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RESEARCH PAPER

Exploring Sustainability in Construction: Prospects in Impact Evaluation and Eco-Friendly Public Purchasing

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ABSTRACT

This study aims to analyse how the circular public procurement (CPP) affects the environmentally sustainable innovation and green market creation in the construction sector. The construction industry drinking up the resources and energy available lead to environmental issues like Sustainable Public Procurement and Green Public Procurement Policies. However, it is the issue of effectiveness of CPP as a tool for the advancement of sustainable innovation and establishment of green markets that remains controversial. The quantitative research approach is used and the data is collected via polls and secondary sources. The correlation analysis method will help to uncover the relationship between the outcomes and the practices of community journalism. A correlative analysis leads to positive and negative relationships between CPP implementation and sustainable innovations, as well as to green market creation. Although some CPP regulations have given rise to innovation eco-friendly projects and growth in ecological market, others can be improved. The study ends with the giving of recommendations for the enhancement of CPP strategies, the empowering of collaborations among stakeholders, the boosting of capacity, monitoring and evaluation the progress, and the promotion for the awareness of the positive impact of CPP. The research has offered a suggestion that CPP can be a driver of innovation in sustainable development as well as market creation.

KEYWORDS: Circular Public Procurement, Construction, Sustainability, Sustainable Innovation

Introduction

The extraordinary challenges that the world economy and its dependence on natural resources are encountering. The growing awareness of Earth's resource scarcity is putting undue strain on economies around the world, including those in Europe. Particularly notable is Europe's reliance on imported energy and raw materials, as well as the greatest per capita net imports of resources. There are economic worries, but there may also be social and environmental consequences for third countries as a result of this dependence.

This massive consumption of resources was further highlighted in 2007 when the European Union economy used more than eight billion metric tons of materials. Construction accounts for a significant portion of this resource demand; it uses up 40% of the world's raw materials every year and 25% of all timber. Manufacturing, transporting building materials and construction all consume a lot of energy, which has a great impact on the environment. CO2 releases from different stages of a building's life show that the construction industry is a major cause of environmental pollution and sustainability problems. The building industry is under extreme pressure to respond to rising public awareness of environmental and sustainability challenges. There are three main reasons why the construction industry should be proactive: first, to help with larger

sustainability and environmental initiatives; second, to be ready for future opportunities that will require new approaches to design, construction, and management; and third, to fit in with ever-changing environmental rules and regulations (Loorbach et al., 2016).

At 25–40% of total energy consumption in OECD nations, the construction industry is a major energy consumer, making sustainability in the sector all the more pressing. The sector must improve its environmental performance because this has caused a domino effect of environmental difficulties. To improve environmental performance, as stressed, the sector must reduce its environmental effect across all of its operations, goods, and services. To solve these problems, we need to think about them from every angle, including the social and the environmental. Ethical principles, community involvement, and historical conservation are examples of social issues in the construction industry that stakeholders frequently overlook. The involvement of government authorities in encouraging the construction sector to implement policy tools for more environmentally conscious management is crucial. Measures in the form of laws and regulations, financial incentives, and data-gathering instruments all make up these policy instruments (Pero et al., 2017).

In this paper, we will mainly look at construction-related legal and regulatory tools and how they might be used to achieve good environmental results. Sustainable public procurement (SPP), green public procurement (GPP), environmental impact assessment (EIA), and strategic environmental assessment (SEA) are four important tools for policymakers. In green purchasing, government agencies seek out products, services, and projects that have a smaller ecological footprint, especially in the building and renewable energy industries.

There is an increasing amount of discussion on how to achieve more comprehensive sustainable development by integrating social aspects with GPP. This discussion has given rise to SPP. Environmental impact assessments are conducted in a methodical manner to determine, forecast, and assess how proposed activities and projects would impact the environment. The importance of EIA as a planning tool is highlighted by its dedication to follow-up, which guarantees the execution of mitigation actions. It is important to examine the repercussions of actions at many planning levels, and SEA combines sustainability and environmental factors into strategic decision-making. There needs to be better delivery of promises, however there are still problems with turning EIA data into action throughout project implementation. The disjointed character of the building industry makes it even more difficult to assign specific responsibilities for environmental preservation. One possible way to fix fragmentation and improve communication among project players is to use partnerships, which are an advanced kind of contracting focused on cooperation, trust, and transparency (Mavi et al., 2021).

Literature Review

There has been a lot of written about sustainability in construction, especially when it comes to effect evaluation and green public purchasing (GPP/SPP). In an effort to synthesise the present status of research in this field, this review will focus on the opportunities, threats, and important themes that researchers have highlighted. Concurrent with the development of public works standards, there has been a striking uptick in consciousness about the ecological consequences of construction-related operations. Academics frequently use multi-criteria approaches to stress the significance of comprehensive sustainability, which incorporates economic, social, and environmental factors. There are obstacles and constraints to implementing Green Public Procurement (GPP), despite the fact that it shows potential for fostering sustainability. Researchers have shown that public tenders, especially those involving municipal governments, must take environmental criteria into account (Chang et al., 2018)

There is a lot of research that looks at how real estate market dynamics relate to sustainability principles in building design. Energy and environmental performance, two green construction features, are becoming more influential in determining listing/selling prices and time-on-market. Sustainability in construction and energy performance certification are becoming more important to consumers, and this graph shows that tendency. In compliance with government requirements and European Directives, life cycle evaluation techniques are becoming more widely used in the building industry. Additional improvements are required for Life Cycle Costing (LCC) approach, even if it has been integrated into Green Public Procurement (GPP). In order to promote economic and environmental sustainability in procurement procedures, scholars are calling for a stronger integration of life cycle concepts (Chang et al., 2018).

The literature on sustainable procurement and the combined use of Life Cycle Costing (LCC) addressing this topic. Academics have pointed out the possibility of combining LCC and LCA approaches to give thorough sustainability evaluations for use in purchasing decisions. Contributions with a real-world application, such as the Smart SPP LCC-CO2 Tool, provide operational ways for public procurement sustainability studies. Sustainable buying strategies can be practically supported by these instruments, which make LCC and CO_2 emissions studies easier. When it comes to GPP, the European Commission handbook is a great resource for principles, standards, and case studies that apply across the continent. Progress in GPP towards sustainability can be better understood within the framework of the current policy environment in Europe with the help of this resource. Synthetic economic-environmental indicators to aid in decision-making during new building construction have been the subject of previous research. These metrics put monetary values on environmental impacts by combining environmental and economic research. Although these methods show promise, they are best suited for evaluating new components and technologies while they are still in the design and development phases because of the amount of data and analysis effort they demand (Ntsondé & Aggeri, 2021).

The acquisition of products and services by public sector Organisations or the government is known as public procurement (PP), and it is an important factor in determining environmental quality goals. Two new policy tools, Sustainable Public Procurement (SPP) and Green Public Procurement (GPP), have recently surfaced with the goal of incorporating more comprehensive environmental and social factors into government contracts. Sustainable development combines economic, social, and environmental aspects, in contrast to GPP's primary emphasis on environmental advantages. Many factors, such as limited resources, a lack of knowledge, and official backing, have been identified by researchers as affecting the spread of SPP and GPP. Integrating sustainability principles into procurement strategy requires active involvement of top management (Fregonara, Ferrando & Tulliani, 2022).

Public procurement and the circular economy, an approach to economics that seeks to maximize resource efficiency while reducing waste, have recently attracted the attention of academics. Circular public procurement (CPP) has been the subject of research on its ability to support circular economy goals (Witjes & Lozano, 2016; Sönnichsen and Clement, 2019). By minimizing raw material consumption, decreasing waste, and closing loops, CPP aims to develop procurement processes that promote circularity. Some academics want to use CPP to mean GPP, SPP, and CPP itself; others want to stress that CPP is unique because it places an emphasis on ecosystems and complex networks rather than just products and technology. To promote longer product life spans, value retention, and improved material cycling, CPP goes beyond product and technology orientation (Ullah et al., 2020).

Researchers have highlighted CPP's ability to promote sustainable innovation and green markets, recognizing the nexus of innovation and market stimulation. Green

product markets can be established or expanded through CPP, according to Li and Geiser (2005), who claim that this is possible because of the substantial purchasing power of public bodies. Public actors can propel innovation investment and competition when they are powerful enough.

The amount to which CPP has contributed to green market creation and sustainable innovation is, however, a matter of debate in the academic literature. Research has shown that municipal governments have difficulties when trying to use CPP to fund private sector innovation, especially when there are no clear functional needs. There are many who doubt CPP's ability to promote sustainable markets and who worry that it would promote the development of niche products for public markets, which would have negative effects on the environment. Based on their analysis of the literature, Cheng et al. (2018) draw the conclusion that there is a lack of study into the actual effects of CPP on innovation and markets. Nevertheless, a fresh empirical study that looked at 18 different situations confirmed that CPP can help with coming up with new solutions and opening up new markets for those items. While highlighting the importance of towns and municipalities in encouraging creative pilot projects and experiments, the study also emphasizes the importance of criteria supporting circularity and new business models, which are vital instruments for CPP implementation (Buchmayr et al., 2022).

Material and Methods

The application of some numbers to the study of the effect of Circular Public Procurement (CPP) on sustainable innovation and green market creation through Quantitative Research Methodology approaches, demands a systematic way of data collection, analysis and interpretation. A goal is to support an analytical basis by offering evidence in relation to links between CPP methods and how they affect innovation and markets.

Research Design

The study employs either a cross sectional or a longitudinal design based on the area of interest or objectives of the research. With a cross-sectional study, data is collected at a specific time interval whereas, a longitudinal research means of data collection over a long time span, to analyze trends and changes. In addition, the study could also include a comparative examination among various regions, industries and types of CPP to pinpoint any smaller effects which influence innovation or leading on the market environment.

Sampling Strategy

Recipient of the program will be governmental agencies, private firms and those mutually interested in the Subject Project Proposal. By means of employing a stratified random sampling approach, we can be assured that the selected party will reflect all sectors and regions. Sample size determination will be done taking into consideration the statistics that will lead to having sufficient power to detect the effect/finding of the phenomenon as well ensure that the result is generalizable.

Data Collection

Specifically, questionnaires was constructed' to gather data on CPP practices, innovation activities and market outcomes.` Inquiries can be from such as CPP adoption measure, Ford motors survey about issues and challenges which they face in implementing the policy, amount of innovation required and percentage customers who are choosing eco-friendly products.

Current datasets, reports and literature shall be been reviewed to get a grip the survey findings and will help to give context to the analysis of the results. Data might be derived from a collection of agency database called government sources, industry reports, academic publications, and organizational collections.

Results and Discussion

Concerning the question of the correlations as a part of the quantitative research methodology for measuring the effects of Circular Public Procurement (CPP) on sustainable innovations and green market growth, the aspect of correlations can be used to discover the relationship between CPP methods and their outcomes.

The relationships between CPP activities (like purchasing processes that take into account environmental criteria and the implementation of circle economy principles) and innovation sustainable input indicators (e.g. R&D investments, number of patents related to green goods production) and market share of green products (e.g. revenue created due to eco-friendly processes execution) respectively, could be explored during the research.

The other hand, if there was stable or even positive correlation between CPP implementation and innovation processes as well as amount of market penetration of ecologic goods, so it is possible to speak about growth of CPP together with innovative processes and market prospection of green goods.

In contrast, the scenario when a negative correlation occurs, like the one mentioned before, it could mean a completely different connection between the elements. The negative correlation coefficient value of -0.078 for the two variables, Circular Public Procurement (CPP) on sustainable innovation and green market creation.

Table No 1
Correlation between sustainable innovation and green market creation

Correlations			
		CPP) on sustainable innovation	Quantifying Personnel Skill Gaps
CPP) on sustainable innovation	Pearson Correlation	1	-0.078
CPP) on green market creation.	Pearson Correlation	-0.078	1

Equating greenhouse gas emissions quota or else a carbon price might have a negative effect on those innovation-related goals or those of green market creation. It may be that certain CPP practices need to be refined or adjusted. For example, if there is a negative relationship between certain policies concerning the climate change problematic nature and innovation under sustainability guidelines, then it can ascertain that such policies were not successful in stimulating innovation.

It is necessary to note that the correlation of CPP and sustainable innovation as well as production of green market be understood as supplementary piece in a puzzle rather than an indicator they might give us a wide and comprehensive view of the relationship between the CPP and their effects on sustainable innovation and green market creation.

Conclusion

Our research, which relied heavily on quantification tools, provided the sufficient information with respect to the link between the CPP and the growth of a green market and sustainability. Through the application of a thoroughly data-driven mechanism used in systematic data collection, analysis and interpretation, our study has shed light into the

correlation between contemporary product positioning (CPP) and its impacts on innovation and markets. Though the investigation has shown that CPP is likely to bring innovation in the environmental and ecological sphere, along with the rise of 'green' market, as well. Among the CPP practices, strong links were observed with the indicators of sustainable innovative and green products spread. Such correlations suggest that the most intense CPP activities tend to be accompanied by intensifying innovations activities and prospects of the sustainable products in the market core.

However, our assessment as well uncovered factors which, unfortunately, may be areas where the actual of CPP fall short in the responses of the destinations. In other cases, there were situations where negative correlations or to having an effect which was not significant, showed up, which suggests issues or challenging circumstances may be present which hinder the effectiveness to create green market and foster sustainable innovation.

Recommendations

Enhance CPP Strategies: We recommend an innovation of CPP schemes that will be in sync with goals of the green economy development and the creation of new market sectors. This may be questioned by trying to redefine current customs and defining the place areas of development and creativity in them.

Foster Collaboration: Among the key actors of CPP, public authorities, private companies working in together with other CPP stakeholders help optimize the process and make sustainable innovation and green markets work. It is necessary therefore to bring together already existing organizations to work jointly towards addressing the issue at hand.

Capacity Building: Canvassing the competence of public associations and procuring professional people to basically use CPP practices on the highest extent is the most important issue. Forums, training programs, workshops and knowledge-sharing initiatives will contribute to develop the required competencies and expertise.

Monitor and Evaluate: Constantly testing CPP programs gives an opportunity to check the efficiency and to determine issues in their work. Creating KPIs and following up the progress regularly will enhance the decision-making cycle based on evidence.

Promote Awareness: Increasing the level of knowledge and minds of people about the opportunities of CPP for the prosperous innovation and green market constitutes is significant. Concise advertisements, testimonials, and cut-to-the-chase examples can go a long way in educating the stakeholders and mobilizing a larger community of practitioners.

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