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PREFACE

On behalf of the Scientific and Organizational Committee, it is my honor and great pleasure to present the Proceedings of the 2nd EUROSA International Conference, held on 15-18 May 2024 in Vrnjačka Banja, Serbia.

The papers contained in this Proceedings represent current scientific and professional informations in the field of sustainable management of occupational health and safety, environmental protection, fire protection and emergency situations and represent a mix of scientific research and professional opinion, shared with us by participants from academia and industry professionals.

We sincerely thank all the conference participants for their contribution, ensuring the success of the conference. Special thanks to all the participants of the round tables and panel discussions, keynote speakers, chairmen of the sessions and of course the reviewers for their invaluable contribution.

Last but not least, I would like to express my sincere gratitude to all members of the Scientific and Organizing Committee, whose efforts and work led to the successful realization of the EUROSA 2024 conference.

Vrnjačka Banja, May 2024

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BUILDING A CIRCULAR FUTURE IN SOUTHEAST EUROPE: A ROADMAP FOR SUSTAINABLE CONSTRUCTION PRACTICES

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Abstract: The objective of our study is to assess the feasibility of implementing circular economy (CE) concepts in the construction sectors of Serbia, Bulgaria, and Romania. Southeast European nations, especially Romania, possess significant potential for environmental and economic advancement due to his 33% adoption of circular economy methods in the Construction sector. As the Construction industry is not only using 3 billion tons of natural raw material annually but also generate 40% of the total waste generated worldwide. We contend that by adopting CE practices, these nations can substantially diminish pollution, promote resource efficiency, and cultivate sustainable development. CE activities such as deconstruction, material reuse, easy to maintain, and waste minimization provide a revolutionary perspective. They not only mitigate the environmental impact of the building industry by decreasing resource usage and pollution, but also generate economic prospects. The implementation of CE innovation in building materials and processes has the potential to result in reduced construction costs across the whole lifespan of a project. In addition, a circular construction sector stimulates employment by generating new job opportunities in waste management, material refurbishment, and deconstruction services, so enhancing overall workforce participation. Nevertheless, harnessing this capacity necessitates a comprehensive and diverse strategy. Governments have a crucial role in implementing rules that provide incentives for investors and construction companies to adopt circular processes. These could include tax incentives for utilizing recycled materials, financial support for deconstruction training, and rules that encourage trash reduction. This study explores the distinct difficulties and possibilities encountered by each nation in Southeast Europe. Southeast Europe can establish itself as a frontrunner in sustainable construction by adopting CE. This will lead to a cleaner environment, a prosperous economy with more jobs, and improved resource efficiency and health and safety standards for construction workers.

Keywords: *Circular Economy; Southeast Europe; Construction sector; Sustainability.*

INTRODUCTION

The construction industry, a cornerstone of civilization and progress, is facing a stark reality. Its reliance on a linear "take-make-dispose" model, responsible for a staggering 3 billion tons

of raw material consumption and 40% of global waste generation annually, is simply unsustainable (Ghaffar et al., 2020a). This research delves into the transformative potential of the circular economy (CE) as a solution for the burgeoning Southeast European nations of Serbia, Bulgaria, and Romania. It explores the feasibility, challenges, and opportunities associated with implementing CE principles in the region's construction sector, paving the way for a more sustainable future (Leider and Rashid, 2016).

The construction industry is a double-edged sword. While it provides the critical infrastructure and shelter that underpins human societies, its environmental impact is undeniable. The insatiable demand for raw materials – from concrete and steel to timber and glass – exerts immense pressure on natural resources. These extraction processes often disrupt ecosystems, cause deforestation, and contribute to greenhouse gas emissions. Furthermore, the construction industry generates a colossal amount of waste throughout its lifecycle. Demolition debris, construction waste from unused materials, and end-of-life building components contribute significantly to overflowing landfills and environmental pollution. This waste often contains hazardous materials like asbestos, lead, and harmful chemicals, posing significant health risks for workers and communities alike. The traditional "take-make-dispose" model prevalent in construction necessitates a transformative shift (Geissdoerfer et al., 2020).

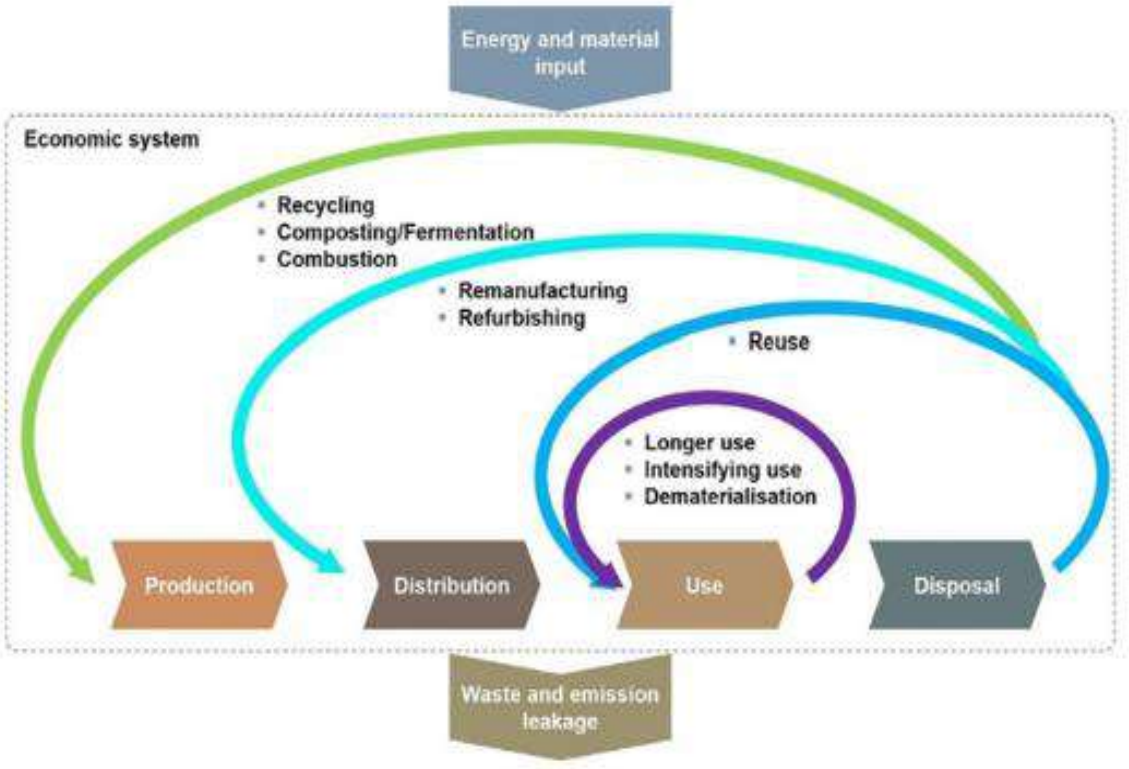

Figure 1. Circular economy model (Geissdoerfer et al., 2020).

The circular economy (CE) offers a compelling alternative, emphasizing the reduction of waste, the circulation of materials at their highest value, and the regeneration of natural resources. CE

principles encourage a closed-loop system where materials are retained within the economic system rather than being discarded at the end of their lifespan (Ghisellini et al., 2016). This involves practices like: Deconstruction (Dismantling buildings in a controlled way to salvage and reuse valuable materials like bricks, timber, and metals) and Material Reuse (Reintroducing salvaged materials into new construction projects or repurposing them for different applications). Design for Easy Maintenance (Extending the lifespan of buildings through innovative design that facilitates repairs and upgrades, minimizing replacement needs). Waste Minimization (Implementing strategies like prefabrication, modular construction, and efficient material utilization to reduce waste generation at the source).

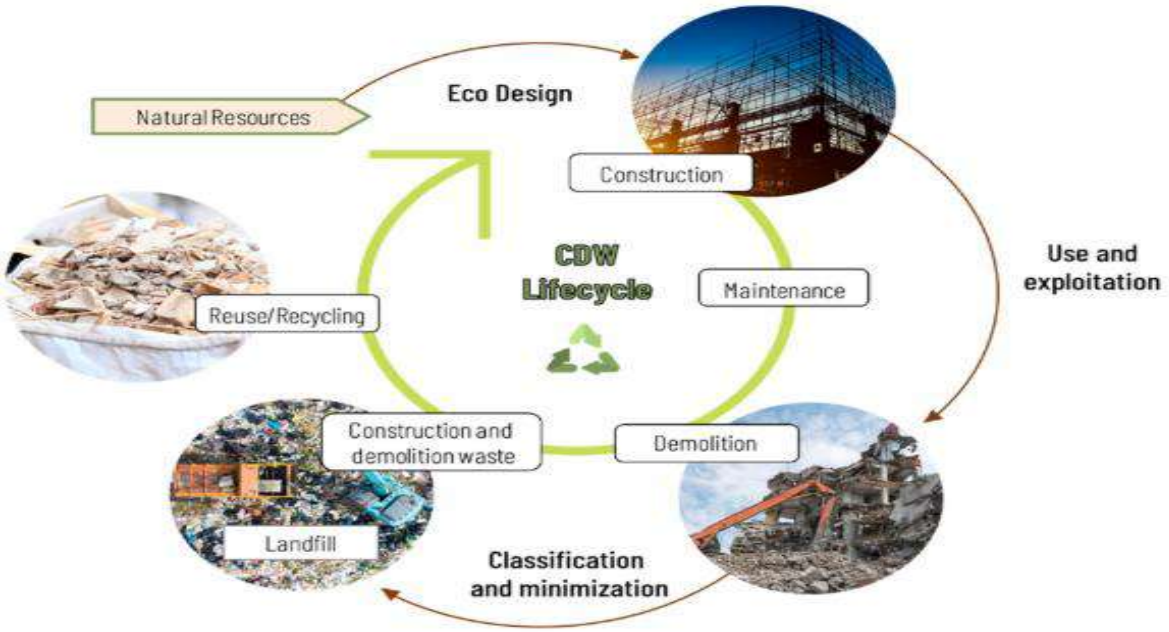

Figure 2. Circular economy in construction sector (Bullejos, 2009).

Southeast European nations like Serbia, Bulgaria, and Romania stand to gain immense advantages by embracing CE principles in their construction sector. Here's a closer look at the potential benefits: Environmental Sustainability: CE practices lead to a significant reduction in resource extraction, lowering environmental impact and contributing to climate change mitigation efforts. By prioritizing waste reduction and material reuse, the building sector's contribution to landfill waste diminishes, leading to cleaner air, soil, and water resources (Prieto-Sandoval et al., 2018). Economic Growth: The focus on material reuse and refurbishment creates new business opportunities in areas like deconstruction services, material recovery and processing and innovative building product development. Additionally, the use of recycled materials can potentially lower construction costs, making projects more affordable and increasing investment in sustainable infrastructure (Kamal et al., 2019). Resource Efficiency: CE promotes a shift from a "virgin material first" approach to maximizing the value of existing resources. This fosters resource security, minimizing dependence on volatile global

markets for raw materials. Innovation: The transition to a circular construction sector necessitates innovation in building materials and processes. This fosters the development of new technologies like prefabrication, modular construction, and life-cycle assessment tools, leading to advancements in the overall efficiency and sustainability of the industry. Employment Opportunities: Implementing CE principles creates new jobs in areas like deconstruction, material refurbishment, waste management, and the development of innovative building products and services (Sui et al., 2020). This fosters a more diversified and skilled workforce, contributing to economic growth and social well-being.

While the potential benefits of CE are undeniable, the Southeast European nations present unique challenges and opportunities for implementation. Serbia: With a growing construction industry but limited experience with CE practices, Serbia holds significant potential. Policy incentives for using recycled materials, coupled with investment in deconstruction training programs, can provide a crucial impetus (Soltmann et al., 2015; Vranjanac et al, 2023). Bulgaria: Bulgaria boasts a relatively mature recycling industry, presenting a solid foundation for adopting CE principles in construction. However, overcoming resistance from established construction companies accustomed to traditional practices remains a challenge. Romania: Romania's potential for CE implementation is particularly high, with estimates suggesting a 33% adoption rate achievable in the construction sector. However, overcoming bureaucratic hurdles and fostering collaboration between government, industry, and academia is key.

RESULTS AND DISCUSSION

Data is taken from the Flash Eurobarometer 498 survey released in their report for November-December 2021 SMEs, green markets and resource effiency on Basic bilingual questionnaire by Ipsos European Public Affairs and we have taken data for only Southeast European countries (Serbia, Romania, and Bulgaria) that shows different levels of reported changes in specific practices concerning SMEs and resource efficiency.

Table 1: Circular Economy Practices in SMEs' of Southeast European Countries

	Selling your residues and waste to another company			Recycling, by reusing material or waste within the company			Designing products that are easier to maintain, repair or reuse		
	Serbia	Romania	Bulgaria	Serbia	Romania	Bulgaria	Serbia	Romania	Bulgaria
Agri-food	8	8	72	2	3	65	6	4	42
Construction	**47**	**80**	**515**	**37**	**89**	**740**	**23**	**68**	**460**
Cultural and creative industries	4	15	68	6	13	122	5	10	70
Digital	4	4	47	10	10	115	2	10	84

Electronics	3	1	40	0	3	55	1	2	49
Energy - renewables	7	9	81	8	9	97	7	7	60
Health	2	2	19	4	4	34	3	1	16
Mobility - Transport - Automotive	31	27	259	15	27	293	12	21	152
Retail	42	68	344	32	56	581	17	41	291
Textile	8	11	27	6	7	48	4	8	40
Tourism	1	1	7	0	3	12	0	1	7
Not applicable	13	15	291	12	11	377	7	13	179

Source: The Flash Eurobarometer 498 survey, November-December 2021

From Table 1, all the sectors are complying the CE practices in southeast European countries but the share of Construction sector is more than any other sector. We can say that Bulgaria had the largest recorded rise in selling residues and garbage to another company in construction sector as well as other industries, followed by Romania and then Serbia. Nevertheless, all three countries have a significant amount of small and medium-sized enterprises indicating growth in this behavior. Bulgaria is dominating in all green initiatives as their number of firms are 10 times higher than Romania and Serbia which are recycling through the reuse of materials or garbage within the company as well as selling residues to other companies or designing products which can be repair or reused. However, if we look towards the ratio of SMEs in all three countries according to turnover in last two years (2019 - 2021) is different to each other. To check that, whether the SMEs' practicing CE also have increase in their turnover, so that we can recommend the policy accordingly to the lawmakers in southeast European countries.

Table 2: Change in Revenue due to Circular Economy Practices in SMEs' of SE EU Countries

Over the past two years, has your company's annual turnover increased, decreased or remained unchanged? Due to Circular Economy practices	Serbia	Romania	Bulgaria
Increased	236	383	3114
Decreased	96	229	1845
Remained unchanged	127	131	1749
Not applicable	1	13	57
Don't know/No Answer	6	9	234

Source: The Flash Eurobarometer 498 survey, November-December 2021

According to the data in Table 1, a substantial number of enterprises in Bulgaria (3114), Romania (383), and Serbia (236) experienced a growth in their turnover because of implementing Circular Economy methods. This implies that circularity could have a beneficial effect on the economy. Additionally, there are companies who have reported a decline or no alteration in their turnover. A significant proportion of enterprises in Bulgaria either lacked knowledge or declined to provide an answer to the question. This may suggest a deficiency in awareness or challenges in quantifying the influence of circularity on their operation. In general, the table offers intriguing insights about the perceived influence of Circular Economy on firm revenue in Southeast Europe. Therefore, it can be inferred that the implementation of corporate environmental standards has led to an increase in the rate at which companies are replaced or changed in the past two years. However, we must delve further into determining which types of SMEs possess the capacity to embrace CE practices. Therefore, we will categorize them based on the aggregate revenue generated by each company in the year 2020.

Source: The Flash Eurobarometer 498 survey, November-December 2021

Figure 3. SMEs' of Southeast European Countries total turnover in 2020

From Figure 3, SMEs' total turnover in 2020, the data provides insights into how businesses in Serbia, Romania, and Bulgaria are implementing sustainable practices. The majority of larger businesses with annual revenue above two million euros sell garbage and residues to other businesses, mostly in Bulgaria, and less in Romania, and Serbia. Larger SMEs are more likely to recycle, particularly by reusing trash or resources inside the company. Out of all turnover categories, Bulgaria has the highest recycling rates. Larger SMEs are more involved in producing products that are easier to maintain, repair, or reuse; Bulgaria leads all turnover

categories. These findings show that the commitment to implementing sustainable practices increases with business turnover, with Bulgaria continuously leading the way in this regard. In conclusion, we can say that SMEs' of Total turnover between 1 to 50 million euros are the best performer in CE practices.

CONCLUSION

Our examination of construction in Southeast Europe indicates a positive outlook for the implementation of Circular Economy (CE) strategies, especially among small and medium-sized firms (SMEs). Although all three nations (Serbia, Romania, and Bulgaria) show considerable involvement of the construction sector in the circular economy, Bulgaria stands out for its leadership in selling wastes, product reusability, and recycling. Nevertheless, there is still a lack of understanding, as certain companies remain uncertain about the consequences. In order to tap into this potential, policymakers have the ability to develop specific assistance programs and provide financial incentives for small and medium-sized enterprises (SMEs). They can also establish platforms for exchanging expertise and examine Bulgaria's achievements in order to provide customized recommendations. Enhanced data collecting is equally essential. Companies, however, should perceive CE as a strategic benefit, cooperate within the industry, and monitor the consequences of their actions. Through the cultivation of a nurturing atmosphere, the exchange of knowledge, and cooperation, Southeast Europe has the ability to fully realize the advantages of circularity in building. This will result in a more sustainable and resource-efficient future for the area, as well as contribute to a worldwide transition towards a circular economy.

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