable procurement » and « government sustainable purchas* ». The selected literature sample consists of articles that have undergone peer review, up until February 16, 2023 (the date of collection).

The databases in question are Web of Science and Scopus. The search on these two databases is conducted as follows: (TITLE-ABS-KEY (sustainable AND public AND procurement) OR TITLE-ABS-KEY (sustainable AND public AND purchas*) OR TITLE-ABS-KEY (government AND sustainable AND procurement) OR TITLE-ABS-KEY (government AND sustainable AND purchas*))

After the initial sorting via the bibliographic Management Tool “Zotero”, the selected articles are exported to “NVIVO” (Release 1.7.1) a Qualitative Data Analysis Tool.

3.2 Inclusion and exclusion criteria for literature selection

Excluded are duplicate articles and articles written in languages other than English or French.

Only journal articles are examined. The filter applied during the search is: limit to « Document type (Article), Source type (Journal), Language (English, French). The exclusion will then concern review articles, book chapters, books, book series, conference proceedings, doctoral theses, symposium articles, etc. Articles for which the full text is not available will also be excluded.

The abstracts are read to verify the relevance. Only articles concerning SPP are included. Excluded are the articles deemed irrelevant that deal with the following topics: Personal purchasing behaviours; Sustainable development in a general sense (the areas detected are: transportation, energy management, buildings, sustainable cities, land management, art, culture, education, training, economy, investment, financing, banking sector, social issues, child protection, environmental concerns, access to clean water, food security, access to medical care, rural development, agriculture, aquaculture, fishing, livestock, forest management, mining, tourism, industry, new technologies, management, geopolitics, regulation, waste management); Green Marketing; Private Sector; Territorial Defence; Public-Private Partnership; Humanitarian Supply

Chain; Public finance in general without focusing on the specific case of SPP; Supply chains in general without focusing on the specific case of SPP; Disposal agreements.

The present SLR focuses on articles with an empirical approach (based on surveys, interviews, case studies, multi-method research, and experiments). This choice is based on the fact that the conclusions drawn from these studies are often more reliable and verifiable than those from theoretical research, and are directly applicable to the practice of SPP. The exclusion applies to articles that are based on a conceptual approach (studies focusing on emerging concepts, models, or frameworks, including literature reviews).

3.3 Eligibility

During the meta-analysis phase, the inclusion criteria are applied to the title and abstract. For the in-depth analysis phase, it involves thoroughly reviewing the shortlisted articles to assess their eligibility in the process.

3.4 Inclusion

This final step involves the inclusion of the final articles.

4 Result and discussion

This analysis aims to establish a synthesis of the references (Figure 2).

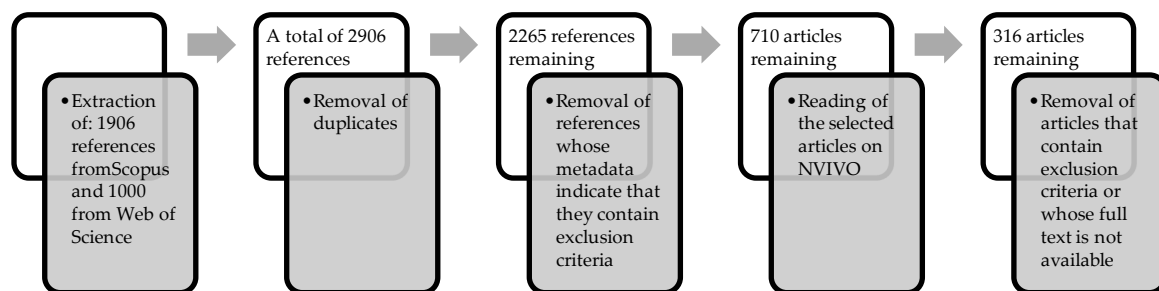


Figure 2 Flowchart of the selection process

The following word cloud (Figure 3) highlights the dominant trends in the text corpus. It is a visual representation of textual data, created using NVivo. It

provides an overview of the most frequently used words in a text or a set of texts, thereby drawing attention to the most recurring themes.



Figure 3 Word cloud

To enable in-depth reading from NVIVO, three codes are created: 'Issue', 'Methodology', and 'Result'. A condensed matrix is generated. It consists of a reading sheet that condenses the key information from each of the 316 articles subject to the final selection, in a concise manner. This approach aids in effectively organizing the extensive body of literature. The subsequent sections of the article will detail the most significant findings derived from the analysis of the condensed matrix.

4.1 Descriptive analysis

4.1.1 Geographical distribution

The geographical distribution of empirical research on SPP is diverse and spread across several regions, highlighting the universal importance of the issue (Figure 4). 270 articles concern studies carried out at the national level, with a concentration in certain countries such as the UK (26), Spain (18) and Sweden (18). These articles cover both developed countries (180 articles for 27 countries) and developing ones (90 articles for 29

countries). 42 studies are regional or multinational. 5 articles concern comparative studies between two or a set of countries.

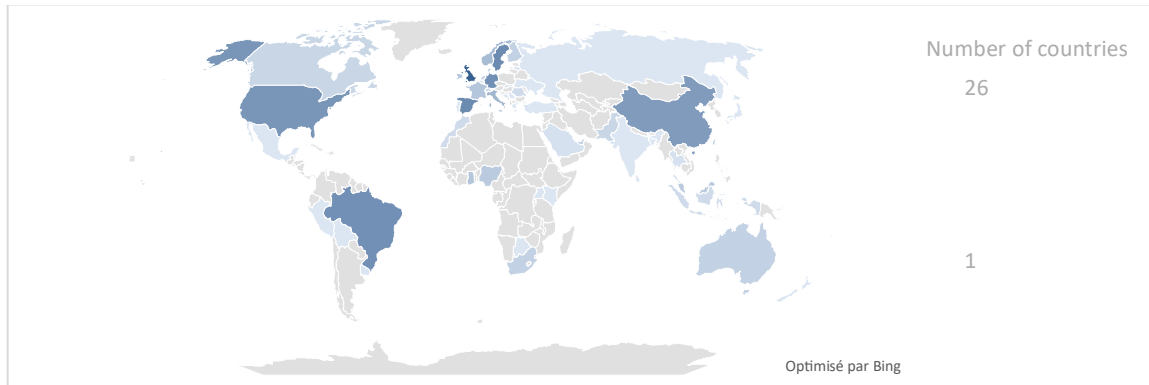


Figure 4 Geographical distribution of empirical research conducted at the national level

4.1.2 Themes and Sub-themes

Structuring the information contained in the reading sheet allows for the identification of 8 main themes. Figure 5 shows the number of articles citing each theme, with an article potentially falling under one or more themes.

Research discussing the barriers and motivations regarding the implementation of SPP dominates with 164 articles, indicating a keen interest in understanding the challenges that prevent certain countries from opting for SPP, as well as the factors that encourage others to embark on this path. Empirical research on e-procurement in the public sector is less common (11 articles).

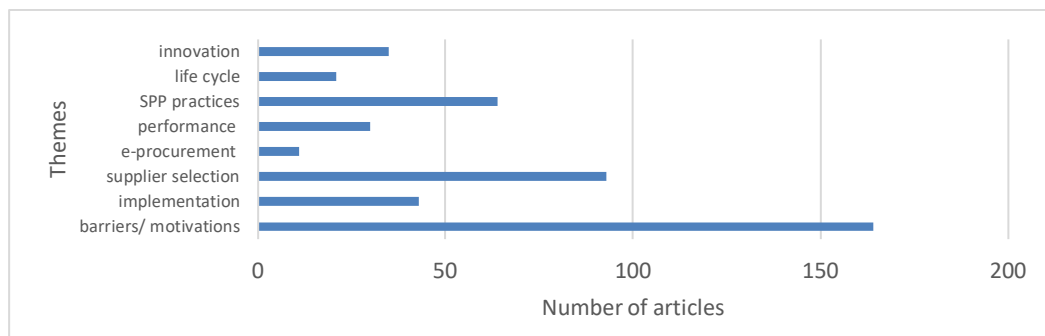


Figure 5 Number of articles per theme

Each of the eight major themes is subdivided into sub-themes as shown in the mind map (Figure 6):

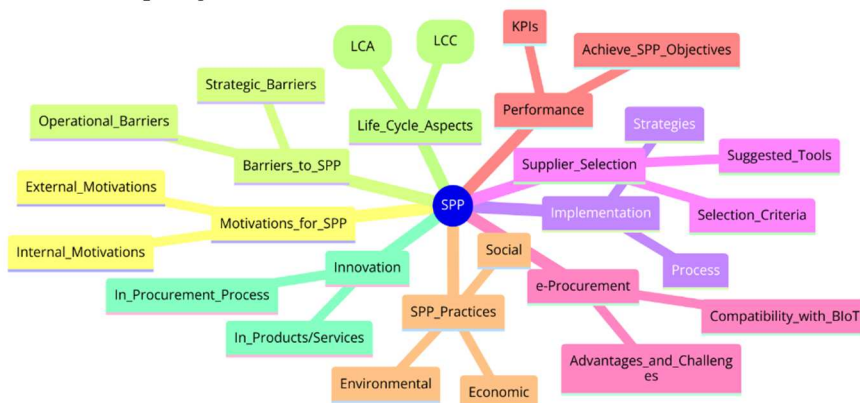


Figure 6 Themes and sub-themes

4.1.3 Chronology

Figure 7 below highlights the evolution of the number of articles on SPP over the years. The trend is upward, indicating a growing interest within the academic community. The literature began to focus on issues related to SPP from the year 2000, when governments started to pay attention to environmental responsibility, following a G7 meeting on the environment in Canada in 1995, during which the various countries developed the concept of 'greening government'; states began to concretely implement actions in response from 2000. The 'Renewed

EU Sustainable Development Strategy' introduced on July 16, 2008, is likely the cause of the peak observed in 2009, one of its main objectives being environmental protection. The European Commission's working document 'European Code of Best Practices Facilitating Access for SMEs to PP Contracts' of June 25, 2008, similarly, encourages the use of life cycle cost assessment, the integration of environmental criteria, adherence to social provisions, and the use of sustainable products.

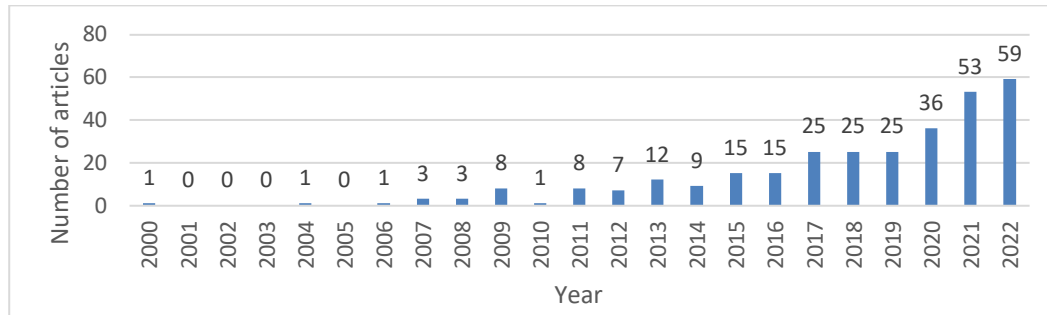


Figure 7 Evolution over the years

Six out of eight sampled articles in 2011 focus on the United Kingdom. This surge in interest can be attributed to several key policy developments. The coalition government, formed in 2010, pledged to foster small business engagement in PP, particularly by aiming to allocate 25% of government contracts to SMEs. The increase in the number of articles in 2015 may be attributed to the implementation of the European 'Directive 2014/24/EU on PP' in 2014. This directive provided national authorities with sufficient flexibility to align procurement processes with social and environmental objectives. This correlation is particularly evident given that, out of the 15 articles in the 2015 literature sample, 13 involve European countries. Empirical articles on SPP have seen a significant increase since 2020. This surge coincides with the development of recovery plans in response to the COVID-19 pandemic crisis, aimed at a sustainable and resilient recovery.

with an overall rate of 50%, this table reveals that half of the articles have been published since 2020, indicating growing interest and evolving research in this area across all sectors. With a total of 17 articles and 16 published since 2020, the public administration sector shows a very high rate of recent publication (94%). This suggests a strong focus on SPP in this sector, especially in the recent context.

4.1.4 Business sectors

Empirical articles in the field of SPP touch on several specific business sectors, as shown in Table 1. However,

For the 156 articles published since 2020, we excluded 21 articles submitted before or during March 2020, as they represent a portion of the research that was likely not influenced by the pandemic in their initial conception. Among the remaining 135 articles, 29 explicitly mention the pandemic context of Covid-19. It represents approximately 21.5% of the articles written after the onset of the pandemic. This suggests that the pandemic has had a notable influence on research themes in the field of SPP. It may indicate an increased interest in understanding how sustainable procurement practices can be adapted or have been affected by the unique challenges posed by the pandemic.

Table 1 Articles per sector of activity

Articles per sector of activity (Part 1/2)			Articles per sector of activity (Part 2/2)		
Sector	Total number of articles	Number since 2020	Sector	Total number of articles	Number since 2020
Acquisition of real estate	1	1	Urban development	6	3
Public Administration	17	16	Transport	14	10
Food	38	21	Tourism	1	1
Furniture	2	1	Textile	2	0
Wood	1	0	Public & private sector	5	0
Construction	57	28	Public Sector	114	49
Infrastructure construction	10	3	Health	27	11
Energy	7	4	Infrastructure	3	2
Education	9	4	IT Equipment	1	1
Health & Education	1	1	Total	316	156

The sectoral analysis (figure 8) provides an overview of the focus on the pandemic within research on SPP, highlighting the sectors that have been most affected or most responsive in the context of the pandemic. The public sector is the most represented, possibly due to its direct impact on public policies and crisis management. The food

sector follows with 6 articles, which may reflect the specific challenges the pandemic has posed in terms of food security, supply chains, and the need for sustainable procurement to ensure food resilience. The health sector is also significant with 4 articles, given that the pandemic has severely tested health systems worldwide.

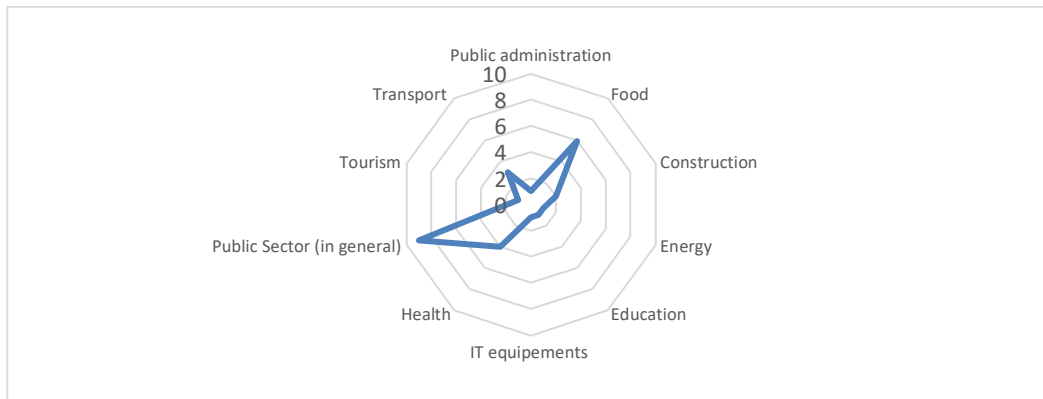


Figure 8 Sectoral analysis of SPP articles where the pandemic context is mentioned

4.2 Thematic analysis

In this section, the themes identified earlier will be explored in depth based on the information provided by the literature sample.

4.2.1 Motivations and Barriers

In the 164 articles addressing the barriers and motivations regarding the adoption of SPP, it was noted that the motivations are either internal or external, and that the barriers can be strategic or operational.

External motivations consist of: 1) Government legislation: This is a primary motivator [3], providing clear standards and criteria for sustainable products and services [4], stimulating eco-friendly market solutions, introducing financial incentives for suppliers offering sustainable products, and imposing restrictions or bans on non-sustainable purchases. Regulations also foster SPP by creating policies that add social value and improve SME access to public markets [5]; 2) Political Commitment: The political leanings of a community, as evidenced by voting patterns, can significantly influence local governments' commitment to SPP, showing a correlation between political preferences and sustainable initiatives [6]; 3) Influence of the Private Sector: Government adoption of SPP signals the private sector to adopt greener practices, encouraging environmental certification and innovation in sustainable solutions, which can lead to a more sustainable economy [7]; 4) Achievement of Sustainable Development Goals (SDG): SPP plays a role in shaping sustainable production and consumption patterns, promoting environmental, social, and economic criteria in procurement processes, and supporting goals like ecological innovation, diversity, and inclusion [8]; 5) Pressure from External Stakeholders: Stakeholders including government agencies, NGOs, international organizations, suppliers, and citizens exert influence on the

public sector to implement SPP, varying between developed and developing economies; 6) Economic Recovery: SPP supports economic recovery by favouring local businesses, fostering innovation, creating jobs, and promoting social and economic inclusion of disadvantaged groups, contributing to a sustainable economic recovery.

Internal motivations consist of: 1) Development of local and regional economies: SPP, especially through public food procurement programs, can boost local economies by providing market access to marginalized producers or small-scale farmers [9], supporting local businesses, creating jobs, reducing transportation costs, and enhancing food security [10]. These programs encourage sustainable agricultural practices, contributing to environmental preservation and the long-term health of local communities [11]. SPP also promotes economic growth by offering contract opportunities to local SMEs, fostering innovation, and enhancing the competitiveness of local businesses in broader markets [12]; 2) Cost reduction: Public institutions can lower energy consumption and operational costs by purchasing energy-efficient products and services. Sustainable procurement practices lead to further savings by minimizing waste production and promoting recyclable products, proving to be cost-effective in the long term due to their durability and low environmental impact; 3) Promotion of sustainable consumption: Institutions like universities can encourage sustainable consumption by integrating environmental and social criteria into their procurement processes, thereby prioritizing eco-friendly and ethically sourced products. This involves raising awareness and providing specialized training on SPP [13]; 3) Culture of the public organization: The organizational culture significantly influences the adoption of SPP. The commitment of management to sustainability is crucial. Without it, it can be challenging to secure the necessary resources or create an environment

conducive to SPP practices [14]. A culture that values sustainability, encourages collaboration, and aligns objectives across the public sector is vital for the successful adoption of SPP [15]; 4) Enhancement of the Image: By adopting SPP, public organizations demonstrate their commitment to social and environmental responsibility, which can enhance public trust, prevent corruption, and improve the perception of the organization. Accountability in procurement processes shows that decisions are made ethically and sustainably.

The barriers to SPP represent the factors that can limit its adoption and the effective implementation of its practices. Strategic barriers highlight the fundamental challenges related to the vision and commitment of public organizations: 1) Lack of Support from Top Management: The absence of leadership support for sustainable practices impedes the development of SPP strategies and the encouragement of innovative ideas among employees. Organizational resistance to change, often due to a short-term focus, prevents the uptake of sustainable procurement practices; 2) Inadequate Regulation: A regulatory framework lacking clear sustainability criteria for tenders, or legal clarity on sustainable procurement actions, leaves public buyers wary of considering environmental or social impacts in their purchasing decisions [16]. Additionally, tender processes prioritizing the lowest price over sustainability criteria can result in the acquisition of low-quality products and services [17]; 3) Economic Uncertainties: Budget constraints and the perceived higher costs of sustainable products and services create financial challenges. Although sustainable options may offer long-term savings, a lack of tools and knowledge makes it difficult for public institutions to assess and compare lifecycle costs accurately. Furthermore, strict budget limitations can force a competition between various government priorities and objectives.

Operational Barriers are the obstacles that are more concerned with concrete processes, training, and the availability of tools: 1) Lack of Transparency: identified as a key challenge, as it can lead to public mistrust towards procurement processes, which can compromise the credibility and integrity of PP institutions; because opacity can encourage corruption, favouritism, and fraudulent practices, which can result in the wastage of public resources and the misuse of funds intended for sustainable procurement and the social, economic, and environmental benefits that ensue from it; 2) Complexity of the Procurement Process: Excessive bureaucracy can cause delays, deter suppliers, and complicate the modification of procurement rules. Adopting electronic procurement systems is suggested as a solution to streamline and simplify these processes; 3) Procurement Teams: The lack of training and skills among procurement teams is a significant operational barrier. It's crucial to train public procurement officials in sustainability, ethics, and professionalism, and to promote their moral development. Establishing study groups for standardizing sustainable criteria in tenders and focusing on training that changes

attitudes and improves communication can help overcome this barrier [18]; 4) Immaturity of the Supplier Market: A lack of awareness about sustainable products and a limited number of suppliers offering eco-friendly products pose challenges for public buyers aiming to implement sustainability criteria, making it difficult to find suppliers that meet specific sustainability requirements; 5) Lack of Decision Support Tools: The absence of tools can result in an underestimation of environmental costs and decisions made based on economic criteria alone. This barrier also includes challenges such as excessive time spent understanding environmental requirements, a lack of understanding among suppliers of the importance of these requirements, and difficulties in recognizing the value of data collection and life cycle assessment. Guidelines to assist public buyers are essential for reducing the complexities of navigating procurement processes and facilitating the integration of sustainability into procurement decisions [19].

4.2.2 Implementation

The implementation of a SPP process differs depending on the context. Political, organizational, and individual factors can vary from one situation to another, necessitating an approach tailored to each context [20]. Specific actions have been identified to facilitate and enable the implementation of SPP processes, including recognizing the importance of sustainability, legitimizing SPP development work, structuring it, offering expert support for skill development in sustainable procurement, facilitating peer support, introducing environmental requirements in public contracts, setting regulations, collaborating with small producer and conducting regular SPP monitoring.

A procurement strategy is an approach that defines how to achieve the objectives set by the procurement policy, involving the planning and implementation of specific measures to promote sustainable procurement practices. Thus, a SPP strategy involves documenting how to achieve optimal solutions in terms of cost, sustainability, and collaboration when acquiring goods, services, and works, with the aim of achieving environmental, social, and economic objectives in line with national priorities. This strategy also promotes the use of innovative solutions and encourages the creation of value for society, the environment, and the economy in line with the circular economy and sustainable development. Among the most used tools to establish a procurement strategy is the Kraljic model, and also the participatory approach [21].

4.2.3 Supplier selection

PP is conducted through tendering, and the principles of tender award are governed by PP law in each country and can vary depending on the nature of the public contracts and the evaluation criteria used for the tenders. Supplier selection in PP is done using criteria such as the lowest price or the most economically advantageous tender (MEAT). Including environmental criteria in the MEAT

evaluation can be a way to promote environmental sustainability in public contracts. Supplier selection in SPP is based on the application of sustainable criteria, namely the ability to meet specific environmental, social, and economic standards, along with legal compliance. This can be defined in the form of binding technical specifications of the product or service such as the use of recyclable materials, carbon emission reduction, adherence to workers' rights, ..., as requirements for the organization (qualification), in the form of award criteria, or as a performance clause in the contract [22]. Several tools are proposed by the literature to assist public buyers in making more informed and sustainable purchasing decisions in terms of supplier selection and PP awarding.

4.2.4 e-procurement

The implementation of an electronic PP system presents several potential advantages, including: the reduction of time and effort required to complete procedures through the automation of procurement processes, complete traceability of the flow of information and materials, enhancing transparency and integrity, reduction of costs related to procurement procedures, such as printing, storage, and distribution of physical documents, equitable access to all interested parties, eliminating geographical barriers and allowing wider participation, simplification of administrative tasks, speed and efficiency of communication between stakeholders and reduce human errors [23], thus accelerating the procurement process, strengthening compliance with established rules and regulations, reducing the risks of misconduct, and securing data, which facilitates the detection of irregularities and fraud.

Digital transformation facilitates the transition towards sustainability of SMEs, given the advantages offered in terms of transparency through better traceability of transactions which facilitates the detection of fraudulent behaviour, optimization of resources, better collaboration between private and public sector actors, which can encourage innovation in terms of sustainability and access to new markets [24].

The main organizational challenges that can compromise the success of the adoption of the electronic PP system are resistance to change from some process actors, technical complexity requiring skills and adequate infrastructure, protection of sensitive and confidential data requiring robust security measures to prevent breaches and cyberattacks, and inequality of access since the actors involved in PP may not have equitable access to the necessary technological resources, which can create disparities and inequalities in the procurement process [25].

The impact of blockchain technology and the Internet of Things (BIoT) on PP has been examined. The results show that blockchain technology can be used at all stages of the PP process. For example, it can be used to improve the efficiency of inventory management, eliminate malicious submissions, and enhance transaction

transparency. Blockchain also allows for the secure and transparent tracking of the use of public funds and ensures the traceability of processes. This contributes to reducing corruption and making government services more transparent and efficient. By combining blockchain technology with the IoT, it is possible to create an intelligent and interoperable PP ecosystem [26]. Da Silveira et al. highlight that by enabling the tracking of the entire supply chain, blockchain facilitates the verification of sustainability criteria required in the tendering process. This helps to detect environmental and social damages such as the use of child or forced labour, the use of wood from deforestation, counterfeit products, unethical agents, etc. Moreover, by providing more transparency to the acquisition process, blockchain promotes open innovation by allowing stakeholders to collaborate and share information confidently. This can encourage public actors to adopt sustainable purchasing practices and to promote innovative solutions to achieve their sustainability goals.

4.2.5 Performance

Performance evaluation occurs at an early stage of the procurement process, during the planning and design of the project, and before the tendering process is initiated. It can also be conducted during the process or at a later stage, where the sustainability assessment of a procurement strategy is established to measure how well this strategy meets the SDGs, thus identifying areas where improvements can be made to make the strategy more sustainable and aligned with sustainable development priorities [27].

Performance indicators provide an objective basis for making informed procurement decisions and encourage more responsible practices [28].

4.2.6 SPP Practices

The selected literature sample mentions several environmental practices to promote SPP. Among these are practices aimed at fostering the transition to more sustainable mobility and reducing CO₂ emissions, through the introduction of environmental procurement policies, the establishment of a reverse logistics system for the backward flow of products to prevent pollution and reduce waste generation, the implementation of sustainability criteria in tender processes, considering psychological, cultural, and infrastructural factors, and encouraging functional specifications rather than specific prescriptions of solutions or materials, to foster innovation and ensure that suppliers offer environmentally friendly products and services in the market [29].

Social practices within the framework of SPP include the inclusion of minority-owned businesses or marginalized groups [30] in public sector set-aside programs by allocating a portion of procurement expenditures to them while encouraging the economic development of these groups, the development of projects that create new opportunities for local communities, the creation of employment opportunities and the promotion of

economic empowerment of disadvantaged populations through subcontracting and purchasing from businesses of all sizes.

The economic benefits of SPP include long-term savings from more efficient resource use, the stimulation of innovation, the creation of markets for sustainable products, and also regional economic development and building community wealth [31].

4.2.7 Life cycle

Life cycle assessment (LCA) is used as a key tool to assess environmental impacts and costs, thereby facilitating the choice of more efficient solutions [32]. Life cycle cost (LCC) is an economic evaluation method that considers all costs associated with the acquisition, operation, maintenance, and disposal of a product or system over its life cycle. Both evaluations (LCA and LCC) are considered complementary, as the first helps to identify and minimize negative environmental impacts, while the second allows understanding and managing the long-term economic implications. The integration of these two analyses in procurement and design processes aims to promote more sustainable and economically viable decisions.

4.2.8 Innovation

Innovation can concern both the purchased product or service and the procurement process itself. Indeed, public demand for solutions contributing to the achievement of objectives can be a powerful driver of innovation and facilitate the development of sustainable products and services. However, innovation encounters numerous obstacles such as the difficulty in making innovations repeatable and sustainable over time, especially in the public sector where procurement regulation is often rigid and aims to ensure open and fair competition, resistance to change and leadership styles [33].

In terms of the procurement process, innovation is crucial for developing frameworks for innovative procurement [34]. The shift from traditional contracts to integrated contracts, for example, leads to fundamental changes in the interdependencies among actors, resources, and activities, which can influence innovation and sustainable development. Smart contracts using Blockchain is also presented as a key technological innovation to overcome barriers to sustainability in SPP, by offering reliable traceability, improving transparency and efficiency, and helping to prevent fraud [35].

5 Conclusions

The results reveal that SPP is gaining popularity due to its potential to foster responsible economic growth and sustainable development. The SLR highlights a trend towards geographical diversification, affirming the global importance of the subject. However, a difference is observed between developed and developing countries in terms of adopting SPP. In developed economies, coercive pressures are often stronger and take the form of

government regulations, green procurement policies, and specific customer requirements for sustainability; they generally have greater awareness and citizen pressure in favour of sustainability, which can lead to a faster adoption of SPP. NGOs and local media also play an important role in raising awareness of sustainability issues. In contrast, in developing economies, coercive measures are often less binding, and SPP is more often considered a voluntary requirement. Some developing economies have implemented initiatives to promote SPP, but they may face legal and operational challenges, which can make the adoption of SPP more difficult, as legal pressures alone are weak due to the absence of sanctions for non-compliance.

Since the onset of the COVID-19 pandemic in 2020, there has been a substantial surge in the volume of scholarly articles, covering the field of SPP. These publications emphasize the need for emergency preparedness, underlining how the crisis has laid bare the fragility of healthcare systems and public finances.

The pandemic has acted as a catalyst for green recovery initiatives, shifting focus towards sustainable development. It has disrupted urban food systems globally, revealing the weak points in ensuring nutritional security for the more vulnerable city dwellers, which proves the importance of resilient local food systems. This shift not only aids in pandemic recovery but also aligns with broader sustainability goals by reducing carbon footprints and fostering community resilience. Additionally, the pandemic unveiled the disproportionate effects on SMEs at large, with a pronounced impact on women-led SMEs, minority-owned enterprises, and marginalized groups, catalysing governmental social innovations in PP that generate value.

Delays in project deliveries were commonplace due to disruptions in supply chains. Furthermore, there has been a noticeable acceleration in the adoption of teleworking as governments have sought to maintain service continuity; this has led to increased IT expenditures. The urgency to expand telehealth services has led to substantial investment in infrastructure and policy adaptation.

The pandemic has accelerated the adoption of digital technologies in PP, notably e-procurement and blockchain. However, the full potential of these technologies in the realm of SPP remains largely untapped and the lack of empirical articles in this regard highlights a neglected research area. This deficiency underscores a critical need for exploration on how blockchain can improve traceability, transparency, and efficiency in PP while respecting sustainability principles. The role of IoT in SPP represents another area of digital transformation. However, there is a glaring lack of empirical articles examining the concrete impact and practical applications of BIOT in PP. These combined technologies have the potential to revolutionize PP by enabling better real-time tracking, cost reduction, and increased efficiency in procurement processes.

It is equally important to note that artificial intelligence (AI) is absent from most research on SPP, a surprising

finding given the extent of its promises. By analysing large amounts of data and identifying complex trends, AI could optimize procurement processes, promote informed and personalized decision-making, and contribute to better risk management. The introduction of AI could thus transform PP, making it more agile and strategic. This gap underscores an urgent need for empirical analyses to explore the implications, benefits, and potential constraints of using AI in optimizing SPP. There is also a lack of empirical articles focused on analysing the risks associated with data security in the digitalization of PP. The existing literature offers little insight into concrete vulnerabilities and security incidents that have occurred in the context of electronic PP processes.

This research highlights that while there is a focus on evaluating environmental impacts using LCA and LCC in PP practices, there's a notable scarcity in addressing social life cycle analysis. This gap hinders a comprehensive understanding of the social implications of PP decisions and limits the ability of organizations to make informed, responsible choices. Additionally, the SLR observes a strong inclination towards prioritizing environmental criteria over social ones in supplier selection. The difficulty in addressing social aspects could be attributed to their qualitative, subjective nature and the challenges in quantifying them similarly to environmental impacts. This imbalance underscores the necessity for research to incorporate social criteria more thoroughly, aligning PP with broader socio-economic values alongside environmental considerations to achieve comprehensive sustainability goals.

The implementation of SPP principles through effective and optimized processes is also not sufficiently documented. This gap in research can be explained by the fact that the methodology for implementing SPP can vary considerably depending on regulatory, cultural, and economic contexts, complicating the creation of a uniform analysis framework or the adoption of a standardized approach. It is therefore essential to enrich the academic corpus and provide case studies, models, and practical tools that could guide and facilitate the implementation of SPP within public administrations. In the context of the study conducted, there is also a lack of articles dealing with the formulation of procurement strategies, which is an important element of a responsible and efficient procurement approach. Moreover, this SLR exposes a lack of papers dedicated to evaluating the sustainability of procurement strategies, making it difficult to measure their effectiveness, assess whether the expected impact on the environment, society, and economy is achieved, and make improvements based on evidence.

It is important to draw attention to a notable limitation of this SLR, which lies in the choice to include exclusively empirical articles. This restriction has probably contributed to the limited number of articles identified concerning innovation in SPP, as researchers often orient themselves in emerging fields towards theoretical or conceptual approaches to explore and establish foundations before

conducting empirical studies. Not to mention the fact that this type of study requires concrete data, often in the form of case studies, experiences, or data collected in the field, which can take longer to be published due to challenges related to data access, regulatory constraints, and coordination between different stakeholders; therefore, studies may be underway but not yet published.

In conclusion, the insights garnered from this review highlight the evolving nature of SPP in ensuring the resilience and sustainability of supply chains, especially in the face of global crises like COVID-19. The pandemic has not only challenged existing practices but also opened new pathways for innovation in PP. As the world continues to grapple with the pandemic's aftermath and other global challenges, SPP stands as a pivotal mechanism in steering societies towards a more sustainable, resilient, and equitable future.

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