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Andreja Todorović[1]
Andrija Popović[2]
Snežana Colić[3]

ANALYSIS OF THE STATE OF GREEN PUBLIC PROCUREMENT: THE CASE OF SERBIA AND CROATIA

Abstract: *Public procurement can be considered a key tool for promoting green growth. Its role and significance have significantly changed, acquiring specific characteristics. The aim of this paper is to present the concept of green public procurement to the scientific and professional community as a tool for improving business performance, reducing pollution, and protecting the environment. The study analyzes the definitions of this concept, its application, and presents examples of sustainable practices in Croatia and Serbia. The results of the research show that the models implemented by European Union countries can be successfully applied in Serbia as well, but there is a need to raise ecological awareness and motivate the business community to apply green criteria in public procurement processes, which account for approximately 10% of Serbia's gross domestic product.*

Keywords: *Green public procurement, green transition, green growth, life cycle costs.*

[1] Innovation Center, University of Niš **,** andrejatod@gmail.com, Univerzitetski trg 2, 18000 Niš, Serbia, ORCID ID: 0000-0003-2849-6987
[2] Innovation Center, University of Niš **,** andrija.m.popovic@gmail.com, Univerzitetski trg 2, 18000 Niš, Serbia, ORCID ID 0000-0003-4558-8226
[3] Innovation Center, University of Niš **,** sneskaa992@gmail.com, Univerzitetski trg 2, 18000 Niš, Serbia, ORCID ID 0000-0002-1683-8292
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1. Introduction

Over the past decades, the role of the state and public institutions in public procurement has been fundamentally reexamined in order to align it with the achievement of sustainable development goals. There is an increasingly developed awareness among the business and broader public about the fact that goals such as sustainable production and sustainable consumption of environmentally friendly products and services have become an imperative for economic activities. Achieving this goal must be supported by an efficient institutional and regulatory national and supranational framework. The responsible role of the state in green public procurement involves ensuring socially and environmentally acceptable practices through the use of public contracts. It should be noted that green public procurement encompasses not only social and environmental issues but also, in a broader sense, the participation of companies in public tender processes.

The entire public sector, which includes decision-makers from local government, through public utilities, universities, to hospitals, controls and manages large budgets that are used to procure a wide range of different products and services. Public administration bodies are major consumers. Given their high level of power, they can directly and indirectly influence the greening of procurement.

The structure of the paper consists of meaningfully connected sections that provide a framework for the qualitative and quantitative analysis of green public procurement. The first part of the paper presents a synthesis of relevant literature on green procurement and explains the terminological distinction in this field (green public procurement, circular public procurement, and sustainable public procurement). Special attention in the first part of the paper is given to the life cycle cost calculation and the redesign of products, i.e., the Eco label, which are essential for a comprehensive understanding of the concept of green public procurement.

The second part presents the results of the research, i.e., examples and models used by the state of Croatia in its practice. There are numerous ecological, social, economic, and political benefits from promoting the use of life cycle cost calculation approaches for products or services. In the context of the European Green Deal, green public procurement has enormous potential for a successful transition to a resource-efficient, low-carbon, circular, sustainable, and innovative economy. After the theoretical and practical implications, the paper concludes with considerations and recommendations for the business community, aimed at strengthening the capacity of economic entities to focus on the application of ecological criteria during the public procurement process.

2. Literature Review and Theoretical Framework

Numerous authors have provided different terminological definitions and scopes of public procurement. By systematizing the relevant literature, Table 1 presents selected definitions of the terms: green public procurement, circular public procurement, and sustainable public procurement.

Table 1. Definitions of Public Procurement Promoting Sustainable Development

Types of Public Procurement	Definitions
Green Public Procurement	**Green public procurement** refers to the process in which the public sector/contracting authorities aim to procure goods, services, and works with reduced environmental impact throughout their life cycle, compared to goods, services, and works that would otherwise be procured, while serving the same primary function (European Commission,2008).
	Green public procurement involves the way the public sector uses ecological criteria in all stages of procurement, by seeking and selecting solutions with the least environmental impact throughout the life cycle of products, and promoting the distribution of ecological technologi es and the development of environmentally friendly goods (Bouwer M.et all,2006)
Circular Public Procurement	The purchase of goods or services that seek to contribute to closed energy and material loops within supply chains, while minimizing, and ideally avoiding, negative environmental impacts and waste generation throughout the entire life cycle (European Commission,2020).
Sustainable Public Procurement	The process by which public authorities aim to achieve an appropriate balance between the three pillars of sustainable development: economic, social, and environmental, when procuring goods, services, or works at all stages of the project (European Commission,2020).
	The process by which public authorities meet their needs for goods, services, works, and public utilities in a way that provides value for money over the entire life cycle, in terms of generating benefits not only for the organization but also for society and the economy, while minimizing environmental harm .
	Procurement in which public authorities use their purchasing power to signal market preferences through their choice of goods and services that meet sustainable criteria .

Source: author's systematization according to Gormly, J. (2014) and Todorović A., et all(2021)

A deeper analysis can lead to the conclusion that the focus of green public procurement is on environmental factors, while in circular public procurement, it has been extended to include economic factors. The broadest approach, sustainable public procurement, encompasses all three pillars of sustainable development, striving to establish a balance between produced capital, natural capital, human and social capital (*Gormly,2014)*. Economic factors integrated into the concept of sustainable public procurement include the price of products and services throughout their life cycle. Environmental factors include

reducing environmental pollution, the impact of goods, works, and services on health, air quality, the creation and disposal of hazardous materials, as well as minimizing resource use (reducing raw materials, recycling, reuse) across the entire supply chain. Finally, social factors include recognizing equality and diversity, respecting basic standards, ensuring fair working conditions, increasing employment, and developing local communities (Roos, 2012).

Large and Thomsen [2011] define ecological or green purchasing as the integration of ecological standards into purchasing policies, programs, and actions. Green or ecological purchasing is a procurement function within supply chain management activities such as life cycle analysis and environmental design, which facilitates recycling, reuse, and resource reduction (Roos, 2012). Zsidisin and Siferd. provided a holistic definition, stating that green procurement for an individual company is a set of purchasing policies, actions taken, and relationships established in response to environmental concerns. Environmental concerns are related to the procurement of raw materials and include supplier selection, resource reduction, and product disposal. It can be seen that the definitions provided by Zsidisin and Siferd and Large and Thomsen (Large, & Thomsen,2011) are similar, while the one given by Carter is outdated as it is limited to technical issues such as recycling.

Green public procurement (GPP) is recognized worldwide, not only by public institutions and decision-makers but also by the business community, due to economic savings and its significant positive potential for the environment. The public sector represents the most significant "buyer" in society and, for this reason, has a great influence across the entire supply chain. As procurement requirements include additional criteria considering the impacts that products and services have during their entire life cycle, suppliers strive to meet these requirements and maintain their position in the market. Furthermore, the

application of green public procurement is in the interest of society as a whole and contributes to the development of the circular economy. The subject of green public procurement most often includes: IT equipment, energy, office supplies and paper, chemicals, cleaning services, electrical equipment (refrigerators, freezers, air conditioners, etc.), passenger and transport vehicles, furniture, and public lighting.

Public procurement has played a leading role in the introduction, promotion, implementation, and improvement of green purchasing at national and supranational levels. A study prepared by Kataoka (*Gormly,2014)*. provides a comparison of the total and "green" purchasing power of the United Nations (UN) and public institutions in the European Union, the United States, and Japan. In the case of the UN, from a total expenditure level of $30 billion (i.e., direct and indirect spending), one-tenth is related to "green procurement opportunities." In the EU, public procurement was recorded at about $1.5 trillion, representing over 14% of GDP. In the US, the federal government spent about $500 billion, while state/local authorities spent an additional $400 billion on green procurement. In Japan, the national government and local authorities spent approximately $162 billion, which represented 17.6% of GDP. It is widely known that "greening" purchasing can significantly contribute to the promotion, selection, and use of greener products and services, thereby improving the health of the global environment (Carter& Carter, J. 1998).

2.1. Calculation of Life Cycle Costs

Green public procurement is becoming a central issue for policy at both the European and national levels. Awareness of the importance of public procurement in terms of sustainable consumption and production has significantly increased after the United Nations Conference on Environment and Development in 1992. As public spending becomes more prominent in the context of economic cycles, public procurement can help achieve the market-oriented goals set by the European 2020 Strategy,

which include minimizing CO2 emissions and improving energy efficiency.

Life Cycle Costing (LCC) is a combination of investment evaluation and cost calculation related to the product's life cycle concept. In this context, controllers attempt to analyze the costs of a product throughout all stages of its life cycle (from development to the end of its production). This is intended to lead to recommendations for product design, as well as final purchase decisions. The goal is to optimize costs throughout the entire product life cycle, particularly in the early stages of product development. One of the tools used in product design is target costing. Target costing is a tool for defining the costs that should be applied as early as possible in the product's life cycle.

Figure 1. Basic Stages of the Product Life Cycle
Source: Management Center Belgrade and European Commission

For certain categories of green procurement that are most commonly purchased, metrics and methodologies for calculating

carbon dioxide savings have been developed. This allows for the quantification of the positive effects of savings, as well as for comparing results with and without the application of green procurement criteria. The potential environmental benefits of green public procurement are greater when green criteria are included in public procurement processes (Pouikli,2021). Testa et al. (2021). emphasized that a thorough knowledge of green public procurement tools and a high level of involvement by public servants increase the likelihood of green procurement being implemented in practice. Therefore, it can be said that green public procurement involves not only the inclusion of green criteria in the purchasing process, but much more.

The application of Life Cycle Costing (LCC) in public contracts can enable the combination of economic and ecological dimensions in procurement (European Commission,2008) and can effectively help determine the lowest price through a comprehensive and thorough evaluation. Life Cycle Costing is a tool that evaluates all costs over the entire life cycle. In the context of sustainable public procurement, the use of LCC is a very important element, as it shifts the paradigm of public procurement beyond the limitations of the price of goods or services.

In the field of public procurement, the LCC calculation must differ for products/works and services. The life cycle of a product or work includes all phases from raw material procurement to final disposal: production, transport, and maintenance. The life cycle of a service includes all stages from its preparation to the end of its provision. The costs to consider include both direct monetary costs and external environmental costs, if they can be monetarily expressed.

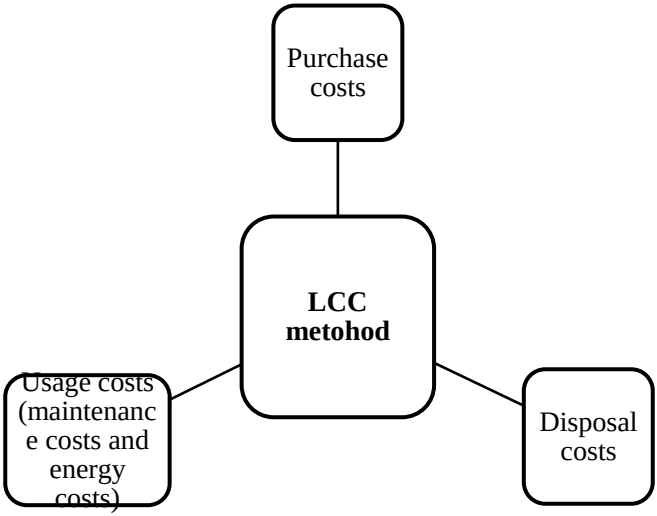

Figure 2. LCC Tools

Source: Author's representation based on Pouikli, K. (2021).

To account for the real costs for the user of a specific product or service, a methodology is applied that covers all monetary expenses related to the use of a product during its lifetime, starting from the time of purchase. A wide range of different LCC tools is in use, but a typical LCC tool includes three main components: the purchase cost, the usage cost (which includes maintenance and energy costs), and the disposal cost, as shown in Figure 2. By considering the costs incurred throughout the entire life of the product, rather than just the purchase price, a more accurate picture of the required financial expenditure for purchasing the product is obtained. The life cycle includes all consecutive or interconnected stages, including necessary research and development, production, trade, transport, use, and maintenance during the existence of the product or work or the provision of a service, from raw material procurement or resource generation to disposal, removal, and the completion of the service or use (Parikka-Alhola,2008).

The application of the LCC methodology takes into account not only the sales price but also the estimation of costs arising during and after use, such as the costs of consumables, labor costs, environmental impacts, maintenance, and any costs that arise after the cessation of the product's use. These are not only operational activities but a clear strategy for implementing a policy that promotes sustainable growth in the economic system. The use of LCC in public procurement combines the economic and ecological dimensions in procurement and effectively helps in determining the lowest price through a comprehensive and thorough evaluation (Pouikli,2021)

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2.2. Eco Label

To make it easier to recognize environmentally friendly products and services, Eco labels have been defined to provide information about products, services, and their environmental impact. All products bearing such labels are aligned with green procurement criteria. This type of label is not available to everyone, but only to products that meet defined standards. Practice shows that between 20-30% of products can meet such requirements. These products are authentic as they promote business and actions that protect the environment (Testa, F., et al. 2016). When determining the criteria for Eco labels, the following factors are particularly considered:

- The most significant environmental impacts, especially climate change impacts – effects on nature and biodiversity, energy consumption, resource use, waste generation, emissions, all types of pollution, and the release of hazardous substances;
- The possibility of replacing hazardous substances with less harmful ones, wherever technically feasible;
- The potential to reduce environmental impact due to product durability and the possibility of reuse;

- The relationship between environmental benefits and environmental burdens, including aspects of safety and human health at different stages of the product life cycle.

The EU Ecolabel was established in 1992 and is recognized across Europe and the world. The EU Ecolabel represents excellence in environmental protection. It is awarded to products and services that meet high ecological standards. These standards are integrated into the entire process of creation: from raw material extraction, production, distribution to end-users. This label encourages organizations to produce products with a long life span, which are easy to repair and can be recycled.

Figure 3. EU Ecolabel
Source: European Commission

In the Republic of Serbia, a national Eco label has been established because Serbia is still not a full EU member state. Details regarding the procedure and conditions for awarding the eco label are defined by the Rulebook on the conditions, criteria, and procedure for obtaining the right to use the eco label, its elements, design, and usage for products and services [20]. The Rulebook also contains specific criteria for the eco label for 26 different product groups. These criteria are modeled after the corresponding criteria for the EU Ecolabel.

Figure 4. Eco Label in the Republic of Serbia
Source: Official Gazette of the RS

The goal of the Eco label is to ensure that a product or service bearing the Eco label has a lower environmental impact. For a product to receive the Eco label, it must be produced within the Republic of Serbia and meet the criteria for obtaining the right to use the Eco label. These criteria are based on the environmental performance of the product, taking into account strategic environmental goals, and apply to the entire product life cycle or product group, in accordance with the purpose outlined in the Environmental Protection Act (ZJN,2022)

3. **Research Results: Examples of Good Practices**

As an example of good practice, the development and implementation of green public procurement in Croatia from 2016 to 2021 will be presented. The data used is from statistical reports by the Ministry of Economy and Sustainable Development of the Republic of Croatia. During 2020, Croatia concluded 1,448 contracts in which green public procurement criteria were used, while sectoral contracting authorities concluded 204 contracts. Table 2 shows that the participation of public procurement in the country's GDP during the observed period ranged from 12-16%, which aligns with the European average. From this, it can be concluded that green products and services have a significant impact on sustainability and the future of business.

Table 2. Overview of Public and Green Public Procurement in Croatia

Source: ZEJN

Year	Total Public Procurement as a % of GDP	Total Value of Green Public Procurement (HRK)	Green Public Procurement as a % of Public Procurement	Number of Public Procurement Contracts	Number of Green Public Procurement Contracts
2016	44,822,736,346 (12.76%)	182,730,827	0.40%	13,838	65
2017	40,451,227,766 (11.00%)	2,577,219,451	6.37%	11,408	164
2018	46,633,118,036 (12.10%)	1,437,968,211	3.08%	18,112	541
2019	54,105,927,158 (13.44%)	4,248,846,794	7.85%	24,354	1,731
2020	58,867,283,775 (15.84%)	6,143,794,529	10.43%	22,947	1,692
2021	57,234,416,871 (16.06%)	5,673,179,818	10.15%	27,253	2,492

Starting from January 1, 2018, the Regulation on Green Public Procurement (Official Gazette of the RS, No. 51/17 and 64/19) applies to 20 product procurement groups in Slovenia. Despite efforts to ensure its application, the Regulation faces challenges in its implementation. The lack of staff, insufficient relevant skills, poor awareness among public procurement officers about the advantages of green procurement, and the minimal role of green procurement in reducing greenhouse gas emissions are just a few of the issues being addressed.

In Croatia, a methodology was applied that uses various criteria by sector, based on which a public procurement is considered green. These criteria are aligned with those developed by the European Commission and are updated in accordance with market changes and European legislation. The criteria are designed and formulated so that contracting authorities can

directly adopt them along with tender documentation for their procurements. Furthermore, the criteria include information about verification methods. For each procurement area, there are two levels of criteria:

- Basic Criteria cover essential environmental protection factors, and their application positively impacts environmental protection. These criteria are applicable to all contracting authorities in EU member states and are designed in a way that does not lead to increased procurement costs.
- Comprehensive Criteria are intended for contracting authorities seeking to procure the best and most advanced ecological products available on the market. The application of these comprehensive criteria requires higher costs and the engagement of specialized services by the contracting authority.

According to public procurement reports from Croatia for the period 2016 to 2021, the number of contracts and the total value of contracts using green public procurement criteria are shown in Table 2. Over the analyzed period, a positive trend is evident, indicating that public procurement is increasingly adopting green characteristics. It can be concluded that the adoption of the National Action Plan for Green Public Procurement, as well as the implementation of promotional activities, has contributed to an increase in the number and value of green public procurements over time. However, this share remains below 10%, representing a relatively small participation.

3.1. Model for Calculating the Positive Effect of Street Lighting Reconstruction Using Green Public Procurement Criteria

In order to ensure the proper functioning of street lighting, electricity is required, which is primarily generated using fossil fuels, resulting in greenhouse gas emissions. Under these conditions, street lighting can be considered a source of pollution. To reduce electricity consumption and the associated greenhouse gas emissions, green public procurement criteria

encourage the use of energy-efficient lighting that consumes less electricity and utilizes electricity generated from renewable sources. Efficient lighting, which uses long-lasting light fixtures, contributes to overall environmental protection. The European Commission has developed green public procurement criteria for street lighting, which cover fixed lighting installations designed to provide good visibility in the dark for users of public traffic areas to ensure safety, traffic flow, and public safety. Street lighting makes up a significant portion of external public lighting in urban areas.

The green public procurement criteria do not apply to lighting installations for tunnels, toll stations, canals, and ferry crossings, parking lots, business or industrial premises, sports facilities, monuments, and building facades. There are two approaches to calculating CO2 emission savings: a simple approach and a detailed approach.

The simple approach represents a CO2 savings calculation model used when the purchase value of LED lighting fixtures (lamps/bulbs) is known. The purchase value entered in the model does not include the cost of energy audits, design services, and/or construction work for new lighting poles or other expenses. For example, during the modernization of street lighting in a neighborhood, the public procurer acquires, among other things, LED lighting fixtures (lamps) worth 145,000.00 HRK (excluding VAT). Green public procurement standards are applied in the public procurement process. With the given budget data, the model calculates intermediate results and then the final output result. The final result represents the savings or avoided CO2 emissions from purchasing or using energy-efficient LED lighting fixtures in the neighborhood's street lighting.

Table 3. Simple Approach for CO2 Emission Savings Calculation

Public Lighting	**Unit**	**Amount**
Input Data:		
Purchase value of LED lamps (excl. VAT)	EUR	19,050.00
Calculation Data:		
Unit price of LED lamp	EUR	255.00
Operating hours (per year) - First lighting level	hours/year	2,000
Operating hours (per year) - Second lighting level	hours/year	2,000
Specific CO2 emission factor for Croatia	KgCO2/kWh	0.234
Power of lighting without using green procurement criteria	W	110
Power of LED lighting with green procurement criteria - first lighting level	W	100
Power of LED lighting with green procurement criteria - second lighting level	W	50
Output Results:		
CO2 emission savings	t CO2/year	2.44
CO2 emission savings over the entire lifecycle	t CO2	60.90

Source: ZEJN

By purchasing LED lighting fixtures (lamps) worth 19,050.00 EUR (excluding VAT) and applying green public procurement criteria, an annual CO2 emission reduction of 2.44 tons is achieved.

The detailed approach is a more comprehensive calculation model used when data on the number of LED lighting fixtures (lamps) being purchased under green public procurement criteria and the (planned) operating hours of street lighting are available. For example, a public procurer acquires 30 LED lighting fixtures (lamps) with a power of 110W, which meet the criteria for green public procurement. The planned operation time for street lighting is 2,000 hours annually at a 100W lighting level and 2,000 hours annually at a 50W lighting level. The procurement

condition is that the LED lighting fixtures have a minimum lifespan of 20,000 hours.

Table 4. Detailed Approach for CO2 Emission Savings Calculation

Public Lighting	**Unit**	**Amount**
Input Data:		
Number of LED lamps for purchase	units	30
Lifespan of LED lamps	years	5
Operating hours (per year) - First lighting level	hours/year	2,000
Operating hours (per year) - Second lighting level	hours/year	2,000
Calculation Data:		
Specific CO2 emission factor for Croatia	kg CO2/kWh	0.234
Power of lighting without using green procurement criteria	W	110
Power of LED lighting with green procurement criteria - first lighting level	W	100
Power of LED lighting with green procurement criteria - second lighting level	W	50
Output Results:		
CO2 emission savings	t CO2/year	0.98
CO2 emission savings over the entire lifecycle	t CO2	4.91

Source: ZEJN

Using this model, intermediate results are obtained, and the final output shows the avoided CO2 emissions resulting from the procurement of LED lighting that meets green public procurement criteria. By purchasing 30 LED lighting fixtures (lamps) with a minimum lifespan of 20,000 hours and planned operating hours of 2,000 hours annually at 100W and 2,000 hours annually at 50W, an annual emission reduction of 0.98 tons of CO2 is achieved. Taking into account the entire lifespan

of the LED bulbs, a total CO2 emission reduction of 4.91 tons is avoided.

3.2. Model of Electric Vehicle Procurement by Hrvatska Elektroprivreda HEP d.d.

The main objectives of this model are: to achieve a reduction in CO2 emissions through the procurement of innovative electric vehicles, lower taxes for ecological vehicles, and improved corporate social responsibility. The public procurement process refers to the purchase of electric vehicles by HEP d.d. In this case, 20 vehicles were procured to renew the fleet. The process was organized into three categories: Category 1: Lower-class electric vehicles – 11 units; Category 2: Lower-middle-class electric vehicles – 5 units; Category 3: Cargo electric vehicles – 4 units

The contract duration was 12 months, and the total value was approximately €625,000 (excluding VAT). The main criterion for using electric vehicles was the use of alternative technologies and the improvement of energy consumption sustainability in state-owned enterprises, as well as raising social responsibility. Energy savings were calculated based on the GPP2020 methodology for a 5-year lifespan.

Table 5. Calculation of Savings from the Procurement of Electric Cars

	Energy Consumption	**Energy Consumption (toe/lifetime)**
Low-carbon solution	0 t CO2/lifetime	43 toe/lifetime
Standard product (benchmark)	379 t CO2/lifetime	142 toe/lifetime
Savings	379 t CO2/lifetime	99 toe/lifetime

Source: ZEJN

The calculation shown in Table 5 was based on the following assumptions: new vehicles consume 0 l/km and between 24,000 and 27,000 kWh, emitting zero grams of CO2/km during their lifespan (only direct emissions were included in the calculations). The least efficient vehicle available on the market consumes between 5.0-7.1 l/km and emits between 108-149 g CO2/km. The expected mileage for each vehicle is 150,000 km over its lifespan. By defining the characteristics of traditional vehicles being replaced by electric ones, significant reductions in consumption can be achieved, primarily through motor power and consequently CO2 emissions. Given that competitiveness was not compromised, more ambitious requirements from local governments for green energy are expected in the future, meaning that green criteria will be an integral part of procurement criteria and technical specifications.

3.3. Example of Green Public Procurement in the Republic of Serbia

A survey conducted in 2021 , which included not only citizens of the Republic of Serbia but also 250 suppliers (companies with experience in public procurement over the past three years) and 155 contracting authorities (public sector institutions that have participated in public procurement in the past three years), examined their awareness and readiness to apply green criteria. According to the survey results, most suppliers are familiar with the green criteria — to a large extent (18%), partially (42%), or to a lesser extent (25%), while a small percentage of contracting authorities who are at least somewhat familiar with the green criteria apply this criterion always (5%), often (15%), or sometimes (14%), with 32% of them never applying the green criterion (ZEJN, 2020).

Although, based on the findings, one might conclude that there are no significant efforts or progress in the implementation of green public procurement procedures in the Republic of Serbia, examples of good practice do exist. The "Merkur" Special Hospital in Vrnjačka Banja issued a public procurement for

materials for cleanliness maintenance, paper products, brushes and cloths, bags and foils, as well as detergents for machine washing of laundry and dishwashing detergents for professional machines. In addition to the requirements stipulated by the Public Procurement Law, contracting authorities requested documentation to prove the fulfillment of environmental protection-related conditions for each lot separately (ZEJN, 2020). A review of the mandatory conditions per lot is provided in Table 6 below.

Table 6. Mandatory Conditions of the Public Procurement of the "Merkur" Special Hospital in Vrnjačka Banja

Lot Number	Mandatory Conditions
Lot 1: Cleaning Materials	• Decision on registration in the temporary list of biocidal products under the Biocidal Products Law. • Catalog certified by the holder of the registration in the biocidal products list showing the required properties of the offered product. • Report on dermatological safety of the product. • Report on microbiological efficiency testing according to EN 1500, EN 12791, EN 1040 (or equivalent) issued by a laboratory.
Lot 2: Paper Products	• Report from an accredited laboratory on the grammage of paper in the finished product.
Lot 3: Brushes and Cloths	• Report on the testing of the product's resistance to chemicals and disinfectants issued by the competent authority.
Lot 4: Bags and Foils	• Confirmation of biodegradability of the bags issued by an accredited laboratory.
Lot 5: Laundry Detergents for Professional Machines	• Manufacturer's specifications and MSDS (Safety Data Sheets) in Serbian in accordance with the Chemical Substances Law and Regulation on Safety Data Sheets. • Proof of registration in the disinfectant washing process list issued by an accredited body. • Proof of health safety testing of the offered detergents issued by the competent institution. • Safety and technical data sheets for the offered products and copies of product labels.

Source: NALED

In this example, the contracting authority introduced green criteria into the public procurement process by specifying mandatory conditions for participation, which require the submission of documentation proving the implementation of relevant environmental protection practices and regulations.

4. Final Considerations and Recommendations for Strengthening the Business Community's Capacities

Green public procurement involves the application of environmental criteria aimed at reducing the negative impact on the environment during the procurement process, whether it's for goods, services, or works. The use of criteria such as life cycle cost, material composition, and quality helps ensure that public procurement contributes to sustainable development and more rational use of natural resources. Green public procurement is a process in which the public sector or contracting authorities seek to procure goods, services, and works with reduced environmental impact throughout their life cycle, compared to goods, services, and works that would otherwise be procured and perform the same primary function. Circular public procurement is the process by which contracting authorities purchase works, products, or services that contribute to closing the energy and material consumption loop through the supply chain while minimizing environmental impact and waste generation. Products with the highest potential for circularity in public procurement are those with average complexity and average technical lifespan. The greater the complexity of the product, the harder it is to reuse materials and components. On the other hand, the longer the technical lifespan of a product, the harder it is to ensure circularity at the end of its life. Some circular criteria that can be included in the tender documentation are: material recycling, reinstallation/reprocessing, reuse, service and repair, long lifespan models, multifunctionality, smart products, the use of non-toxic chemicals, etc.

The application of the Life Cycle Costing (LCC) methodology is crucial. It takes into account not only the purchase price but also estimates the costs incurred during use and after use, i.e., estimates the costs of consumables, labor, environmental impact, maintenance, and all costs arising from the end of use of the procurement item.

According to the Annual Report of the Public Procurement Directorate of the Republic of Serbia (ZEJN, 2020).the participation of public procurement in the GDP is between 8%-10%. In 2021, contracting authorities applied environmental aspects in 650 procedures (within technical specifications, award criteria, or special conditions for contract performance). However, this is still a small number of procedures, considering that in 2021, 182,998 contracts were concluded. Areas where the application of green public procurement is especially important and desirable include: public infrastructure construction, waste management, energy, and municipal services (heating, water supply). The most common public procurement items with integrated environmental aspects are: vehicle procurement, office materials, computer equipment, laboratory materials, lighting, construction materials, cleaning services, and chemicals.

Finally, considering the theoretical considerations, the current situation, and development perspectives, the following recommendations can be made to strengthen the business community's capacity through the application of circularity and green public procurement principles:

- Start with sustainable procurement by introducing minimal mandatory criteria for green public procurement.
- Foster dialogue with the public sector and market, network with suppliers and participants to develop circular business solutions that enable sustainable production and consumption.
- Explore examples of good practices and innovative monitoring approaches aimed at achieving positive results for society as a whole.
- Do not think about waste but about the product: how it is designed, how recyclable it is, how it is produced, and how environmentally friendly it is.

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ANALIZA STANJA ZELENIH JAVNIH NABAVKI NA PRIMERU SRBIJE I HRVATSKE

Rezime: Javne nabavke mogu se smatrati ključnim alatom za podsticanje zelenog rasta. Njihova uloga i značaj su se značajno promenili, čime su stekle specifične karakteristike. Cilj ovog rada je da predstavi koncept zelenih javnih nabavki naučnoj i stručnoj zajednici, kao alat za poboljšanje poslovnih rezultata, smanjenje zagađenja i zaštitu životne sredine. U istraživanju su analizirane definicije ovog pojma, njegova primena, te su prikazani primeri održivih praksi u Hrvatskoj i Srbiji. Rezultati istraživanja pokazuju da se modeli koje primenjuju zemlje Evropske unije mogu uspešno implementirati i u Srbiji, ali da je potrebno povećati ekološku svest i motivisati poslovnu zajednicu na primenu zelenih kriterijuma u postupcima javnih nabavki, čiji udeo u bruto domaćem proizvodu Srbije iznosi oko 10%.

Ključne reči: Zelene javne nabavke, zelena tranzicija, zeleni rast, trošakovi životnog ciklusa.