PRAKSE, PRILIKE I IZAZOVI U ZELENOJ NABAVCI I ZELENOJ PROIZVODNJI/ THE GREEN PROCUREMENT AND GREEN MANUFACTURING PRACTICES, OPPORTUNITIES AND CHALLENGES

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Sažetak
Ova istraživačka studija se bavi oblastima praksi zelene nabavke i zelene proizvodnje u kontekstu Bosne i Hercegovine, kao zemlje u razvoju. Kroz prepoznavanje imperativa održivog razvoja, posebno u regijama u procesu industrijalizacije, ovo istraživanje nastoji istražiti usvajanje i implementaciju ekološki odgovornih strategija nabavke i proizvodnje. Kroz sveobuhvatnu analizu postojeće literature i empirijskih podataka, studija ima za cilj da otkrije izazove, prilike i najbolje prakse povezane sa zelenom nabavkom i proizvodnjom u specifičnom društveno-ekonomskom i ekološkom pejzažu zemlje u razvoju. Korištenjem pristupa zasnovanog na upitniku, operativni menadžeri i menadžeri proizvodnje u malim i srednjim preduzećima (MSP) otkrili su koje prilike i izazove vide u zelenim praksama, kao i koje su prakse zelene nabavke i proizvodnje integrirane u poslovanje njihovih kompanija. Bacajući svjetlo na zamršenost zelenih praksi u nabavci i proizvodnji, ovo istraživanje nastoji ponuditi uvid koji može informirati kreatore politika, učesnike industrije i akademike, podstičući napredak održivih poslovnih praksi i doprinoseći široj globalnoj agendi održivosti.
Ključne riječi: *Zelena nabavka, zelena proizvodnja, održivost, održive prakse, zelene prakse*

Abstract
This research study delves into the realms of green procurement and green manufacturing practices within the context of Bosnia and Herzegovina, as a developing nation. Recognizing the imperative for sustainable development, particularly in regions undergoing industrialization, this research endeavors to investigate the adoption and implementation of environmentally responsible procurement and manufacturing strategies. Through a comprehensive analysis of existing literature and empirical data, the study aims to uncover the challenges, opportunities, and best practices associated with green procurement and manufacturing in the specific socio-economic and environmental landscape of the developing country. Through the utilization of a questionnaire-based approach, operation and production managers within small to medium enterprises (SMEs) unveiled the opportunities and challenges regarding green practices and which green procurement and manufacturing practices were integrated into their respective company operations. By shedding light on the intricacies of green practices in procurement and manufacturing, this research seeks to offer insights that can inform policymakers, industry stakeholders, and academics alike, fostering the advancement of sustainable business practices and contributing to the broader global sustainability agenda.
Keywords*: Green procurement, green manufacturing, sustainability, sustainability practices, green practices*

INTRODUCTION

At present, the majority of countries and companies across the globe are contending with a mounting array of challenges, including surging inflation in commodity prices, escalating sustainability risks, energy crisis, scarcity of skilled workers, the burgeoning unpredictability in demand and supply dynamics, and volatile geopolitical landscapes (Ahmić, 2023a). In the realm of sustainability risks, several critical concerns loom large, including the generation of hazardous waste, the proliferation of harmful chemicals, escalating global temperatures, unpredictable climate patterns, inefficient use and depletion of resources, food scarcity, and the exacerbation of human rights violations through industrial practices (Muhammad et al., 2016). Transition towards choosing green practices essentially involves a commitment to gathering knowledge, pursuing activities, and embracing ways of living that contribute positively to the health and sustainability of the environment. The impetus behind the rise of green procurement and green manufacturing practices stems from a confluence of factors, including heightened environmental consciousness, regulatory mandates promoting sustainability, consumer preferences favoring eco-conscious products, and the realization of the enduring economic advantages inherent in environmentally responsible practices.

Green procurement entails the incorporation of environmental criteria into purchasing decisions, supplementing traditional supplier selection factors such as quality, availability and price (Mahammadzadeh, 2012). A study conducted by McKinsey et al. (2021) asserts that around two-thirds of sustainable footprint by a typical company's can be traced back to its suppliers. Embracing green procurement practices not only fosters sustainability but also proactively diminishes regulatory risks amidst growing stringent environmental laws across supply chains (Wilhelm & Villena, 2021). Moreover, multinational corporations ought to adhere to global benchmarks like ISO 14001, which, although not legally binding, serve as essential prerequisites for operating across various regions, necessitating a structured approach to environmental management, encompassing procurement practices. Recognizing the concerns highlighted by the United Nations Environment Programme (UNEP, 2022), it's evident that one of the most significant barriers to the procurement of sustainable products is the perceived high cost associated with them. Conversely, green procurement and green manufacturing is believed to bolster corporate reputation, offering a competitive advantage in appealing to consumers and investors who prioritize sustainability.

In numerous industrialized regions across North America and Europe, manufacturers are legally obligated to manage the collection, recovery, and disposal of utilized packaging and products, leading to the emergence of concepts like "green supply chain (GSC)" and "reverse logistics" (Mitra and Datta, 2013). Manufacturers recognize the manifold immediate and long-term financial advantages of incorporating environmentally sustainable practices, including the development of energy-efficient components tailored for the automation industry. Implementing green techniques, such as reducing the carbon dioxide footprint, diminishing the release of particulate matter, minimizing water consumption, and managing the release of waste effluents not only mitigate environmental impact but also enhance firm performances (Ali and Haseeb, 2019).

Despite the increasing global recognition of Green Supply Chain Management (GSCM) practices (such as green procurement/manufacturing), its comprehension, representation, and application remain inadequate in developing nations like Bosnia and Herzegovina (BiH). This paper endeavors to contribute to the existing body of knowledge on green procurement and green manufacturing by delving into exploration of the opportunities, challenges and concrete green practices adopted by enterprises in Bosnia and Herzegovina.

1. GREEN PROCUREMENT MEANING AND PRACTIES

Green procurement, also known as environmentally preferable purchasing, refers to the intentional choice of eco-friendly materials, products and services that minimize their environmental footprint across all stages of their lifespan (Ahmić, 2023b). This includes taking into account factors such as the extraction of raw materials, distribution processes, energy efficiency, usage patterns, and eventual disposal, reusage and recycling. Besides acquiring eco-conscious products and services, green procurement also entails choosing contractors (suppliers) and incorporating environmental clauses into contracts (Nyachombamachira & Juma, 2016). Companies that select green procurement prioritize finding a harmonious balance among price-setting, quality, timeliness of delivery, and environmental concerns (Tan et al., 2016). Implementing green techniques like eco-certification, supplier partnerships for environmental targets, comprehensive environmental audits, designing products with recycling capabilities, and reducing the usage of harmful materials are essential for fostering sustainability within business operations (Zhu et al., 2007).

Blomea et al. (2013) underscored three main practices within green procurement: the process of selecting suppliers, the adoption of e-procurement methods, and the nurturing of supplier relationships for sustainability. By opting for suppliers aligned with their commitment to environmental responsibility, companies engage in a shared effort to diminish their ecological impact, as green suppliers prioritize strategies like waste minimization, resource preservation, and reliance on renewable energy sources. According to Guo and Tsai (2015) research, green supply chain suppliers were evaluated based on several criteria, including the use of eco-friendly materials in supplies, implementation of eco-design principles, adoption of environmentally friendly sales processes and packaging with minimal ecological impact, commitment to recycling and eco-responsible transportation methods. The evaluation process for suppliers typically hinges on the widespread acknowledgment of ISO 14001 certification standards, total quality management and the utilization of IT technologies (such as e-procurement) as fundamental pillars. E-procurement refers to the utilization of online platforms, software tools, and automated systems to effectively manage and optimize every stage of the procurement process, spanning from requisitioning items to processing final payments (Ahmić, 2023b). Particularly, authors Croom and Brandon-Jones (2005) characterized corporate e-procurement as the adoption of online service platforms to streamline traditional procurement processes, encompassing planning, supplier identification, ordering, payment transactions, and after-procurement evaluation and monitoring phases. Regarding the concept of green supplier development, it entails fostering a network of environmentally sustainable suppliers who collaborate with companies, transcending regulatory

compliance to collectively reduce supply chain ecological footprints, drive innovation, enhance resilience, and ensure viability in the long-run.

2. GREEN MANUFACTURING DEFINITION AND PRACTICES

Green manufacturing aims to revolutionize corporate processes, manufacturing practices, and stakeholder perspectives to mitigate the industrial repercussions of climate change and environmental challenges, empowering companies to bolster their prosperity, competitiveness, and financial gains, transcending mere ethical obligations. Manufacturers recognize the manifold immediate and enduring financial advantages of incorporating environmentally conscious practices (Leong et al., 2019). Green manufacturing, synonymous with green production, endeavors to modernize outdated production methods, opting for sustainable manufacturing solutions that minimize waste generation, requiring individuals to explore, develop, or utilize intelligent technologies to identify optimal practices for reducing their environmental impact. Closely related to green manufacturing is green Computing, also referred to as Green Technology, which has emerged as the forefront approach to efficiently utilize technology in production by significantly reducing environmental impacts through minimizing energy consumption, waste generation, and fostering sustainable development.

Dornfeld (2014) defined green manufacturing practices as those manufacturing methods that not only fulfill customer requirements but also adhere to environmental standards and regulations. Some of the green manufacturing practices involve:

- Energy efficiency improvements - involves the integration of energy-saving technologies and methodologies to reduce energy consumption throughout manufacturing operations.
- Green product design - the creation of environmentally-conscious products by selecting sustainable materials, maximizing resource efficiency, and considering environmentally-friendly disposal methods, all aimed at reducing environmental harm throughout the product's entire lifespan.
- Renewable energy adoption - involves integrating sustainable sources like solar, wind, or hydroelectric power into operations to diminish dependence on fossil fuels and mitigate greenhouse gas emissions.
- Waste reduction and recycling - encompass the deployment of tactics aimed at minimizing waste production and encouraging the recycling of materials, components, and by-products throughout the manufacturing operations.
- Lean manufacturing - involves the utilization of lean methodologies to optimize production procedures, eliminate waste by removing non-value-added activities, and enhance the effective utilization of resources.
- Employee training and engagement - involve offering instructional programs and cultivating an organizational culture that promotes environmental stewardship, motivating employees to actively engage in green manufacturing practices and ongoing improvement initiatives.

- Pollution prevention involves adopting strategies like controlling emissions, treating wastewater, and monitoring air quality to reduce environmental pollution originating from manufacturing processes.

3. OPPORTUNITIES AND CHALLENGES FROM GREEN PRACTICES IN BUSINESS

Embracing GSC practices (such as green procurement and green manufacturing) offers companies a bouquet of opportunities. Beyond just reducing their environmental footprint, it's a strategic move that can enhance their competitive edge. By prioritizing sustainable sourcing, companies can secure a more resilient supply chain, mitigating risks associated with resource scarcity and regulatory changes. Moreover, it opens doors to new markets and customers who prioritize eco-friendly products and services. Efficiency gains through waste reduction and energy optimization translate directly into cost savings, boosting profitability in the long run. Furthermore, commitment to sustainability fosters innovation, driving the development of greener technologies and processes. Ultimately, integrating green practices isn't just about corporate responsibility—it's a pathway to prosperity in a world increasingly demanding environmental stewardship.

Regarding challenges, one of the foremost hurdles is the initial investment required to overhaul existing practices and infrastructure. Implementing sustainable sourcing often demands capital expenditure, which can strain budgets, especially for smaller businesses. A significant barrier to the adoption of green practices is also the absence of support from upper management or a diminished commitment to sustainability, compounded by the failure to integrate green principles into the organization's overarching vision and mission (Appolloni et al., 2014). Additionally, finding suppliers who align with environmental standards and share the same commitment to sustainability can be like searching for a needle in a haystack. This challenge is compounded by the need for transparency and traceability throughout the supply chain—a daunting task given its complexity. Moreover, regulatory landscapes are ever-evolving, posing compliance challenges and the risk of penalties for non-compliance. Furthermore, while embracing green practices is commendable, it can sometimes clash with traditional business models and practices, requiring a cultural shift within the organization. Lastly, measuring and quantifying the impact of green initiatives can be tricky, making it difficult to demonstrate tangible returns on investment to stakeholders. Despite these challenges, companies that successfully navigate the green supply management maze stand to reap the rewards of enhanced brand reputation, resilience, and long-term viability in a rapidly changing world.

4. THE SCIENTIFIC APPROACH AND PORTRAYAL OF THE SAMPLE

This research study aimed to investigate the opportunities and challenges in adopting GSC practices, as well as the implementation of green procurement and green manufacturing practices specifically within small and medium enterprises located in Bosnia and Herzegovina. An

examination encompassed the participation of 37 operation and production managers. To collect responses, the questionnaire was distributed to managers via email. The questionnaire comprised questions structured in a Likert scale format ranging from 1 for "completely disagree" to 5 for "completely agree."

The analysis of the sample revealed that 65% of the managers were male, while 35% were female. The majority of managers (68%) fell within the median age range of 30-50 years, with the remaining managers (32%) belonging to the 51-60 age bracket. Regarding managerial positions, the overwhelming majority of respondents held roles as operation managers (57%), with production managers comprising the remaining 43%.

5. RESEARCH RESULTS

In this section, descriptive statistics are provided to illustrate the green procurement and manufacturing practices adopted by small and medium enterprises in Bosnia and Herzegovina, as outlined in Table 1. The findings of a study detailed in table 1. uncovered that operation/production managers viewed the greatest opportunity from adopting GSC practices in creating competitive advantage (mean=4.66; SD=0.625). Therefore, managers perceive green practices as a means to differentiate their products/services in the market, tapping into growing consumer preferences for environmentally sustainable options. This differentiation can help them gain a competitive edge and capture market share in increasingly eco-conscious consumer segments. Secondly, enhancing company's reputation and brand image in the market (mean=4.33; SD=0.733) was viewed as a huge opportunity of using GSC practices. Thirdly, managers viewed a large opportunity in improving employees' morale and productivity through engaging them in green initiatives (mean=4.20; SD=0.750). Other noteworthy opportunities presented by adopting GSC practices, which exhibited high mean values, included: attracting more customers; and creating new revenue streams. Even though long-term cost savings are an important consideration in adopting green practices, the most managers in BiH have a perception that adopting green practices requires significant upfront investment (enormous initial costs) in technologies, processes, or certifications; so they prioritize other immediate and tangible goals above it.

No.	The opportunities for firms to adopt the GSC practices	Mean	SD	Rank
1.	Enhancing company's reputation and brand image in the market.	4.33	0.733	2
2.	Long-term cost savings for our business.	3.41	0.834	6
3.	Improving quality and reliability of our products.	2.33	1.430	10
4.	Creating new revenue streams	3.66	0.820	5
5.	Enhancing operational efficiency	3.11	0.913	8
6.	Strengthening supply chain resilience	3.00	0.955	9
7.	Mitigating business risks	3.33	0.889	7
8.	Attracting more customers and boosts sales.	4.00	0.781	4
9.	Engaging employees in green initiatives improves morale and productivity.	4.20	0.750	3
10.	Creating competitive advantage	4.66	0.625	1

Table 1: The opportunities for firms to adopt the green supply chain (GSC) practices (Source: Author's work)

The challenges for adopting GSC practices within firms are displayed in the table 2. The operation/production managers perceived that the highest challenge in adopting GSC in firms involve unskilled leadership and low commitment demonstrated by top management (mean=4.54; SD=0.652). As the second greatest challenge was financial constraints (mean=4.33; SD=0.733), while on the third place was lack of knowledge and experience (mean=4.23; SD=0.764). Among other challenges of GSC practices in firms with high mean values were: change in attitudes and organizational culture; lack of resources (technological, material…); limited sustainable transportation options; and resistance from stakeholders within the organization.

No.	The challenges for firms to adopt the GSC practices	Mean	SD	Rank
1.	Unskilled leadership and low commitment demonstrated by top management	4.54	0.652	1
2.	Change in attitudes and organizational culture	4.11	0.789	4
3.	Lack of knowledge and experience	4.23	0.764	3
4.	Financial constraints	4.33	0.733	2
5.	Hardship in identifying reliable green suppliers	3.00	0.955	9
6.	The complexity of implementing green processes	3.50	0.881	8
7.	Resistance from stakeholders within our organization	3.66	0.840	7
8.	Lack of resources (technological, material…)	4.00	0.811	5
9.	Limited sustainable transportation options	3.78	0.834	6

Table 2: The challenges for firms to adopt the GSC practices (Source: Author's work)

Regarding green procurement practices which are already utilized in firms (table 3.), managers ranked first "using e-procurement methods" (mean=4.75; SD=0.611). The second most prevalent green procurement practice in companies based in BiH was using eco-friendly materials (mean=4.00; SD=0.813). The third most prevalent green procurement practice included supporting locally sourced products (mean=3.88; SD=0.854).

No.	Green procurement practices in your firm	Mean	SD	Rank
1.	Prioritizing suppliers who consider the environmental criteria	2.50	1.258	7
2.	Buying eco-friendly materials	3.65	0.876	4
3.	Using eco-friendly packaging	4.00	0.813	2
4.	Using e-procurement methods	4.75	0.611	1
5.	Commitment to green supplier development	2.75	1.104	6
6.	Supporting locally sourced products	3.88	0.854	3
7.	Establishing green procurement policies	3.33	0.941	5

Table 3: Green procurement practices in firms in BiH (Source: Author's work)

The green manufacturing practices in companies in BiH are illustrated on the table 4. The first place in the ranking belonged to the use of healthy and eco-friendly materials (mean=4.00; SD=0.813). Ranked second was fostering an environmental responsibility culture among

employees (mean=3.88; SD=0.854). Ranked third was applying green product design principles (mean=3.55; SD=0.879).

No.	Green manufacturing practices in your firm	Mean	SD	Rank
1.	Utilizing more energy-efficient technologies	3.30	0.912	4
2.	Minimizing waste in production processes	2.71	1.223	7
3.	Utilizing cleaner production	2.50	1.580	8
4.	Use of healthy and eco-friendly materials	4.00	0.813	1
5.	Utilizing renewable energy sources (solar…)	2.80	1.109	6
6.	Applying green product design principles	3.55	0.879	3
7.	Fostering an environmental responsibility culture among employees.	3.88	0.854	2
8.	Applying pollution prevention measures	3.00	0.955	5

Table 4: Green manufacturing practices in firms in BiH (Source: Author's work)

CONCLUSION

In conclusion, this research sheds light on the multifaceted landscape of green procurement and green manufacturing, uncovering a plethora of opportunities alongside formidable challenges. Both practices promise significant environmental and economic benefits. Managers viewed the largest opportunities in the following order: (1) creating competitive advantage; (2) enhancing company's reputation and brand image in the market; and (3) improving employees' morale and productivity through engaging them in green initiatives. Besides bright opportunities, successful implementation of green procurement and manufacturing hinges on overcoming challenges such as unskilled leadership and low commitment demonstrated by top management, financial constraints, lack of knowledge/experience and organizational culture shifts. Concerning green procurement practices that have been utilized in the firms in BiH, managers put on the first three places the next practices: (1) using e-procurement methods; (2) using eco-friendly packaging; and (3) supporting locally sourced products. Among the green manufacturing practices, the dominated ones in BiH companies were: (1) using healthy and eco-friendly materials; (2) fostering an environmental responsibility culture among employees; and (3) Applying green product design principles.

Specific recommendations at the enterprise level include:

- developing sustainable strategies (through defining clear and measurable goals for eg saving energy, reducing waste and using renewable resources);
- implementation of sustainability strategies (in all aspects of business, including production, procurement, logistics, marketing and sales);
- developing a green procurement business policy (give preference to suppliers with green practices and certified green products);

- managing resources efficiently (optimization of energy consumption through more efficient technologies/practices; and development of processes that minimize waste in production);
- using more environmentally friendly materials in business;
- raising awareness and work on employee education about the importance of sustainability and how they can contribute to green initiatives;
- transparently communicating the company's efforts and achievements in sustainability to all relevant interest groups (including employees, customers and the public);
- developing cooperation and partnerships with other companies, non-governmental organizations and research institutions in order to jointly improve green practices;
- joining and participating in global and local sustainability initiatives (such as the UN Global Compact or other industry sustainability groups); and
- seeking to obtain relevant environmental certifications (eg ISO 14001) to confirm commitment to sustainable practices.

At the state level, the recommendations go in the direction of: formulating clear policies and regulations (promotion of green procurement and production); introduction of financial incentives (subsidies, tax breaks for the adoption of green practices in business); organizing educational campaigns and programs to raise awareness of the importance of green business practices; promoting research and development (R&D) in the field of green technologies through public and private investments; promoting regional and international cooperation in order to exchange knowledge and experience and to jointly develop green policies and strategies; and providing technical assistance and advisory services through international organizations to help developing countries adapt and implement green practices.

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