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National Skills Gaps and Needs Analysis: Serbia

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Abbreviations and glossary of terms

AI	Artificial Intelligence
AT	Austria
ASP	Associated Strategic Partners
BH	Bosnia and Herzegovina
BG	Bulgaria
CE	Circular Economy
CZ	Czech Republic
DE	Germany
DR	Danube Region
EU	European Union
HR	Croatia
HU	Hungary
i4.0	Industry 4.0
IoT	Internet of Things
LCA	Life Cycle Assessment
LP	Lead Partner
MD	Moldova
NGO	Non-Government Organization
PP	Project Partner
R&I	Research and Innovation
RO	Romania
RS	Serbia
S3	Smart Specialization
SK	Slovakia
SL	Slovenia
SME	Small and Medium Enterprises
SO	Specific Objective
STEM	Science, Technology, Engineering, and Mathematics

1 Executive summary

The share of women entrepreneurs among the total number of entrepreneurs has been increasing over the past fifteen years. The latest data shows that women now represent 31.2% of all entrepreneurs in Serbia. Despite this, their share is still undervalued considering women make up 51.4% of the total population and are predominant among graduates. Women form the majority in several academic fields, including Health (71%), Arts (68%), and Science (66%), whereas men are more represented in Engineering, Manufacturing and Construction (57%), Information and Communications Technology (ICT) (66%), and Services (56%).

Comparative data from 2011 and 2021 reveal significant changes in the sectoral structure of women's businesses in Serbia. The proportion of female entrepreneurs in the trade and catering sectors has declined, while their presence in the ICT sector, real estate, and particularly in professional, scientific, technical, and innovative activities has grown. Additionally, there has been an increase in businesses within the administrative and social services sectors, mainly driven by a rise in ventures in education and healthcare. A slight uptick in women's involvement in the construction industry is also noteworthy, suggesting an emerging trend of women entering a traditionally male-dominated field.

Unfortunately, women do not predominate in any of the priority areas of smart specialization. However, it is promising that the participation of women entrepreneurs in the ICT sector and knowledge-based industries has been rising in recent years. The survey, conducted on a diverse sample of 35 respondents, primarily from the Food and Agriculture and Manufacturing and Production sectors (each comprising 16.3%), as well as other sectors like Healthcare, indicates that the principles of the Circular Economy (CE) are becoming increasingly common.

Most respondents are familiar with the general concept of CE and employ various strategies to minimize waste and pollution in their products and processes. Many practice repair, refurbishment, reuse, recycling, and the regeneration of natural systems to restore their energy and material sources. They also favor rethinking business models to promote using products as services (e.g., leasing instead of owning) to maximize resource utilization. There is strong support for using renewable, recyclable, or biodegradable resources to sustain circular production and supply chains. Their primary motivation for adopting CE principles is the need

to meet consumer expectations for green/circular products and services, as well as to reduce raw material costs. However, to expand the use of CE principles, they require more knowledge and financial support.

The report also provides insights from the stakeholders' perspectives. The Serbian project team conducted five interviews with stakeholders, including representatives from diverse sectors such as policymakers, industry experts, business support organizations/NGOs, academia/research institutions, and training educational organizations. Consistent with the results of the desk research and survey, stakeholders emphasized the importance of skills development, networking, and idea exchange among stakeholders to bridge existing gaps in support structures and enhance women's entrepreneurship (WE) understanding of how their businesses can benefit from innovative business models related to the Circular Economy (CE), Smart Specialization Strategy (S3), Industry 4.0 (i.4), and digital transformation.

A success story from Serbia highlights a female entrepreneur who exemplifies a successful twin transition, integrating digital and green transformation not only in her business but also in consumer purchasing behavior and the practices of retail chains, primarily corporations. These corporations play a crucial role in the implementation of digital and green technologies.

According to desk and field research, women entrepreneurs in Serbia generally have a positive attitude toward digital technologies and CE principles. They are much more active in using digital technologies, a trend that has intensified since the COVID-19 pandemic, compared to CE principles, which they view as relatively new.

2 Introduction

This National Report for the Republic of Serbia is an integral component of the Transnational Skills Gaps and Needs Analysis, aimed at dissecting the unique barriers and opportunities that lie within Serbia's transition to a more circular, innovative, and digital economy. Through a meticulous examination of the current state, this report endeavours to illuminate the path forward, identifying specific needs and proposing strategic interventions to empower women entrepreneurs in the realm of CE, S3, and i4.0.

Amidst the backdrop of a global pandemic and shifting geopolitical landscapes, the urgency for this analysis has never been greater. The resilience and agility of economies hinge on its ability to harness the potential of its female entrepreneurs, equipping them with the skills and knowledge to thrive in an increasingly competitive and sustainable marketplace.

This report synthesizes data collected from a comprehensive survey, stakeholder interviews, and case studies, offering a nuanced understanding of the skills landscape in Serbia. The objective is not only to chart the existing skills gaps but also to forge a roadmap for capacity building, policy intervention, and collaborative action that aligns with the nation's aspirations for economic revitalization and gender equity in entrepreneurship.

As we delve into the findings and recommendations herein, it is our hope that this report will serve as a catalyst for concerted efforts to bridge the skills divide, fostering an environment where women entrepreneurs can lead the charge towards a brighter, more sustainable future.

3 Methodology

Desk research, surveys, stakeholder interviews, case studies, and comparative analysis are used for to ensure a robust and inclusive analysis. By employing a multi-dimensional methodology, a detailed and nuanced understanding of the skills gaps and needs among women entrepreneurs in the Danube Region is aimed to be provided. This approach

ensures that the analysis is both broad in its scope and specific in its findings, providing a solid foundation for the development of effective support strategies for the transition towards a more sustainable, digital, and circular economy.

Approached applied	Description of the performed task
Desk research	As part of the desk research, studies and research on women's entrepreneurship in Serbia were analysed to present the state of women's entrepreneurship in Serbia. The Ministry of Economy of the Republic of Serbia published a comprehensive study in 2021/2022, which includes quantitative data that has been regularly published on the Business Register Agency website since 2021. Additionally, data regularly published by the Statistical Office of the Republic of Serbia was analysed. Furthermore, documents related to the circular economy and waste management, which fall under the domain of the Ministry of Environmental Protection, were also consulted. Not all documents or strategies were used in the description of the state, but they were read and therefore listed in the references. The list of references includes: 1. Review of Law on Waste Management of the Republic of Serbia, Transposition and implementation of environmental and climate change acquis - chapter 27: status and plans (https://www.pregovarackagrupa27.gov.rs/wp-content/uploads/2021/06/Post-screening-ENG.pdf), 2. Municipal waste management - Country fact Sheets Serbia (European Environment Agency, (www.eea.europa.eu), 3. Waste management program of the republic of Serbia for the period 2022-2031 (https://www.ekologija.gov.rs/sites/default/files/2022-03/program_upravljanja_otpadom_eng_-_adopted_version.pdf),

4. List of regulations- Law on Waste Management , pg. 6 (https://www.ekologija.gov.rs/sites/default/files/inline-files/List_of_regulations.pdf),
5. The national waste management strategy for the period 2010-2019 (<https://www.pregovarackagrupa27.gov.rs/wp-content/uploads/2021/06/Waste-management-strategy-for-the-period-2010-19.pdf>),
6. Babović, M. (2022). *Preduzetništvo žena u Srbiji - deset godina kasnije*. UN Women, Srbija.
7. Popović-Pantić, S. (2020). Dve decenije ženskog preduzetništva u Srbiji. Beograd: Institut Mihajlo Pupin,
8. Women and Men in Serbia, Statistical Office of the Republic of Serbia, 2020, https://www.stat.gov.rs/media/5804/wm-in-the-rs-2020_webopt.pdf
9. Statistical Office of Serbia, <https://www.stat.gov.rs/en-us/vesti/statisticalrelease/?p=13622>, accessed June 2024
10. Serbia Country Profile, <https://www.bbc.com/news/world-europe-17907947>
11. Adult Education Survey, 2022., Statistical Office of the Republic of Serbia, <https://www.stat.gov.rs/enUS/oblasti/obrazovanje/obrazovanje-odraslih-i-celozivotno-ucenje>
12. Women and Men in Serbia, Statistical Office of the Republic of Serbia, 2020, https://www.stat.gov.rs/media/5804/wm-in-the-rs-2020_webopt.pdf
13. Smart Specialization Strategy of Serbia, https://pametnaspecijalizacija.mpn.gov.rs/wp-content/uploads/2021/06/Strategija-pametne-specijalizacije_EN_WEB.pdf

Survey among women entrepreneurs	The analysis incorporates results from survey conducted among women entrepreneurs from Serbia. It was organized in the period 24/04/2024 – 31/05/2024. 35 of respondents were identified from different sectors and questionnaires were provided to them by Survey Monkey platform. The survey provides both quantitative data and qualitative insights to analyse prevailing skills gaps and needs. 35 of responses are collected which is equal to 19% responding rate and could be accepted as quite sufficient for the main goal of the current Analysis.
Stakeholders interview	The Serbian project team conducted five interviews with stakeholders, including representatives from diverse sectors such as policymakers, industry experts, business support organizations/NGOs, academia/research institutions, and training educational organizations. Interviews reflect the perceptions and suggestions for facilitating a successful s3 and i4.0 transition within the CE aspects of WEs in Serbia.
Successful case interviews	One Success story is presented. It highlights a female entrepreneur who exemplifies a successful twin transition, integrating digital and green transformation not only in her business but also in consumer purchasing behaviour and the practices of retail chains, primarily corporations. These corporations play a crucial role in the implementation of digital and green technologies.

To effectively understand the dynamics of the skills gap and needs within Serbia, a carefully curated sample of women entrepreneurs and female-led start-ups has been selected for this study. This sampling approach is designed to ensure a comprehensive analysis that reflects the diverse sectors and regions within the country. By examining a representative cross-section of businesses, this investigation aims to identify prevalent challenges, opportunities for growth, and specific skills necessary for thriving in the realms of the Circular Economy, Smart Specialization, and Industry 4.0. This methodological step is crucial for deriving actionable insights and tailored recommendations that will empower women entrepreneurs to navigate and succeed in the evolving economic landscape of Serbia.

In the following text, a detailed structure of the sample comprising women entrepreneurs who participated in the survey is presented, along with the demographics of the interviewees, and an illustrative case study.

4 SERBIA

4.1 General presentation of Serbia

4.1.1



4.1.1 Serbia became a stand-alone sovereign republic in the summer of 2006 after Montenegro voted in a referendum for independence from the Union of Serbia and Montenegro.¹

The end of the Union marked the closing chapter in the separation of the six republics of the old Socialist Republic of Yugoslavia, which was proclaimed in 1945 and comprised Serbia, Montenegro, Slovenia, Croatia, Bosnia-Herzegovina and Macedonia.

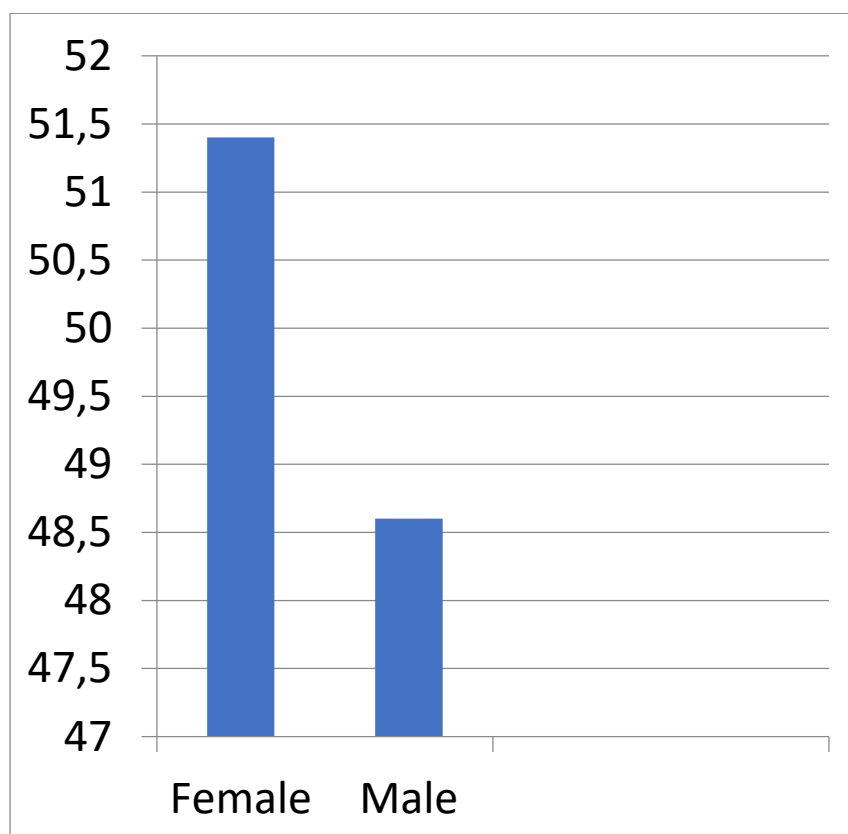
4.1.1 Over 2002–2022, the number of population of the Republic of Serbia was continuously decreasing. At regional level, Belgrade region was the only one to record population growth up to the year 2020, but this trend has changed since 2021. In all other regions population was declining over the whole observed period. The total population of Serbia is **6 647 003 (2022)²**.

¹ Serbia Country Profile, <https://www.bbc.com/news/world-europe-17907947>,

² <https://www.stat.gov.rs/en-us/vesti/statisticalrelease/?p=13622>

4.1.2 Figure 1. The structure of the population in Serbia per gender

51.4% were women (3 423 627), and 48.6% were men (3 240 822) in July 2023.

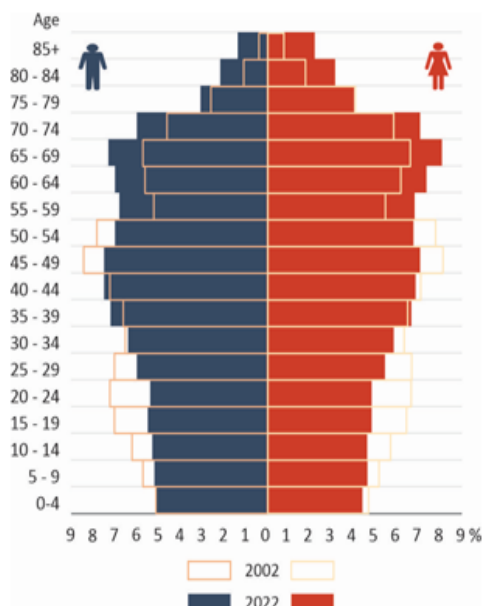


Source: Author's research

4.1.3 Age structure per gender

Apart from the changes in the total number of population, there is an evident change in the population age-sex structure, which is best visible in the age pyramid. In 2002, the population of both sexes aged 45-49 was the most represented, while in 2022 the largest shares in the total population were those of men aged 40-44, and women aged 65-69.

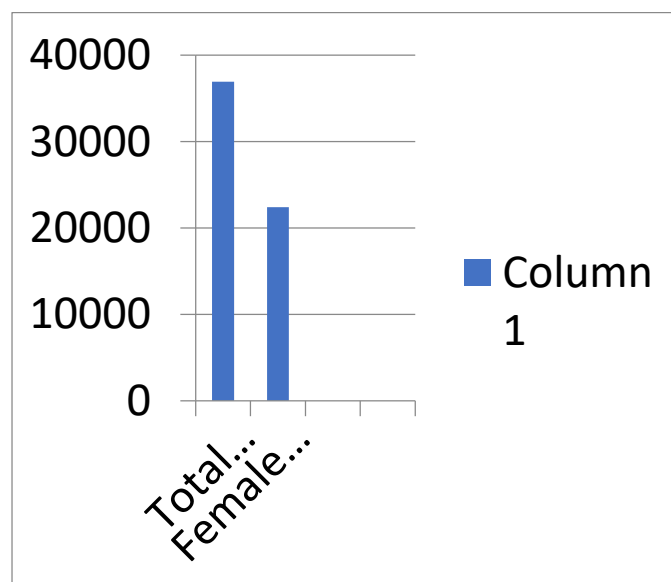
Figure 2. Population age-sex structure, 2002 and 2022



Source: Statistical Office of Serbia, 2022.

4.1.4 Educational level per gender

Figure 3. Graduated students: Total in 2022- 36951, Women – 22435



Source: Author's research

According to the Adult Education Survey (AES)³, there was 22493 graduated female students (60,9%) among the total of 36951, in 2022.

In this round of the survey, the sample was extended to include young people (aged 18-24), for whom the data show that more than two-thirds (67.8%) participate in some kind of formal or non-formal education and training. More than half of respondents of this age (58.2%) participates in formal education, while 29.9% of them participate in non-formal education.

Table 1. Share of respondents aged 18-24 in formal and/or non-formal education and trainings (%)

	Total	Males	Females
Share in formal and/or non-formal education and training	67.8	67.2	68.4
Share in formal education	58.2	54.5	62.3
Share in non-formal education and training	29.9	26.9	33.2

Source: Adult Education Survey (AES), 2022.⁴

When it comes to adults, the situation is significantly different. According to the results obtained, the **participation rate of adults (25-69 years) in some form of formal or non-formal education or training is 19.9%** and is almost identical as in the previous survey cycle in 2016, when it was 19.8% (AES, 2022).

Women (21.3%) are more represented than men (18.4%) in some form of education and training in the 12 month period preceding the survey. Unlike young people, adults more often participate in non-formal education and training (17.4%), while only 3.7% participate in formal education (ibid).

Observed according to the level of acquired education and employment status, the data show that both women and men who are employed and have completed upper-secondary school most often participate in lifelong education.

³ **AES** was conducted for the third time in the Republic of Serbia in 2022 according to Eurostat standards and methodology.

⁴ Adult Education Survey, 2022., Statistical Office of the Republic of Serbia, <https://www.stat.gov.rs/en-US/oblasti/obrazovanje/obrazovanje-odraslih-i-celozivotno-ucenje>

Inclusive education in primary schools covers significantly more boys than girls (according to the individual education plan, the proportion of girls to boys is roughly one to two) (Statistical Office of the Republic of Serbia, 2020). „The proportion of boys to girls graduating from three-year secondary vocational schools is three to one. Girls are more numerous in the fields of education: Textile and leatherwork, Personal services and Health and social work. Among the students who complete general secondary four-year education (high school), there are more girls (58%) than boys (42%). Also, girls make majority among students who complete secondary vocational four-year schools (53% girls to 47% boys). Boys are more numerous in the fields of education: Electrical engineering, Mechanical engineering and metalworking, Geodetics and construction, Transport, Forestry and woodworking, and Geology and mining. More women enrol and complete tertiary education (higher schools and university).. Among the graduate students in 2019, women accounted for more than a half of all graduates in a large number of fields of education, while men are dominant in the fields of: Information and communications technology/ICT (66%) and Engineering, manufacturing and construction (61%). In 2019, more women (57%) than men (43%) became holders of PhD degrees. Women make majority in many academic fields such as Health (71%), Arts (68%), and Science (66%), while men are more represented in: Engineering, manufacturing and construction (57%), Information and communications technology/ICT (66%) and Services (56%). Men are dominant among the members of the Serbian Academy of Science and Art (SANU). In 2020, over 90% of all members are men. Among employed in the field of R&D, in 2018 women are dominant with a 51% share. Almost the same proportion is among scientific researchers, i.e. women make 51.4%. The largest participation of women researchers is in medical sciences, 58.6%, and the smallest participation is in engineering and technology (40%). In the most of age groups, women are more computer-literate than men. In older age groups, there are more men among computer users. The majority of internet users are also women (Statistical Office of the Republic of Serbia, 2020).⁵

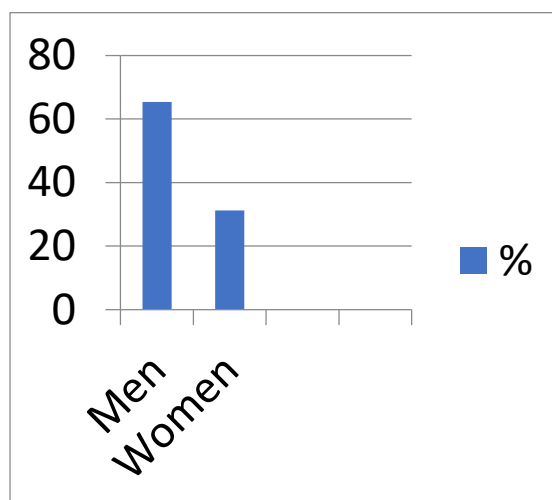
4.1.5 Owned companies per gender

In the period between 2011 and 2021, there was an increase in the share of women in the total number of entrepreneurs (including registered entrepreneurs

⁵ Women and Men in Serbia, Statistical Office of the Republic of Serbia, 2020, https://www.stat.gov.rs/media/5804/wm-in-the-rs-2020_webopt.pdf

and persons who are simultaneously (co)owners and main representatives of companies) from 28.9% to 31.2% (Babović, 2022)⁶.

Figure 4. Owned companies per gender



Source: Author's research

Table 2. Active enterprises by gender of owner/administrator during 2016-2020.

		2016	2017	2018	2019	2020
Total		228 556	242 094	257 629	271 210*	278 984
Men	N	149 509	158 150	168 519	177 665	182 396
	%	65.41	65.32	65.41	65.50	65.38
Women	N	75 165	79 917	84 847	89 087	92 046
	%	32.89	33.01	32.93	32.85	31.20

⁶ Babović, M. (2022). *Preduzetništvo žena u Srbiji - deset godina kasnije*. UN Women, Srbija.

4.2 Female entrepreneurial ecosystem in Serbia

Historically, women's entrepreneurship in WB economies developed through a period of crises since 1990 (Popović-Pantić, 2020)⁷. The war and inflation impacted economies causing many women to enter into entrepreneurship by need, which significantly affected the sustainability of their companies. The inclusion of women in Serbian entrepreneurship officially began after the creation of legal conditions with the entry into the period of post-socialist transformation, among which the Law on Small Enterprises from 2008 is particularly significant. Since this period, various support programs for small and medium enterprises have been developed. Over time, among the users of these programs, more and more women and young people appeared who represent opportunities, and not entrepreneurs of necessity, that is, who chose entrepreneurship as a result of their own choice, and not as a last chance on the labor market (Popović-Pantić)⁸.

Considering the state of the play of women's entrepreneurship in Serbia during the two last decades, we can say that women's entrepreneurship in Serbia has gone through a long transition from social to economic, developmental category and is exposed to a constant risk of returning to the level of social category. The basic characteristic of women's entrepreneurship as a social category is that the motivation to enter entrepreneurship is a necessity and not an opportunity (Popović-Pantić, 2020)⁹. But, according to the latest research, conducted during 2022. (Babović, 2022)¹⁰, the motivation has also changed so that women today enter entrepreneurship with the desire to explore new opportunities and chances and not because of necessity. In the last decade (2011 -2022), there have been other significant changes, both in the scope and in the structure of women's entrepreneurship.

Scope of women entrepreneurship

The share of women's companies, defined as a company with at least 1% of female ownership or managerial position, was 25.8% of the total number of MSMEs according to the first comprehensive study on women entrepreneurship published in 2012 (Babović,

⁷ Popović-Pantić, S. (2020). *Dve decenije ženskog preduzetništva u Srbiji*. Beograd: Institut Mihajlo Pupin.

⁸ Popović-Pantić, S. (2020). *Dve decenije ženskog preduzetništva u Srbiji*. Beograd: Institut Mihajlo Pupin

⁹ Popović-Pantić, S. (2020). *Dve decenije ženskog preduzetništva u Srbiji*. Beograd: Institut Mihajlo Pupin.

¹⁰ Babović, M. (2022). *Preduzetništvo žena u Srbiji - deset godina kasnije*. UN Women, Srbija.

2012)¹¹. In December, 2021, Serbian Ministry of Economy launched the second comprehensive research on women's entrepreneurship, in order to assess the state of play in this field. However, the criteria applied in the calculation of the share of women entrepreneurs in the total number of MSME has changed, as the definition of UNWOMEN was adopted in 2021 which states that, *'to qualify as a women-owned business, a business must be owned in whole, or at least more than half, by one or more women'* (UNWOMEN, 2017)¹². This has led to the share of women's enterprises in the total number of MSME being calculated as 31,2% in 2021 (Babović, 2022). This increase could be attributed mostly to subsidies/aid which have been available to women-owned companies since 2007 on a regular basis within institutional support programs for entrepreneurship. A broad range of supporting measures and financial and non-financial supporting programs have been implemented since then.

But the fact is that the scope of women's entrepreneurship in Serbia has not been recorded on a regular basis and it has not been part of the regular statistical reporting by 2022. In July 2022, the Business Register Agency (BRA) introduced the registration of the gender of the founder and the main representative of the company, but this identification is not applied retroactively, so it will be possible to track entrepreneurship by gender based on this record only for companies founded after that period or those that changed owners and representatives (not those that have undergone other changes, such as changing the company headquarters, etc.) (Babović, 2022)¹³.

The chances of running a successful business are higher when the entrepreneur is a young woman with a record of employment, avoids the traditional personal services sector, is starting a business in a familiar line of work, which she already has knowledge of and business contacts in, participates in training programs, comes up with innovative products or services and has good, regular contacts with clients (Babović, 2012)¹⁴.

Socio-demographic profile of female entrepreneurs

Female entrepreneurs from the research sample in 2022 in most cases (70%) were not entrepreneurs at the time of the previous research in 2011. Therefore, it can be said that

¹¹ Babović, M. (2022). *Preduzetništvo žena u Srbiji - deset godina kasnije*. UN Women, Srbija.

¹² UNWOMEN (2017). *Manual The Power of Procurement: How to Source from Women-owned businesses Corporate Guide to Gender-Responsive Procurement*. Belgrade: UN Women Serbia.

¹³ Babović, M. (2022). *Preduzetništvo žena u Srbiji - deset godina kasnije*. UN Women, Srbija.

¹⁴ Babović, M. (2012). *Polazna studija o preduzetništvu žena u Srbiji*. Beograd: UN Women, Srbija.

they are newer entrepreneurs. Their entry into entrepreneurship changed the socio-demographic profile of female entrepreneurs. Today's female entrepreneurs are, on average, somewhat older, more educated, less burdened by family obligations, as a smaller percentage live with a partner and twice as often have minor children. When looking more closely at the age structure of female entrepreneurs in two time periods, it is noted that in the sample from 2022, more than half of female entrepreneurs belong to the age category of the so-called "older workforce", aged 45-64. The extremely small share of young female entrepreneurs (ages 19-29) can be a warning that young women today have a harder time deciding to start a business than it was ten years ago. The reasons for such a trend could not be established adequately by research on a sample of female entrepreneurs, such tendencies are actually investigated by the GEM research, which was not conducted in Serbia during the last decade. However, as will be seen later, among current female entrepreneurs, reasons related to the right to maternity and parental leave are often among the obstacles, which indicate that these rights are not adequately regulated for female entrepreneurs, which can be a demotivating or excluding factor for young women to venture into entrepreneurship.

Sectoral specification (s3)

When it comes to the sectoral structure of women's and men's businesses, the data indicate the reproduction of pronounced patterns of segregation according to the sectors of activity between "women's" and "men's" businesses but with simultaneous significant changes in the sectoral structure of women's businesses. Gender segregation in the sectoral structure of business is manifested through a lower representation of women's businesses compared to men's businesses in the areas of industrial production, agriculture, construction, transport, information and communications, and greater representation in the areas of trade, hospitality, professional, scientific and technical activities, administrative activities, social services such as education, health care, and other service activities that include the spectrum of classic personal services.

Although gender segregation is still present in terms of the sectoral orientation of "women's" and "men's" businesses, comparative data for 2011 and 2021 indicate that there have been noticeable changes in the sectoral structure of women's businesses: the share of female entrepreneurs operating in the trade and catering sector has decreased to some extent, and the share of those operating in the IT and communication sector, real estate and especially professional, scientific, technical and innovative activities has increased as well as the share of businesses in the administrative and social services,

primarily due to the increased share of business ventures in the field of education and health care. The slight increase in the share of business ventures in the field of construction is also interesting, possibly hinting at the initial trend of women entering this field, which traditionally did not include women.

According to S3, priority sectors in Serbia are: Food for Future, Information Technology, Future Machines and Manufacturing Systems and Creative Industries. Based on the applications to the programs of the Innovation Fund to date, Serbia's greatest innovation potential exists in the ICT field, dominated by the software industry and software application development, followed by food and agriculture, mechanical engineering and energy efficiency (S3, Serbia).¹⁵ Unfortunately, women do not prevailed in any of the priority areas of smart specialization. However, it is encouraging to note that the participation of women entrepreneurs in the ICT sector and knowledge-based industries has been on an upward trend in recent years.

Key actors in women entrepreneurship in Serbia and in the CE

Name of the Stakeholders
Ministry of Economy
Development Agency of Serbia
Chamber of Commerce and Industry of Serbia
Association of Business Women in Serbia
EBRD – Women in Business Program
Local associations of business women/women entrepreneurs across Serbia
Ministry of Environmental Protection of the Republic of Serbia

The legislative and regulatory framework for the circular economy in Serbia includes key documents such as the Law on Waste Management, the Waste Management Program of the Republic of Serbia for the period 2022-2031, the Smart Specialization Strategy of Serbia, and the National Waste Management Strategy for the period 2010-2019. To gain a comprehensive understanding of the circular economy landscape, the following documents were also consulted: the Review of the Law on Waste Management of the Republic of Serbia, Transposition and Implementation of Environmental and Climate

¹⁵ Smart Specialization Strategy of Serbia, https://pametnaspecijalizacija.mpn.gov.rs/wp-content/uploads/2021/06/Strategija-pametne-specijalizacije_EN_WEB.pdf

5 Analysis of skills gaps and needs of women entrepreneurs for digital and circular transition

Assessing the Skills and Needs of Women Entrepreneurs for Sustainable Circular and Digital Transition in the Danube Region

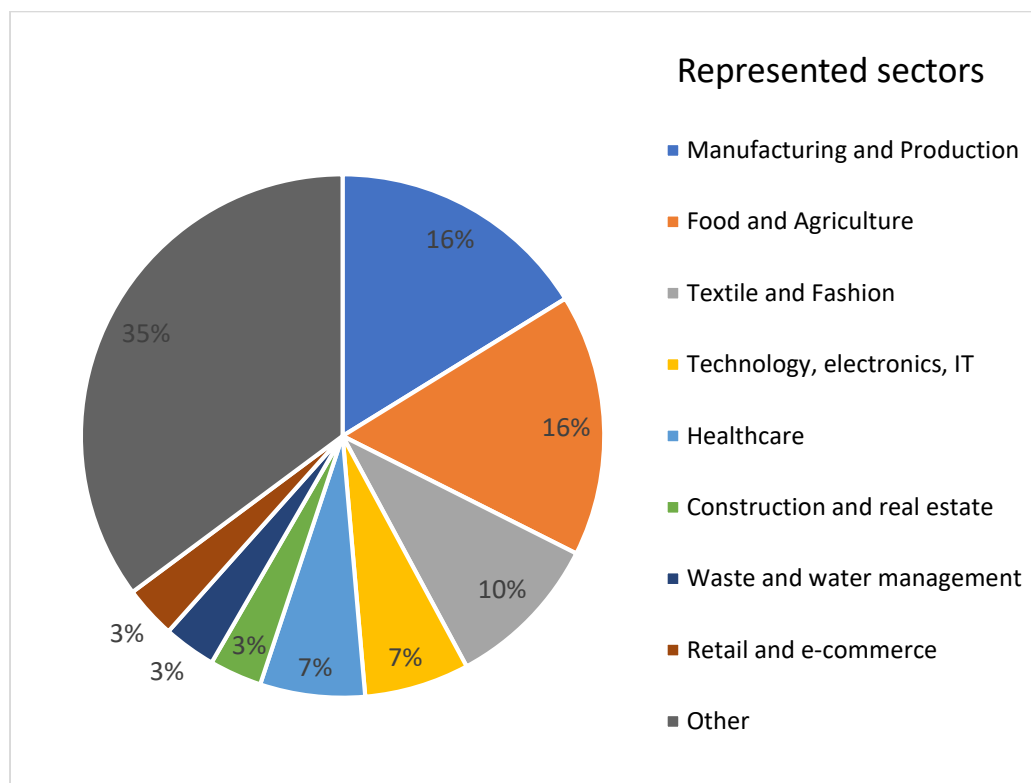
This survey is a part of the Danube Transnational Programme financed project WE.Circular - “Boosting digital and industrial capacity for sustainable circular transition of women entrepreneurs in the Danube Region”. The goal of the survey is understanding the unique skills, needs, and challenges faced by women entrepreneurs in the Danube Region.

In the research, 35 female respondents who are owners/co-owners of businesses participated. The responses to the questions posed to the respondents are presented below.

All surveyed participants are female (hence forth referred to as “respondents”). All 35 respondents indicated Serbia as their country of origin. In response to the question, **“Is your business women-owned?”**, 32 respondents (91.43%) answered affirmatively.

31 respondents answered the question, **“What is the primary sector of your business?”**, while 4 respondents avoided answering this question. The most common answer was “Other,” chosen by 35% of respondents. The sectors “Food and Agriculture” and “Manufacturing and Production” were each represented by 16.13%. Following these were “Textiles and Fashion” at 9.68%, “Technology, Electronics, and IT” and “Healthcare” each at 6.45%. The least represented sectors were “Construction and Real Estate,” “Waste and Water Management,” and “Retail and E-commerce,” each at 3.23%. These data are shown in graph 1.

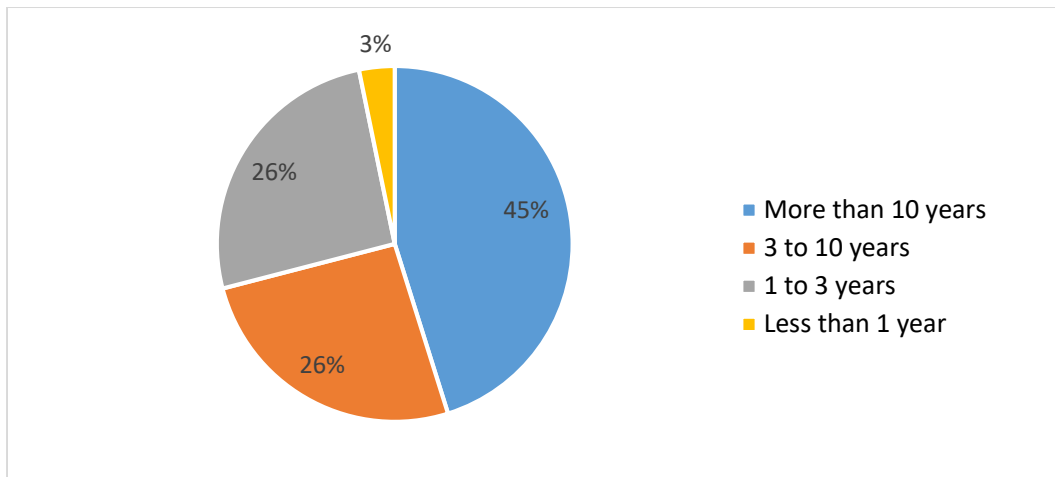
Figure 5: The primary business sector



Source: Author's research

In response to the question, "**How long have you been running your company?**", 31 respondents provided an answer. Of these, 14 respondents (45.16%) selected "More than 10 years," 8 respondents (25.81%) each selected "1 to 3 years" and "3+ to 10 years," while only one respondent (3.23%) selected "Less than 1 year."

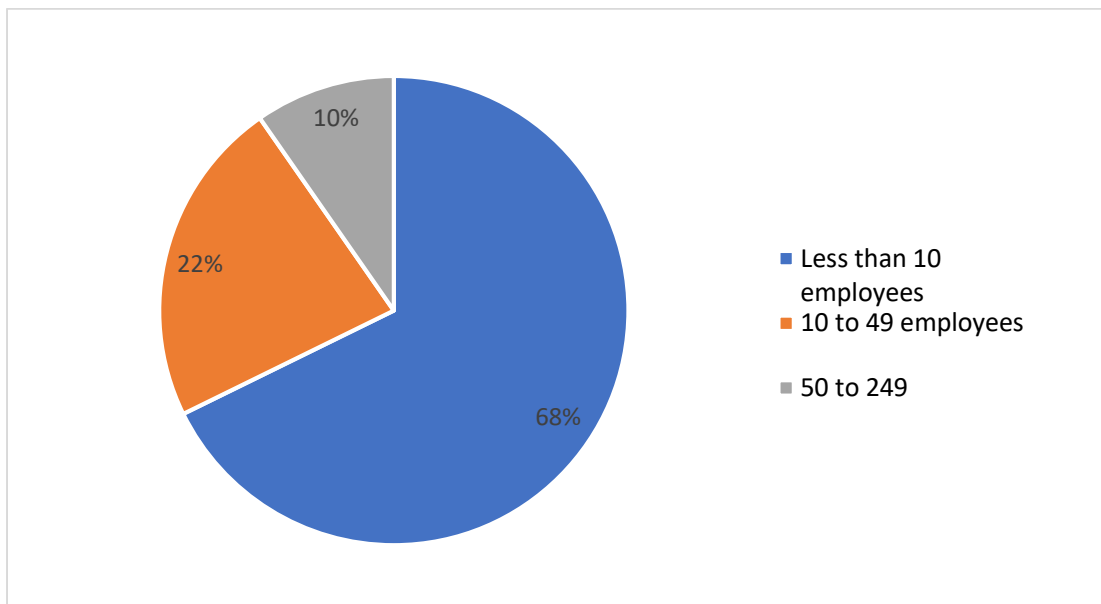
Figure 6: Years on the market



Source: Author's research

Regarding **the size of the business**, the most represented in the surveyed sample are businesses with fewer than 10 employees (67.74%), followed by businesses with 10 to 49 employees (22.58%), and the least represented are businesses with 50 to 249 employees (9.68%).

Figure 7: The size of the business (Source: Author's research)



Source: Author's research

5.1 Circular Economy (CE)

In the next set of questions, the respondents were asked to indicate their agreement on a scale of 1 to 5, where 1 = Strongly disagree/Absolutely unknown and 5 = Strongly agree/Absolutely known. 24 respondents answered the questions. The questions began with "I am familiar with...". The statements and the obtained responses are presented below.

"The general concept of the circular economy (CE)" - 13 respondents (54.17%) strongly agree/are absolutely familiar with the statement, 6 respondents (25%) are undecided, 3 respondents (12.5%) agree with the statement, 2 respondents (8.33%) disagree with the statement.

„The concept of designing products and processes in a way that minimizes waste and pollution" - 13 respondents (54.17%) strongly agree/are absolutely familiar with this statement, 7 respondents (29.17%) are undecided, 4 respondents (16.67%) agree with the statement.

"Strategies for keeping products and materials in use for as long as possible, through practices such as repair, refurbishment, reuse, and recycling": 14 respondents (58.33%) strongly agree/are absolutely familiar with the statement, 5 respondents (20.83%) agree with the statement, 4 respondents (16.67%) are undecided, 1 respondent (4.17%) strongly disagrees/is absolutely unfamiliar with this statement.

"The concept of regenerating natural systems with the aim of restoring or revitalizing their own energy and material sources": 14 respondents (58.33%) strongly agree/are absolutely familiar with the statement, 5 respondents (20.83%) agree with the statement, 5 respondents (20.83%) are undecided.

"The idea of rethinking business models to encourage the use of products as services (e.g., leasing instead of owning) to maximize resource utilization": 12 respondents (50%) strongly agree/are absolutely familiar with the statement, 7 respondents (29.17%) are undecided, 5 respondents (20.83%) agree with the statement.

"The concept of products as services, where companies retain ownership of the product while selling its use or the service it provides": 10 respondents (41.67%) strongly agree/are absolutely familiar with the statement, 7 respondents (29.17%) agree with the statement, 4 respondents (16.67%) are undecided, 2 respondents (8.33%) disagree with the statement, 1 respondent (4.17%) strongly disagrees/is absolutely unfamiliar with this statement.

"Using renewable, recyclable, or biodegradable resources to support circular production and supply chains": 16 respondents (66.67%) strongly agree/are absolutely familiar with the statement, 5 respondents (20.83%) agree with the statement, 3 respondents (12.5%) are undecided.

"Strategies for the recovery and regeneration of products and materials at the end of their life cycle": 14 respondents (58.33%) strongly agree/are absolutely familiar with the statement, 6 respondents (25%) agree with the statement, 3 respondents (12.5%) are undecided, 1 respondent (4.17%) strongly disagrees/is absolutely unfamiliar with this statement.

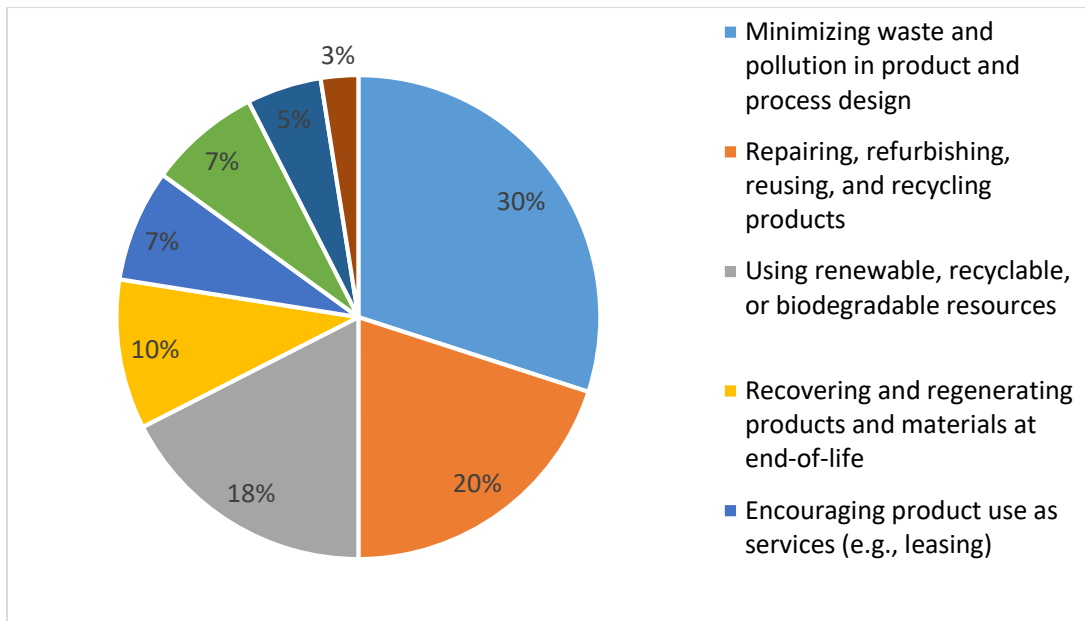
"Strategies and designs aimed at extending product life through durability, repairability, and upgradability": 13 respondents (54.17%) strongly agree/are absolutely familiar with the statement, 7 respondents (29.17%) agree with the statement, 3 respondents (12.5%) are undecided, 1 respondent (4.17%) disagrees with the statement.

"The concept of the sharing economy as a way to reduce ownership and increase product utilization rates through sharing": 12 respondents (50%) strongly agree/are absolutely familiar with the statement, 4 respondents (16.67%) agree with the statement, 4 respondents (16.67%) are undecided, 3 respondents (12.5%) disagree with the statement, 1 respondent (4.17%) strongly disagrees/is absolutely unfamiliar with this statement.

"The role of digital technology in enabling circular economy practices, such as sharing platforms, rentals, or tracking materials for products": 12 respondents (50%) strongly agree/are absolutely familiar with the statement, 6 respondents (25%) agree with the statement, 5 respondents (20.83%) are undecided, 1 respondent (4.17%) disagrees with the statement.

To the question "Do you apply any circular technologies or models in your business?" 24 respondents answered. Of those, 16 responded positively, and 8 negatively. The respondents who answered "YES" were directed to the next question: **"Which circular technologies or models do you apply in your business?"** Multiple answers could be selected for this question. A total of 15 respondents provided answers. The obtained answers are shown below:

Figure 8: Application of CE technologies/models (Source: Author's research)



Source: Author's research

The respondents who answered "YES" to the question "Do you apply any circular technologies or models in your business?" were directed to another question: **"What were your main drivers for applying circular technology or circular models?"** Multiple answers could be selected for this question. A total of 15 respondents provided answers. The obtained answers are shown below:

"Managerial mindset, knowledge, commitment, and engagement in the green transition" – was selected by 10 respondents (66.67%).

"Role models" – was selected by 3 respondents (20%).

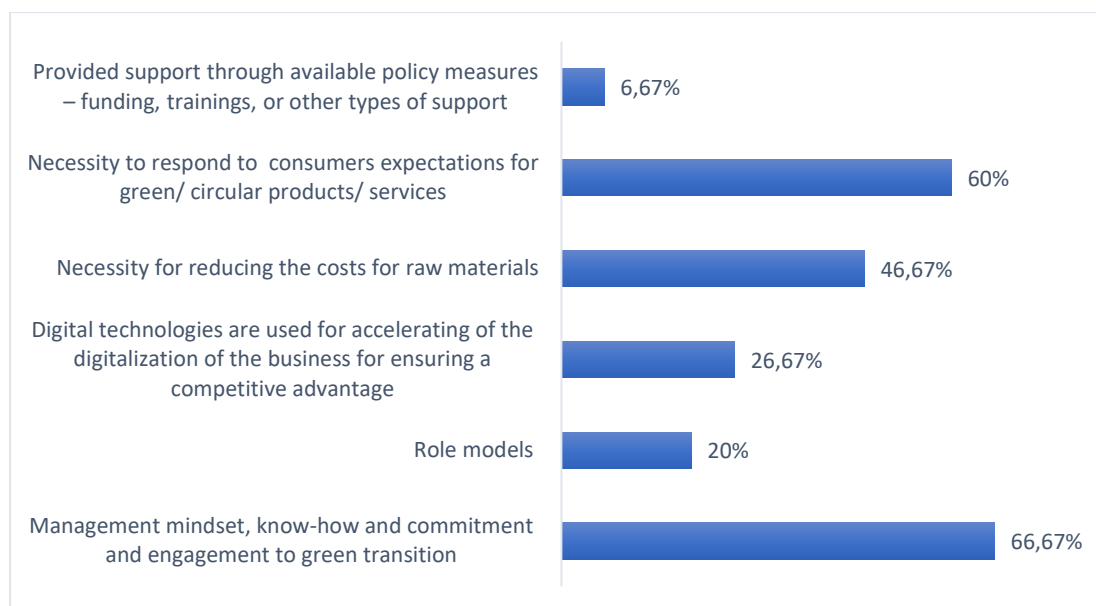
"Digital technologies are used to accelerate business digitalization to ensure competitive advantage" – was selected by 4 respondents (26.67%).

"Need to reduce raw material costs" – was selected by 7 respondents (46.67%).

"Need to meet consumer expectations for green/circular products/services" – was selected by 9 respondents (60%).

"Secured support through available policy measures – financing, training, or other types of support" – selected one respondent (6.67%).

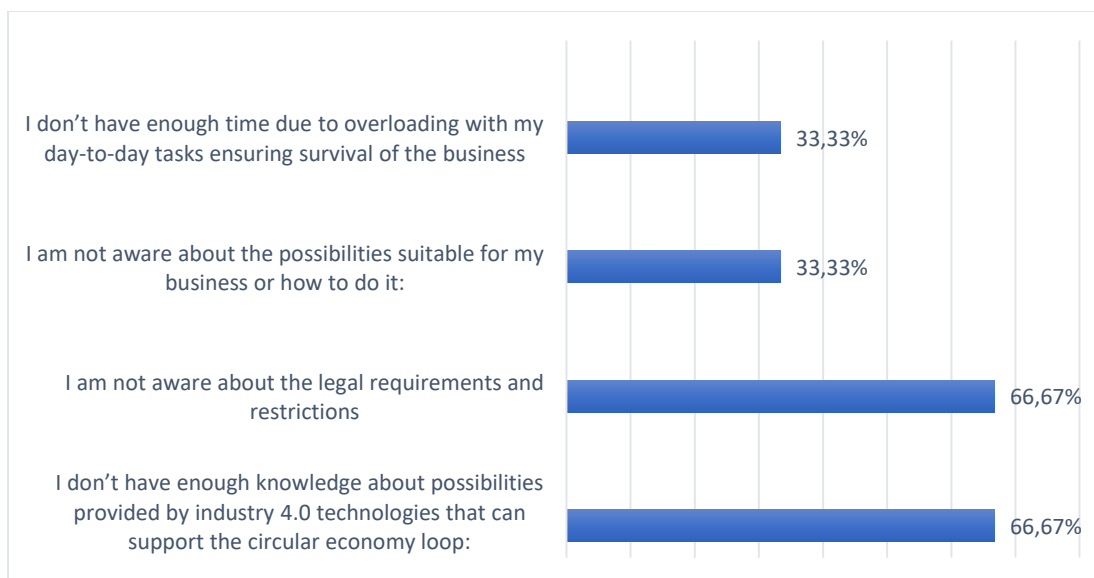
Figure 9: Main drivers for applying circular technology or circular models (Source: Author's research)



Source: Author's research

Respondents who circled "NO" to the question "Do you apply any circular technologies or models in your business?" were directed to the question: "**What are the main reasons?**" This question offered multiple answers, and respondents could choose more than one answer. In total, 3 respondents provided answers. The obtained responses are shown below.

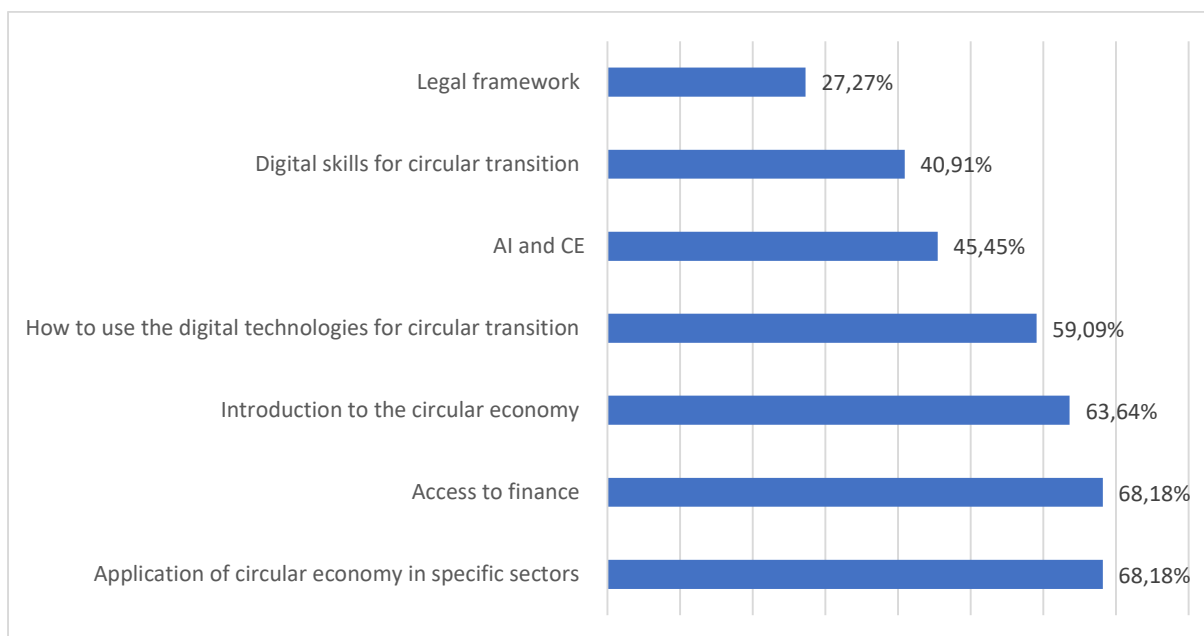
Figure 10: The main reasons for non-application of any circular technologies or models (Source: Author's research)



Source: Author's research

In response to the question **"Which training topics would be most useful to stimulate the circular transition of female entrepreneurs?"** respondents were allowed to choose more than one answer. Twenty-two respondents answered this question. The obtained responses are shown below.

Figure 11. Needs for training – ranking of the topics



Source: Author's research

5.2 Industry 4.0 (i4.0)

To the question **"Do you consider that your business has adopted digital technologies?"** 22 respondents answered. Of these, 15 answered "YES" and 7 answered "NO".

To the question **"To what extent have you adopted the following digital and Industry 4.0 technologies?"** respondents were given options to rank from 1 to 5 (1 = very low level of adoption, 5 = very high level of adoption). This question was answered by 13 respondents. The obtained responses are shown below.

"Mobile Technologies: The use of mobile devices and applications to facilitate communication, remote work, and access to business applications and services" - 10 respondents (83.33%) indicated a very high level of adoption, while two respondents (16.67%) were undecided.

"Collaboration Tools: Adoption of platforms for teamwork, project management, and communication to increase productivity and support remote work" - 6 respondents (46.15%) marked a very high level of adoption, 4 respondents (30.77%) were undecided, and 3 respondents (23.08%) indicated a high level of adoption.

"E-commerce Platforms: The use of online platforms for buying and selling goods and services, including websites and mobile apps tailored for e-commerce" - 9 respondents (69.23%) marked a very high level of adoption, two respondents (15.38%) indicated a high level of adoption, one respondent (7.69%) marked a low level of adoption, and one respondent (7.69%) marked a very low level of adoption.

"Cloud Services: The use of cloud services for storage, computing power, and business applications enables scalability, flexibility, and remote access to resources" - 9 respondents (69.23%) indicated a very high level of adoption, two respondents (15.38%) indicated a high level of adoption, one respondent (7.69%) was undecided, and one respondent (7.69%) marked a low level of adoption.

"Digital Marketing Tools: The use of online platforms, social media, and analytical tools for targeted marketing, customer engagement, and sales optimization" - 7 respondents (53.85%) marked a very high level of adoption, 4 respondents (30.77%) indicated a high level of adoption, while two respondents (15.38%) marked a low level of adoption.

"Big Data and Analytics: The use of large datasets for analyzing trends, patterns, and insights for informed decision-making and strategic planning" - one respondent (7.69%) indicated a very high level of adoption, 6 respondents (46.15%) indicated a high level of adoption, 3 respondents (23.08%) were undecided, two respondents (15.38%) marked a low level of adoption, and one respondent (7.69%) marked a very low level of adoption.

"Artificial Intelligence (AI) and Machine Learning (ML): Implementation of AI and ML for automation, predictive analysis, customer support (via chatbot), and service personalization" - one respondent (7.69%) indicated a very high level of adoption, 3 respondents (23.08%) indicated a high level of adoption, 4 respondents (30.77%) were undecided, 3 respondents (23.08%) indicated a low level of adoption, and two respondents (15.38%) indicated a very low level of adoption.

"Internet of Things (IoT): Connecting devices and machines for data collection and exchange, enabling smart operations, enhanced monitoring, and efficiency improvement" - 3 respondents (23.08%) indicated a very high level of adoption, 3 respondents (23.08%) indicated a high level of adoption, 3 respondents (23.08%) were undecided, two respondents (15.38%) indicated a low level of adoption, and two respondents (15.38%) indicated a very low level of adoption.

"Blockchain: Adoption of blockchain technology for secure and transparent record-keeping and transactions" - one respondent (7.69%) indicated a very high level of adoption, 3 respondents (23.08%) indicated a high level of adoption, one respondent (7.69%) was undecided, while 8 respondents (61.54%) indicated a very low level of adoption.

"Cybersecurity Technologies: Implementation of advanced security solutions to protect data, networks, and operations from cyber threats and breaches" - two respondents (15.38%) indicated a very high level of adoption, 4 respondents (30.77%) indicated a high level of adoption, 3 respondents (23.08%) were undecided, two respondents (15.38%) indicated a low level of adoption, and two respondents (15.38%) indicated a very low level of adoption.

"Augmented Reality (AR) and Virtual Reality (VR): Use of AR and VR for immersive experiences, training, product demonstrations, and customer engagement" - one respondent (7.69%) indicated a very high level of adoption, one respondent (7.69%) indicated a high level of adoption, two respondents (15.38%) were undecided, two respondents (15.38%) indicated a low level of adoption, and 7 respondents (53.85%) indicated a very low level of adoption.

"3D Printing: Use of additive manufacturing technologies for prototyping, production, and customization of products" - one respondent (7.69%) indicated a very high level of adoption, one respondent (7.69%) indicated a high level of adoption, two respondents (15.38%) were undecided, one respondent (7.69%) indicated a low level of adoption, and 8 respondents (61.54%) indicated a very low level of adoption.

"Robotics and Automation: Integration of robots and automated systems for production, storage, and repetitive tasks to increase efficiency and reduce costs" - one respondent (7.69%) indicated a high level of adoption, one respondent (7.69%) was undecided, two

respondents (15.38%) indicated a low level of adoption, and 9 respondents (69.23%) indicated a very low level of adoption.

"Digital Twin Technology: Creation of virtual replicas of physical systems for simulation, monitoring, and real-time performance analysis" - two respondents (15.38%) indicated a high level of adoption, one respondent (7.69%) was undecided, one respondent (7.69%) indicated a low level of adoption, and 9 respondents (69.23%) indicated a very low level of adoption.

In response to the question **"What has motivated you the most to transition your business to Industry 4.0?"** 14 respondents provided answers by selecting the offered options. Their responses are detailed below:

"Pressure from clients and suppliers to modernize" – selected by one respondent (7.14%).

"Expected improvements in operational efficiency and quality" – selected by 5 respondents (35.71%).

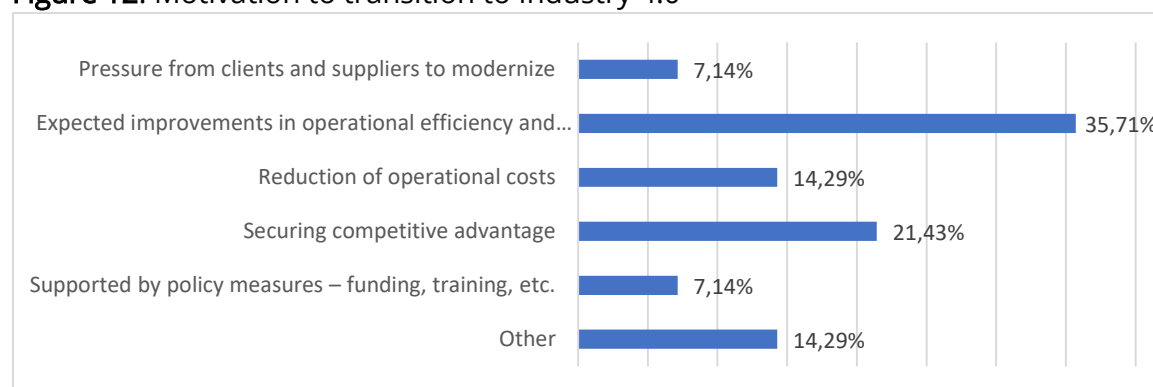
"Reduction of operational costs"– selected by two respondents (14.29%).

"Securing competitive advantage"– selected by 3 respondents (21.43%).

"Supported by policy measures – funding, training, etc."– selected by one respondent (7.14%).

"Other"– selected by two respondents (14.29%)."

Figure 12. Motivation to transition to Industry 4.0



Source: Author's research

Respondents who answered 'YES' to the question 'Do you consider that your business has adopted digital technologies?' were directed to answer the following question: **"What are the primary barriers to adopting more advanced digital technologies in your business?"** Ten respondents provided answers by selecting the offered options. Their responses are shown below:

"High investment costs"– selected by 7 respondents (70%).

"Lack of trained staff to work with them"– selected by 3 respondents (30%).

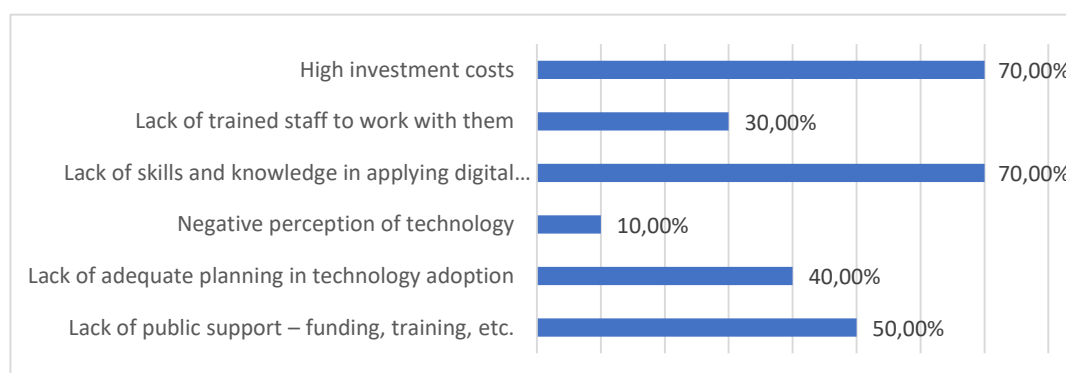
"Lack of skills and knowledge in applying digital technology" - selected by 7 respondents (70%).

"Negative perception of technology"- selected by one respondent (10%).

"Lack of adequate planning in technology adoption"- selected by 4 respondents (40%).

"Lack of public support – funding, training, etc."- selected by 5 respondents (50%).

Figure 13. Primary barriers to adopting more advanced digital technologies



Source: Author's research

Ten respondents provided answers by selecting the offered options to the question **"Which digital skills do you need to acquire or improve?"** Their responses are detailed below:

"Skills for using Microsoft Office and similar software products" – selected by one respondent (10%).

"Skills for using email, social media, video calls for business communication"– not selected by any respondents.

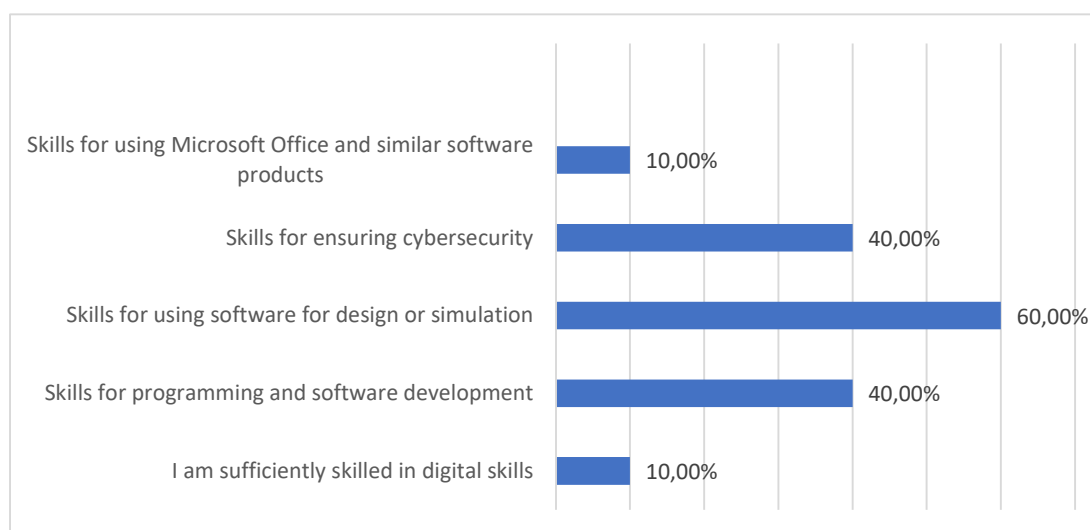
"Skills for ensuring cybersecurity"– selected by 4 respondents (40%).

"Skills for using software for design or simulation"– selected by 6 respondents (60%).

"Skills for programming and software development"– selected by 4 respondents (40%).

"I am sufficiently skilled in digital skills" - selected by one respondent (10%).

Figure 14: Digital skills to acquire or improve (Source: Author's research)



Source: Author's research

Ten respondents provided answers by selecting the offered options to the question **"Which of the following ICT areas are most needed for training among female entrepreneurs?"** Their responses are detailed below:

"Production automation"– selected by one respondent (10%).

"Digital marketing"– selected by 6 respondents (60%).

"Cybersecurity" - selected by 4 respondents (40%).

"Fully integrated digital processes"– selected by 3 respondents (30%).

"Resource optimization (time, personnel, investments)" - selected by 5 respondents (50%).

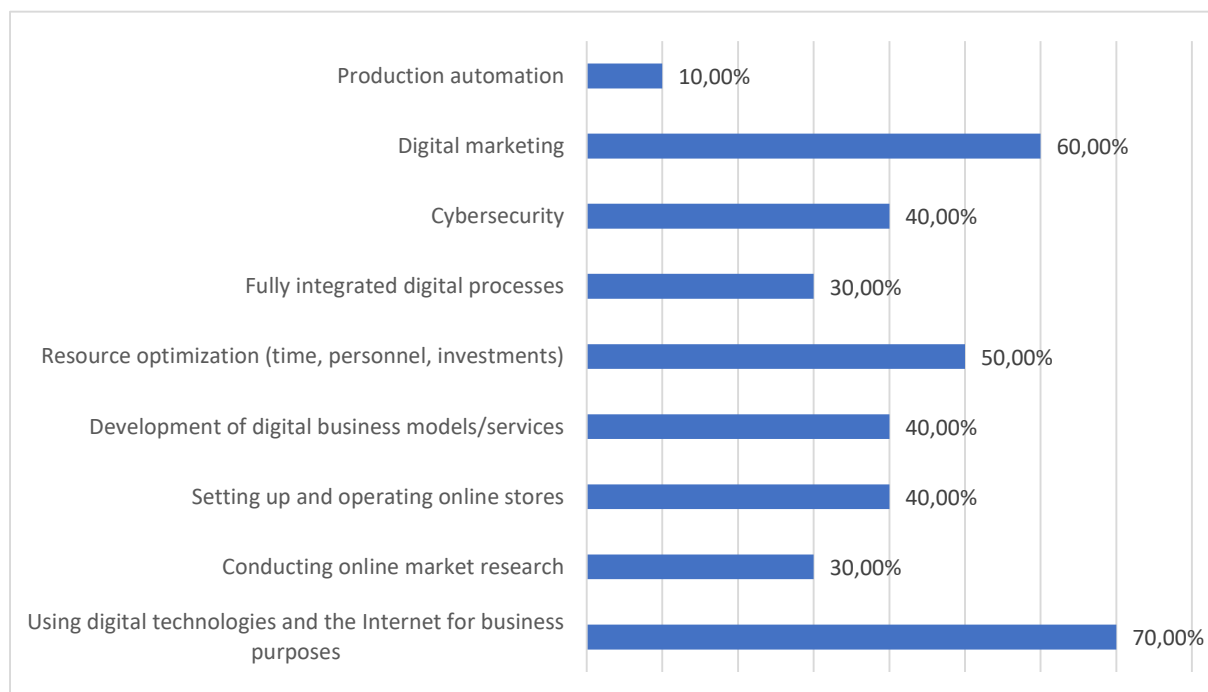
"Development of digital business models/services"– selected by 4 respondents (40%).

"Setting up and operating online stores"– selected by 4 respondents (40%).

"Conducting online market research" selected by 3 respondents (30%).

"Using digital technologies and the Internet for business purposes" selected by 7 respondents (70%).

Figure 15: Most needed ICT areas for training among female entrepreneurs (Source: Author's research)



Source: Author's research

5.3 Smart Specialization (S3) and external impacts

To the question **"Are you aware of the Smart Specialization Strategy (S3) in your region?"** 19 respondents provided answers. Out of these, 14 respondents answered "NO," while 5 respondents answered "YES."

To the question **"Please specify how your business aligns with S3 in your region,"** 5 respondents provided rankings from 1 to 5 (1 = not aligned at all with S3, 5 = fully aligned with S3). The responses are summarized below:

"My company understands the specific sectors, technologies, and challenges identified in the S3 of my region" - One respondent (20%) indicated they are fully aligned with S3, one respondent (20%) indicated they are aligned with S3, two respondents (40%) were undecided, one respondent (20%) indicated they are not aligned at all with S3.

"My company aligns its business objectives and innovation efforts with the technologies and challenges identified in the S3 of my region" - Three respondents (60%) indicated they are aligned with S3, one respondent (20%) indicated they are not aligned with S3, one respondent (20%) indicated they are not aligned at all with S3.

"My company is connected with local clusters, innovation hubs, research institutions, and networks that are part of the S3 system" - Two respondents (40%) indicated they are aligned with S3, one respondent (20%) was undecided, one respondent (20%) indicated they are not aligned with S3, one respondent (20%) indicated they are not aligned at all with S3.

"My company collaborates based on S3 priorities" - Two respondents (40%) indicated they align with S3, one respondent (20%) was undecided, one respondent (20%) indicated they do not align with S3, one respondent (20%) indicated they do not align at all with S3.

"My company focuses on research and development activities that contribute to S3 priorities" - Two respondents (40%) indicated they align with S3, one respondent (20%) was undecided, one respondent (20%) indicated they do not align with S3, one respondent (20%) indicated they do not align at all with S3.

"My company co-innovates with universities, research centers, innovation hubs, and others in the S3 system" - Three respondents (60%) were undecided, one respondent (20%) indicated they do not align with S3, one respondent (20%) indicated they do not align at all with S3.

"My company is involved in regional, national, and/or EU funding programs designed to support S3 areas" - One respondent (20%) indicated they align with S3, Two respondents (40%) indicated they do not align with S3, Two respondents (40%) indicated they do not align at all with S3.

"My company invests in training and reskilling the workforce to meet the demands of new innovation areas identified by S3" - Two respondents (40%) indicated they align with S3, one respondent (20%) was undecided, one respondent (20%) indicated they do not align with S3, one respondent (20%) indicated they do not align at all with S3.

"My company aligns its business practices with S3 sustainability goals" - Two respondents (40%) indicated they align with S3, one respondent (20%) was undecided, one respondent (20%) indicated they do not align with S3, one respondent (20%) indicated they do not align at all with S3.

"My company participates/has participated in discussions and consultations on the development and implementation of S3" - Two respondents (40%) indicated they align with S3, one respondent (20%) was undecided, one respondent (20%) indicated they do not align with S3, one respondent (20%) indicated they do not align at all with S3.

"My company stays informed about progress and new S3 information in your region" - Two respondents (40%) indicated they align with S3, one respondent (20%) was undecided, one respondent (20%) indicated they do not align with S3, one respondent (20%) indicated they do not align at all with S3.

"My company is showcased as a success story contributing to S3 goals" - One respondent (20%) indicated they fully align with S3, two respondents (40%) were undecided, one respondent (20%) indicated they do not align with S3, one respondent (20%) indicated they do not align at all with S3.

To the question **"Would you say that COVID-19/the war crisis in Ukraine has affected your business and strategy?"** 19 respondents provided answers. Out of these, 14 respondents answered "YES," while 5 respondents answered "NO."

The respondents who answered 'YES' were directed to the following question: **"What type of professional support did you resort to in order to aid the 'restart' of your business after the pandemic/crisis due to the war in Ukraine?"** Thirteen respondents provided answers by selecting from the options provided. Their responses are shown below:

"Business development services" - marked by two respondents (15.38%).

"Training, mentoring, or training for improvement of digital skills" - marked by three respondents (23.08%).

"Training related to entrepreneurial knowledge and skills" - marked by four respondents (30.77%).

"Training in soft skills (e.g., time management or stress management, resilience)" - marked by two respondents (15.38%).

"Webinars or online skill development (individual learning)" - marked by two respondents (15.38%).

"Joining formal/informal communities of (female) entrepreneurs" - marked by three respondents (23.08%).

"None of the above, although it would have been necessary" - marked by two respondents (15.38%).

"None of the above, it was not necessary" - marked by three respondents (23.08%).

"I was not aware of any type of available professional support" - answered by one respondent (7.69%).

5.4 Successful women entrepreneurs

The interview has been conducted with Sanja Dramićanin, co-director and executive director for marketing and sales of the Eat Me App doo.

Eat Me App doo is a startup green tech company founded in May 2021 (3 years of operating), whose sector of activity is the development of software - mobile applications, AI technology and blockchain technology with the aim of reducing food waste and CO2 gas emissions. Eat Me App is a micro company, the first startup and pioneering concept in Serbia and the Balkans, owned equally by 2 female founders (Sanja Dramićanin 50% and Aleksandra Lazović-Lønningen 50%), which solves the problem of food waste at the household and supermarket level.

The application technology, driven by artificial intelligence, connects supermarkets with users directly through innovative smart price technology and by sending notifications that inform the user about the expiry date of the food and the drop in prices in real time and enables him to purchase cheaper and fresher food online. Consumer behavior and habits are mapped, which become the basis for personalized offers, dietary recommendations and loyalty programs. This allocation of behavioral information further improves branch chain and supermarket-level planning, and also improves personal consumer and household planning. Everyone wins: consumers-supermarkets-environment.

Eat Me App is the result of a sincere pioneering and innovative venture that is built out of love and a desire for a better and higher quality relationship with the environment and the planet, as well as with ourselves. At the world level, according to the data of the UN Food and Agriculture Organization, more than 30% of the total amount of food is wasted! We saw that we are part of the solution and ventured into entrepreneurial waters. This phenomenon is known in the literature as "user entrepreneurship", i.e. user-entrepreneur innovation.

From year to year there is a shift in the availability and number of grants, competitions with monetary prizes, subsidies and loans. Sanja Dramićanin especially praises the programs and grants of the Innovation Fund, as well as EU Climate Kic, DRG4Food, EIT Food, DR4Food, etc. Recently, there are more specialized programs and trainings on the topic of CE and digital skills, which are often free or at affordable prices. There are startup incubators and accelerators that provide both mentoring and technical assistance. What does not work well is the complexity of applying for financial support (grant applications

are complex), the lack of continuous support (long-term programs that follow female entrepreneurs through all phases), access to information regarding current programs.

She believes that female entrepreneurs should acquire some of the key skills, which are: digital skills - e-commerce, social networks, SEO optimization; platforms for opening online stores as well as for managing social networks, for data analytics - (Google Analytics, Power BI); eco/sustainable design (use of recycled materials in production with the aim of reducing waste); creation and implementation of circular business models (repair, reuse use, recycling).

Considering that Sanja has been an entrepreneur for many years, she thinks that in the past few years there has been a very good shift in public support, but it is still very far from what is provided by the EU and the world.

She believes that the understanding and use of advanced digital tools, software solutions and technologies such as: artificial intelligence, blockchain and the Internet of Things will be the most important in the next 3 years for women's businesses, because these technologies enable business optimization, better data analytics and automatic process management. When we talk about the principles of CE, it is sustainable design and the transition from a linear to a circular business model (use of ecological materials, efficient management of resources, waste reduction, knowledge of designing long-lasting products, recycling, repair, reuse, etc.). And finally E-commerce and digital marketing (skills for running online stores, advertising and selling products and services).

Among others, she sees the biggest possibilities in transition from sales to the provision of services, as well as in the development of digital platforms for the sharing economy that enable the sharing of resources and services between users, which reduces the need for the production of new products and increases the utilization of existing ones.

6 Stakeholder Perspectives

Qualitative research: F2F interviews with the stakeholders

General information

Five interviewed stakeholders are also members of the Serbian National stakeholders Group, and since the NSHG meeting was held on May 28, interviews in a form of questionnaire were completed in the following days, which gave them space to reflect on subjects addressed at the NSHGM, covered in interviews as well. This is one of the main reasons they were willing to cooperate.

Types of the interviewed stakeholders: policy maker, industry expert, business support organization / NGO, Academia/research institution and Training educational organization.

Description of the experience of the stakeholder with regard to CE and i4.0 transition

Policy maker representative believes that digitalization and Industry 4.0 are essential for improving work processes, although she hasn't noticed any specific initiatives or investments in this area. **Industry expert** emphasizes the importance of policy measures to stimulate the adoption of digital technologies and Industry 4.0 practices, pointing out the lack of knowledge among businesses about the benefits of these technologies. **Business support organization/NGO** representative highlights the transformative impact of digital technologies on industries and mentions specific examples like the E-governance portal in Serbia and TEXTILE RECYCLING project, supported by the City of Čačak. ABW Nadežda Petrović, in cooperation with Regional Chamber of Commerce also launched the project "Commitment to renewing and preserving the planet is our priority", where they talk with high school students, future entrepreneurs, and guide them to the importance of the circular economy. She also stresses the importance of grants for digitization and providing support to female entrepreneurs. **Academia/research institution** representative emphasizes the need for communication, cooperation, and financial support to encourage businesses to adopt digital technologies and Industry 4.0 practices. **The representative of Training educational organization**, as a certified consultant for digital transformation, advocates for providing financial incentives and support to women-led businesses to invest in digital technologies and promote gender equality in the economy, as they currently face barriers such as lack of access to funding and high costs of digital tools.

Insights from interviews

Overall, interviewed stakeholders provided valuable insights into the challenges and opportunities for women entrepreneurs in transitioning to practices within the Circular Economy. There is a clear need for enhanced support structures, improved awareness raising campaigns, practical benefits for women entrepreneurs to enhance their participation, and tailor-made training programs to bridge the gaps and facilitate a successful transition for women entrepreneurs in these areas.

They highlighted the importance of skills development, networking, and exchanging ideas between stakeholders to bridge existing gaps in support structures and over-all WE's understanding of the ways their business can benefit from innovative business models related to CE, S3, i4 and digital transformation. Additionally, stakeholders identified the need for improved access to funding, tailor-made trainings/mentorship, effective communication and collaboration skills, and understanding of the current legal framework to empower women entrepreneurs in the transition towards a circular and digital economy.

Stakeholders are the least familiar with the Smart specialization strategy, therefore the need emerges for policy makers to raise awareness and focus on promoting and informing the public, WEs and interested parties on the purpose and importance of this Strategy on national, regional and European level.

Identified gaps in the support provided to Women Entrepreneurs (WE) for s3 and i4.0 transition

In summary, the identified gaps in the support provided to Women Entrepreneurs (WE) for S3 and I4.0 transition include a lack of knowledge and understanding of CE transitioning principles, low awareness of the importance of sustainable practices, the existence of "male" and "female" jobs, financial readiness for investment, insufficient skill development initiatives, and the need for specific skills such as ICT, e-business, and managerial skills. Additionally, gaps were identified in the areas of staff, legal regulations, and infrastructure. To address these gaps, implementing interactive workshops, raising awareness of business opportunities, and providing access to funding, tailor-made training programs, mentorship, networking opportunities, inclusive policies, technology, and further research are recommended by Industry expert, Business support

organization/NGO representative, Academia/research institution representative, and the representative of Training educational organization.

Recommendations and proposed actions from stakeholders

1. Provide training and education on Circular Economy principles, digitalization, innovation management, business communication, and marketing for employees to develop the necessary skills for the next three years.
2. Facilitate partnerships with other businesses to leverage opportunities in the circular and digital economy.
3. Focus on improving management skills in Agriculture, Construction, and Energy sectors to take advantage of opportunities in the circular and digital economy.
4. Address Twin Transition and waste management as crucial issues in the business strategy.
5. Develop sustainable business practices, innovation and design thinking, supply chain management, and communication skills within the organization.
6. Utilize technology to optimize resource use, enhance product lifecycle management, develop innovative circular business models, create value-added services, establish collaborative networks for resource sharing and recycling, and capitalize on data analytics for sustainability initiatives and customer engagement.

7 Conclusion

Since respondents in Serbia come from the sectors where CE principles were part of their manufacturing practices, the majority of them answered they are “familiar with the general concept of CE. Almost half of them apply circular technologies or models in their businesses, and only 8 out of those who responded, didn’t apply circular technologies. Those who applied, mostly practice minimizing waste and pollution while designing products and processes. Also, high percentages of the respondents apply both: strategies for keeping products and materials in use for as long as possible, through practices such as repair, refurbishment, reuse, and recycling and the concept of regenerating natural systems to restore or revitalize their own energy and material sources. More than half of respondents also apply strategies for recovering and

regenerating products and materials at the end of their life cycle. Slightly fewer, others apply the concept of products as services, where companies retain ownership of the product while selling its use or the service it provides.

The concept of the sharing economy is either absolutely or to a great extent familiar to more than half of the respondents.

The key drivers for applying circular technologies or circular models are at the first place Managerial mind-set, knowledge, commitment, and engagement in the green transition followed by the need to meet consumer expectations for green/circular products/services and the need to reduce raw material costs.

Interestingly, the main reason for not applying CE principles is a lack of knowledge of possibilities provided by industry 4.0 technologies that can support the circular economy loop.

As expected, the majority are not familiar with S3, primarily because many companies were not involved in the Entrepreneurial Discovery Process (EDP). Even if they were, it was nearly five years ago, after which S3 was introduced in Serbia. If S3 were to be implemented at the regional level in Serbia, which is also the recommendation of this study, companies would become more directly acquainted with it. Consequently, this would increase the chances of enhancing the competitiveness of SMEs in sectors where some of the companies operate and which align with the priority sectors in the S3 developed for Serbia.

Taking into account quite a satisfactory level of regulatory framework for CE in Serbia, measures and steps Serbia should implement on their EU accession journey related to chapter 27 on the protection of the environment in the forthcoming period as well as the CBAM regulations that exporting SMEs should meet in entering EU market, the pressure to the businesses to accept and apply CE principles will have increasing trend. It goes in favour of their response that “ensuring the competitive advantage” actually dominantly motivates them to transition their business to Industry 4.0. Therefore, it is recommended that policymakers plan support measures for the introduction of green standards in a timely manner and allocate them in the annual budget, specifically within the support framework for small and medium-sized enterprises. Unlike large corporations, these enterprises do not have sufficient capacity to fully finance the green transition from their own resources. F2F Interviews that we ran with the stakeholders confirmed the same as

the research among SMEs: additional training and knowledge on Circular Economy principles, digitalization, innovation management, business communication, and marketing for employees to develop the necessary skills for the next three years. The lack of funding can hinder women-led enterprises' full implementation of circular economy principles. Therefore, it is recommended that stakeholders offer a package of financial and non-financial support to SMEs soon, to develop capacities for the full implementation of CE principles. The interviews also revealed the necessity of a sectoral approach in skill development for the circular economy. Specifically, there is a need to enhance management skills in the Agriculture, Construction, and Energy sectors to fully capitalize on opportunities in the circular and digital economies.

Annexes

Survey Questionnaire

Interview Guides

List of Interviewees

References

Adult Education Survey, 2022., Statistical Office of the Republic of Serbia, <https://www.stat.gov.rs/enUS/oblasti/obrazovanje/obrazovanje-odraslih-i-celozivotno-ucenje>

Babović, M. (2022). *Preduzetništvo žena u Srbiji - deset godina kasnije*. UN Women, Srbija.

List of regulations- Law on Waste Management, pg. 6 (https://www.ekologija.gov.rs/sites/default/files/inline-files/List_of_regulations.pdf),

McCarthy, A., R. Dellink and R. Bibas (2018), "The Macroeconomics of the Circular Economy Transition: A Critical Review of Modelling Approaches", OECD Environment Working Papers, No. 130, OECD Publishing, Paris, <https://doi.org/10.1787/af983f9a-en>.

Municipal waste management- Country fact Sheets Serbia (European Environment Agency, (www.eea.europa.eu),

Waste management program of the republic of Serbia for the period 2022-2031 (https://www.ekologija.gov.rs/sites/default/files/2022-03/program_upravljanja_otpadom_eng_-_adopted_version.pdf

Popović-Pantić, S. (2020). Dve decenije ženskog preduzetništva u Srbiji. Beograd: Institut Mihajlo Pupin,

Review of Law on Waste Management of the Republic of Serbia, Transposition and implementation of environmental and climate change acquis - chapter 27: status and plans (<https://www.pregovarackagrupa27.gov.rs/wp-content/uploads/2021/06/Post-screening-ENG.pdf>),

Serbia Country Profile, <https://www.bbc.com/news/world-europe-17907947> .

Smart Specialization Strategy of Serbia, https://pametnaspecijalizacija.mpn.gov.rs/wp-content/uploads/2021/06/Strategija-pametne-specijalizacije_EN_WEB.pdf

– The National Waste Management Strategy for the period 2010-2019

(<https://www.pregovarackagrupa27.gov.rs/wp-content/uploads/2021/06/Waste-management-strategy-for-the-period-2010-19.pdf>),

Women and Men in Serbia, Statistical Office of the Republic of Serbia, 2020, https://www.stat.gov.rs/media/5804/wm-in-the-rs-2020_webopt.pdf

Websites:

- A digital future for Europe - Consilium (europa.eu). Available at: <https://www.consilium.europa.eu/en/policies/a-digital-future-for-europe/>
- Inforegio - About S3 Smart Specialisation (europa.eu). Available at: https://ec.europa.eu/regional_policy/policy/communities-and-networks/s3-community-of-practice/about_en
- Statistical Office of Serbia, <https://www.stat.gov.rs/en-us/vesti/statisticalrelease/?p=13622>, accessed June 2021.