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D.1.1.2. Transnational Skills Needs and Gaps Analysis

10/2024

RAPIV, IREAS, SBA

Document ID	Transnational Skills Needs and Gaps Analysis
Subtitle	WE.Circular - Boosting digital and industrial capacity for sustainable circular transition of women entrepreneurs in the Danube Region
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Publisher	Regional Agency for Entrepreneurship and Innovations – Varna (RAPIV)
Date	01 October 2024
ISBN	978-954-92187-5-6

This paper was supported as part of WE.Circular, an Interreg Danube Region Programme project co-funded by the European Union.

Versioning and Contribution History

Version	Date	Author/Editor/Contributor	Description/Comments
1	27.8.2024	Martina Kubíková/ IREAS Vojtěch Dvořák/ IREAS	Chapter 3; Chapter 4: sections 4.1, 4.2, 4.3, 4.4, 4.5
1	01.09.2024	Mariya Zlateva/ RAPIV	Chapter 1; Chapter 2; Chapter 3; Chapter 4: section 4.6, and Chapter 6
1	20.09.2024	Sandra Weiß-Wallner/ IRS Lejla Turulja; Amra Kapo; Maja Arslanagić-Kalajdžić; Melika Husić-Mehmedović/ UNSA Mariya Zlateva/ RAPIV Vojtěch Dvořák; Martina Kubíková/ IREAS Amanda Dome/ PBN Adelina Bancila; Raluca Grigore/ Ropot Botique Lija Stojkovic; Sanja Popovic Pantic/ABW Veronika Blizman Servilová; Katarína Gavalcová; Diana Suchánková; Hana Palušková/ SBA Karin Črepinko; Mojca Tominšek / CCIS	Chapter 5, input for insights from the relevant countries
1	23.09.2024	Emilija Strucic/ TECHPARK Max Gemmeke/ BWCON Moroșan Valentina; Olga Marandici; Silvia Cangea-Digolean / ODA	Chapter 5, input for insights from the relevant countries
1	01.10.2024	Mariya Zlateva, Irina Kircheva, Ralitsa Zhekova/ RAPIV Veronika Blizman Servilová; Katarína Gavalcová; Diana Suchánková; Hana Palušková/ SBA	Final version

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Abbreviations and glossary of terms

ABW	Association of Business Women in Serbia
AT	Austria
BA	Bosnia and Herzegovina
BG	Bulgaria
BWCON	Bwcon GmbH, Germany
CE	Circular economy
CCIS	Chamber of Commerce and Industry of Štajerska, Slovenia
CZ	Czech Republic
DE	Germany
HR	Croatia
HU	Hungary
ICT	Information and Communication Technologies
IREAS	Institute for Structural Policy, o. p. s., Czech Republic
IRS	Innovation Region Styria LTD, Austria
MD	Moldova
ODA	Organization for Entrepreneurship Development, Moldova
PBN	Pannon Business Network Association, Hungary
RAPIV	Regional Agency for Entrepreneurship and Innovations – Varna,

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	Bulgaria
RO	Romania
Ropot Botique	Ropot Boutique SRL – Impact Hub Bucharest, Romania
RS	Serbia
S3	Smart Specialization Strategies
SBA	Slovak Business Agency
SI	Slovenia
SK	Slovakia
SME	Small and medium-sized enterprise
TECHPARK	Technology Park Varaždin ltd, Croatia
UNSA	University of Sarajevo, Bosnia and Herzegovina
WE	Women entrepreneur

1 Executive summary

The Transnational Skills Needs and Gaps Analysis synthesizes the current state of women entrepreneurs in twelve countries in the Danube region and their specific needs for circular and digital transitions. The analysis employs four methodological approaches to describe the situation and derive policy recommendations and conclusions. The analysis employs four methodological approaches to describe the situation and derive policy recommendations and conclusions: (1) analysis of secondary data from various national and international institutions, (2) quantitative research results based on a survey of women business (co-) owners, (3) qualitative research based on interviews with key stakeholders; and (4) interview-based case studies.

Main conclusions, triangulated by different methods, are as follows:

- While some areas are spearheading the transition towards a circular economy (e.g. Germany), others are still in the initial stages of this shift (e.g. Moldova). The data highlights the need for targeted policies and support systems to accelerate the adoption of circular technologies, particularly in regions with lower implementation rates.
- Primary motivations for women entrepreneurs to implement circular economy principles into their businesses include expected improvements in operational efficiency and quality, which suggests that many entrepreneurs view circular technologies as a means to enhance their business processes. Securing a competitive advantage is another significant driver, indicating that entrepreneurs believe adopting circular practices can provide them with a market edge. Pressure from clients and suppliers to modernize also plays a role, highlighting the external influences encouraging businesses to adopt more sustainable practices.
- Main barriers to adopting more advanced digital technologies among women entrepreneurs in the Danube region are high investment costs, which suggests that the financial burden of acquiring and implementing new technologies is a major deterrent. This is followed by a **lack of skills and knowledge on how to effectively implement these technologies, indicating a need for more educational resources and training programs**.

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- Besides, already above mentioned the main challenges faced by women entrepreneurs are lack of access to **networks and mentoring** that could provide the necessary guidance, support, and opportunities for collaboration in the tech-driven sectors. **Policy and regulatory support** are insufficiently gender-sensitive, creating additional hurdles for women entrepreneurs in adopting new technologies and scaling their businesses. Limited **access to technology and infrastructure**, particularly in rural areas, hinders women's ability to compete effectively in the digital economy. Social norms that view women as primary caregivers **reduce the time available** for business development and learning, further disadvantaging them in the entrepreneurial landscape. The digital transition is hindered by the need for advanced digital skills among team members and challenges in balancing work-life commitments, which affects participation in ongoing education and training. **Awareness gaps** - the need for access to information, adaptation to legislative changes, and expert advice is crucial.

- **Top 3 training topics for CE transition: (1) Funding opportunities for transitioning to a circular economy** - highlights the crucial importance of financial resources in enabling entrepreneurs to adopt circular economy practices. (2) **Application of circular economy tools and measures in specific industries** - necessity for guidance tailored to specific industries, indicating that entrepreneurs are seeking practical, actionable insights tailored to their respective sectors. The necessity for specialised training addresses the specific challenges and opportunities presented by each industry. (3) **Utilization of digital technologies for transitioning to a CE** - the data indicates that entrepreneurs recognise the transformative potential of digital tools and are keen to leverage these technologies to enhance their circular economy initiatives.
- **Top 3 training topics for digital transition**: The highest demand is for **Resource optimization (time, personnel, investments).** This is closely followed by **digital marketing and development of digital business models and services** and the **use of digital technologies and the Internet for business needs**. Cybersecurity is also a notable concern.
- Digital skills needs vary from country to country depending on their level of adoption of digital technologies and supporting ecosystem. The first group (includes Czechia and Germany), places a strong emphasis on the necessity to enhance only advanced **digital competencies, particularly in domains such as advanced software and cybersecurity.** The second group (Austria, Hungary,

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Moldova, Slovakia, Bulgaria and Slovenia) has a **balanced need for improvement across both basic and advanced digital skills.** The third group (includes Bosnia and Herzegovina, Croatia, Romania, and Serbia), demonstrates a distinct **requirement to enhance advanced software capabilities while also strengthening basic digital literacy**

KEY RECOMMENDATIONS:

- **Develop specialized training programs:** Create accessible training initiatives focused on digital skills, circular economy practices, and innovation management tailored to women entrepreneurs with main focus on indicated top training topics. These should also cover business communication and marketing skills. Emphasizing the importance of continuous skill development, particularly in: accessing financial instruments; innovation management; circular transition and digitalization, especially in sectors like Food and Agriculture, Textile and Plastics; circular economy and digital transformation tailored to women's needs. Offering flexible learning opportunities that accommodate work-life balance.

- **Enhance networking and mentorship:** Establish platforms that facilitate networking and mentorship, allowing women entrepreneurs to connect with industry leaders and gain valuable insights. Public-private partnerships and cross-sector collaborations should be encouraged.

- **Increase financial support:** Introduce targeted financial mechanisms like grants, preferential loans, and microcredits to help women invest in new technologies and circular business models.

- **Improve access to digital infrastructure:** Ensure that women entrepreneurs have the necessary digital tools and high-speed internet to participate fully in the digital economy.

- **Promote inclusive policies:** Focus on simplifying administrative processes and providing clear guidance for transitioning to circular business models. Increasing public support through financial assistance for initial costs, and promoting events, workshops, and international exchanges to bridge regional gaps. Engaging male entrepreneurs in sustainability discussions and empowering women in decision-making roles is also crucial.

- **Focus on key sectors:** Prioritize skill development and management training in sectors like agriculture, food, textile and fashion, construction, and energy, where circular economy practices can be most impactful.

- **Highlight success stories and role models:** Promote examples of successful women entrepreneurs to inspire and motivate others. Implement awards and recognition programs to boost visibility and motivation.

- **Support flexibility and work-life balance:** Encourage policies and workplace practices that support flexible work arrangements, helping women balance professional and personal responsibilities.

- **Encourage government and private sector collaboration:** Increase involvement of the private sector in legislation drafting and promote voluntary commitments to enhance policy awareness and implementation.

- **Raise awareness and provide resources:** Increase efforts to spread awareness of circular economy benefits, provide accessible education, and ensure that resources are available to help women entrepreneurs seize new opportunities. Promoting sustainability as a key business topic to ensure broader acceptance and the need for specialized software to manage sustainability data efficiently.

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2 Introduction

The Transnational Skills Gaps and Needs Analysis aimes at dissecting the unique barriers and opportunities that lie within the Danube region transition to a more circular, innovative, and digital economy. Through a meticulous examination of the current state, this report endeavors 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, stakeholders' interviews, and case studies, offering a nuanced understanding of the skills landscape in 12 countries in the Danube region. 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 applied

Desk research, surveys, stakeholder interviews, case studies, and comparative analysis are used 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.

The countries included in the survey are Austria, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, the Republic of Moldova, Romania, Serbia, Slovakia and Slovenia. The data for Germany is specific to the region of Baden-Württemberg and does not represent the entire country.

The objective of these surveys was to gather data on the application of circular economy principles in businesses operated by women entrepreneurs within these countries.

The questionnaires were translated into the relevant national languages to ensure clarity and ease of understanding for participants. The questionnaires were distributed via a variety of channels, including social media platforms, email campaigns, and other relevant communication methods, with a specific focus on reaching women entrepreneurs. The data collection period was from April to early June 2024, allowing sufficient time to gather a robust dataset.

Once the data collection phase was complete, the responses were translated into English to ensure a coherent and unified analysis. Subsequently, all collected data were consolidated and subjected to a rigorous data cleaning process to eliminate irrelevant

responses, such as submissions from male respondents or incomplete questionnaires. Following this rigorous refinement process, the final dataset comprised 373 valid responses[1] from the twelve participating countries.

To effectively understand the dynamics of the skills gap and needs within Danube region, a carefully curated sample of women entrepreneurs and female-led startups 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 countries. 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 Bulgaria.

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

[1] *It should be noted that not all questions in the survey were mandatory. Consequently, the number of responses differs across the various sections of the analysis, due to the voluntary nature of certain questions. This variability has been factored into the subsequent analysis, ensuring that each insight is based on the most relevant and accurate data available*

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4 Women entrepreneurs in the Danube Region: An analysis of skills needs and gaps for circular economy and i4.0 transition

This section of the Transnational Analysis has been prepared based on the findings from a series of extensive questionnaire surveys and interviews conducted at the national/ regional level across twelve countries in the Danube region.

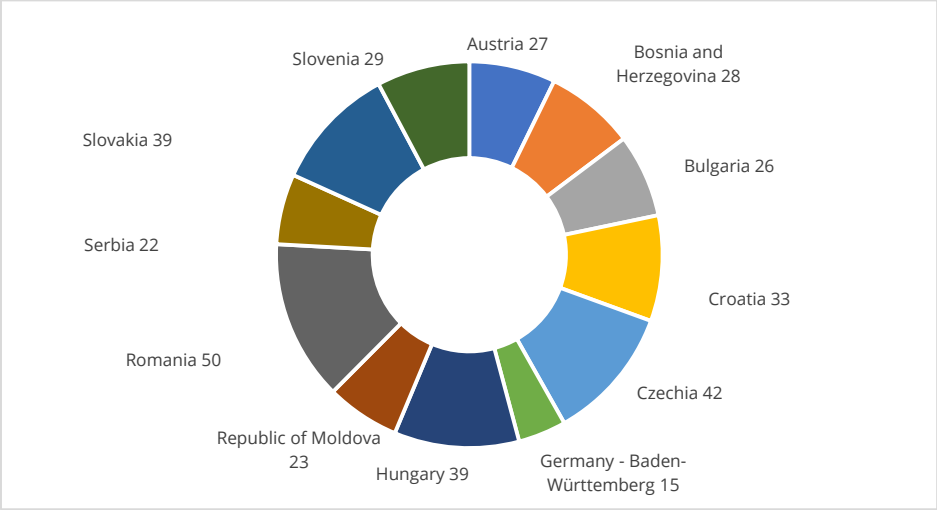

Figure 1: Number of respondents all countries

The first objective is to identify and **analyse the differences in the application of circular economy practices** among women entrepreneurs across the various countries within the Danube region. Secondly, we will try to **identify common themes and challenges faced by women entrepreneurs** in relation to the adoption of circular economy practices. Furthermore, it is necessary to identify specific areas where women entrepreneurs across these countries lack access to education and support, which are essential for enabling a successful transition to circular business models.

By examining these aspects in detail, this analysis provides valuable insights that can inform policymakers, stakeholders, and support organisations in designing targeted interventions to enhance the adoption of circular economy practices among women entrepreneurs in the Danube region. These efforts are crucial for promoting sustainable

economic development and ensuring that women entrepreneurs are adequately supported in their transition towards more sustainable and resilient business practices.

Sector	AT	BA	BG	HR	CZ	DE	HU	MD	RO	RS	SK	SI	Total
Construction and Real estate	2			1	1		1			1	2	2	10
Consumer Goods	1		3		1	1	2				1	1	10
Energy	1	1				1	1	1	1			2	8
Food and Agriculture	1	2	3	2			3	6	2	4	2	1	26
Healthcare	4		1	1	1	2	4	1	5			2	21
Manufacturing and Production		11	2	1	2	2	6	5	4	5	7	3	48
Retail and e-commerce	1	1	4	1	7		2		2	1	2	1	22
Technology, electronics, IT	6		3	2	4	3	1		2		2	3	26
Textile and Fashion	2		4	3	5	1	7		3		2	2	29
Transport	1		2	1			2	1				2	9
Waste and water management	1						2				1	1	5
Other	7	13	4	21	21	2	8	9	25	11	20	9	150
Total	27	28	26	33	42	12	39	23	44	22	39	29	364

Figure 2: Structure of respondents according to the sectors

When it comes to presenting the structure of the surveyed women entrepreneurs, it could be noted that there is good representation from the highest impact to the CE (Food and Agriculture, Textile and Fashion, Manufactoring and production). Lower representation is noted mainly in sectors usually predominated by men (Energy, Transport, Waste and Water management, Construction). The responses from the 150 respondents who selected "Other" indicate a diverse range of business sectors, with a notable concentration in key areas. The most frequently occurring response was "consulting," which was mentioned in various forms, including "business and marketing consulting," "management consulting," and "process management." It is also notable that roles in education and training services are common, including positions in the areas of education, training, and digital education. Marketing and media services are frequently referenced, with specific mentions of "Marketing," "PR and education," and "Social networks." A significant proportion of respondents are involved in the tourism and hospitality sectors, with many citing roles in tourism, hospitality, and accommodation services. The creative and cultural industries are represented by roles in art, design, and architecture, while health and beauty services include beauty,

manicure, pedicure, and fitness. It is also notable that respondents indicated involvement in the legal, financial, and administrative sectors, with specific mentions of "law," "accounting services," and "financial consultation." The "Other" category demonstrates the extensive range of business activities undertaken by women entrepreneurs in the Danube region, showcasing their diverse expertise and notable contributions to various industries.

4.1 Application of circular technologies into female business

The adoption of circular technologies, which prioritise sustainable resource management and waste reduction, is a crucial step in advancing towards a more sustainable economy.

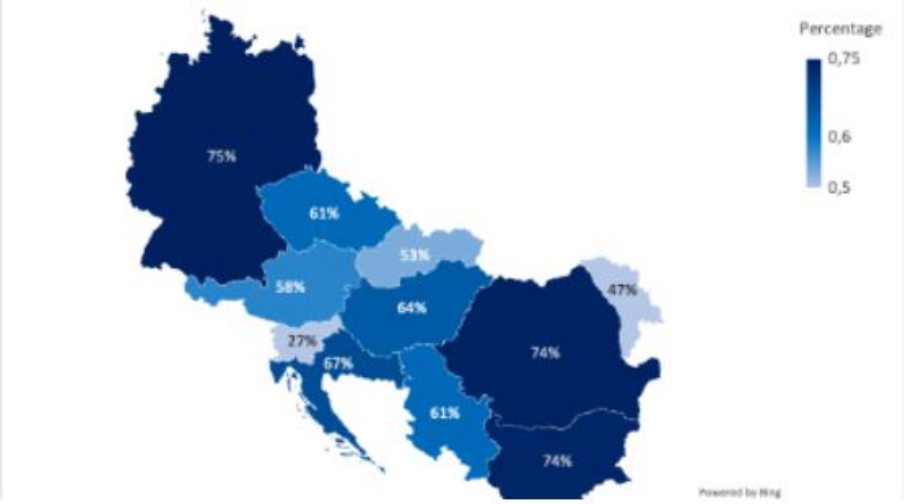

Figure 3: Application of circular technologies into business in the Danube region (n=314)

Note: The data for Germany is specific to the regions of Baden-Württemberg and Bavaria and does not represent the entire country.

The highest levels of circular technology adoption by surveyed women entrepreneurs, exceeding 70%, are as follows: Germany (Baden-Württemberg) leads the way with an impressive 75% adoption rate, followed by Romania with 74.36%, Bulgaria with 73.91%, and Bosnia and Herzegovina with 71.43%. Regions with **moderate implementation** rates, ranging from approximately 50% to 69%, include a diverse group of countries. Croatia has demonstrated a notable level of adoption with a rate of 66.67%, while Hungary and

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the Czech Republic have shown commendable efforts in integrating these technologies into their business operations, with rates of 63.89% and 61.29%, respectively. Serbia has an adoption rate of 61.11%, while Austria and Slovakia have rates of 57.69% and 53.13% respectively. The Republic of Moldova has an adoption rate of 47.06%, while Slovenia has **the lowest adoption rate** in the region at 26.92%.

It could be noted (figure3) a disparity in the uptake of circular technologies across the Danube regions. While some areas are spearheading the transition towards a circular economy, others are still in the initial stages of this shift. The data highlights the need for targeted policies and support systems to accelerate the adoption of circular technologies, particularly in regions with lower implementation rates.

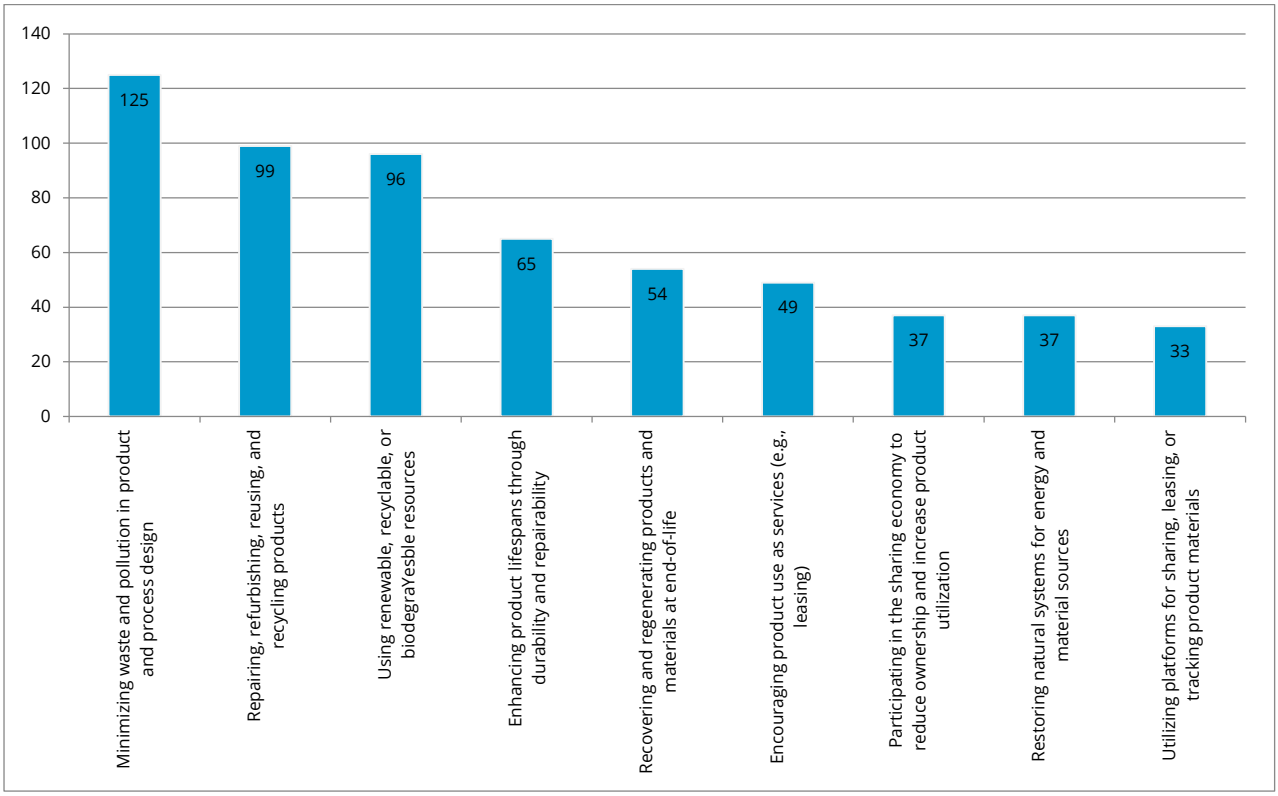

Figure 4: Circular technologies or models used in business (n=595)

Regarding the specific circular technologies most used by respondents, similar trends are noted across the surveyed countries. **The most used measures** are "Minimizing and waste pollution in product and process design" and "Repairing, refurbishing, reusing and recycling products". **The least used circular economy measures** include "Utilizing platforms for sharing, leasing or tracking product materials".

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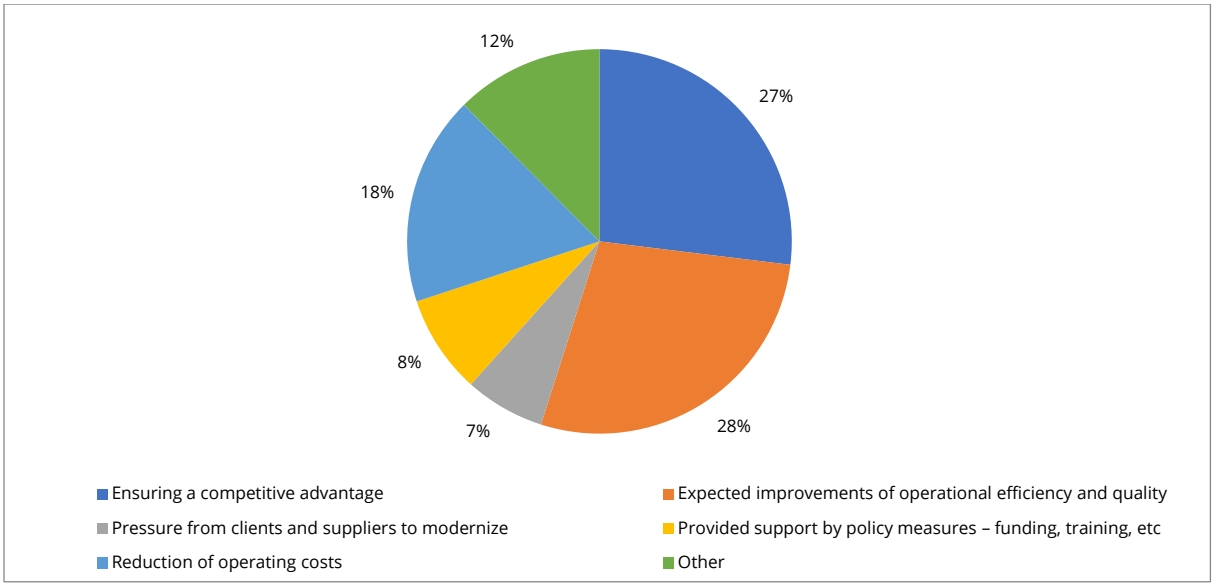

Figure 5: Motivation to implement CE principles into business (n=193)

The **primary motivations for women entrepreneurs to implement circular economy principles into their businesses**. The most common motivations include expected improvements in operational efficiency and quality, which suggests that many entrepreneurs view circular technologies as a means to enhance their business processes. Securing a competitive advantage is another significant driver, indicating that entrepreneurs believe adopting circular practices can provide them with a market edge. Pressure from clients and suppliers to modernize also plays a role, highlighting the external influences encouraging businesses to adopt more sustainable practices. Additionally, provided support by policy measures, such as funding and training, is a notable motivator, showing the importance of external assistance in facilitating the transition to circular economy models. Lastly, the reduction of operating costs is a key factor, emphasizing the financial benefits associated with implementing circular technologies.

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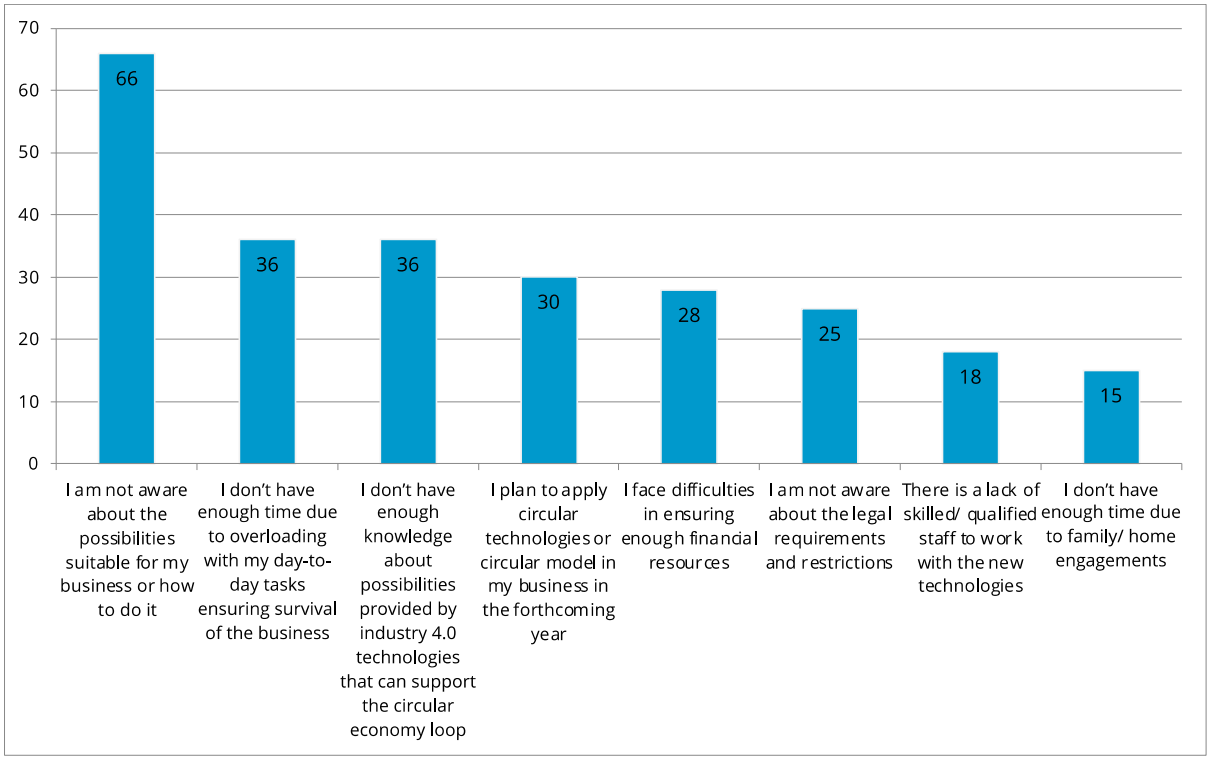

Figure 6: Reasons for not using CE models and technologies (n=278)

It is interesting to see that the primary reasons for the non-implementation of circular technologies are primarily due to a lack of awareness of the potential benefits of these technologies and a shortage of time to integrate them into existing processes. Three options were rarely mentioned in the survey, indicating that they do not represent significant considerations for respondents. These reasons are "It is challenging to alter the company's overall mindset and culture", "I am not inclined to pursue green solutions for my business" and "I am not motivated to apply because of the behaviour of my clients/consumers who are not willing to reuse, lease or buy recycled products".

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4.2 Barriers faced by women entrepreneurs

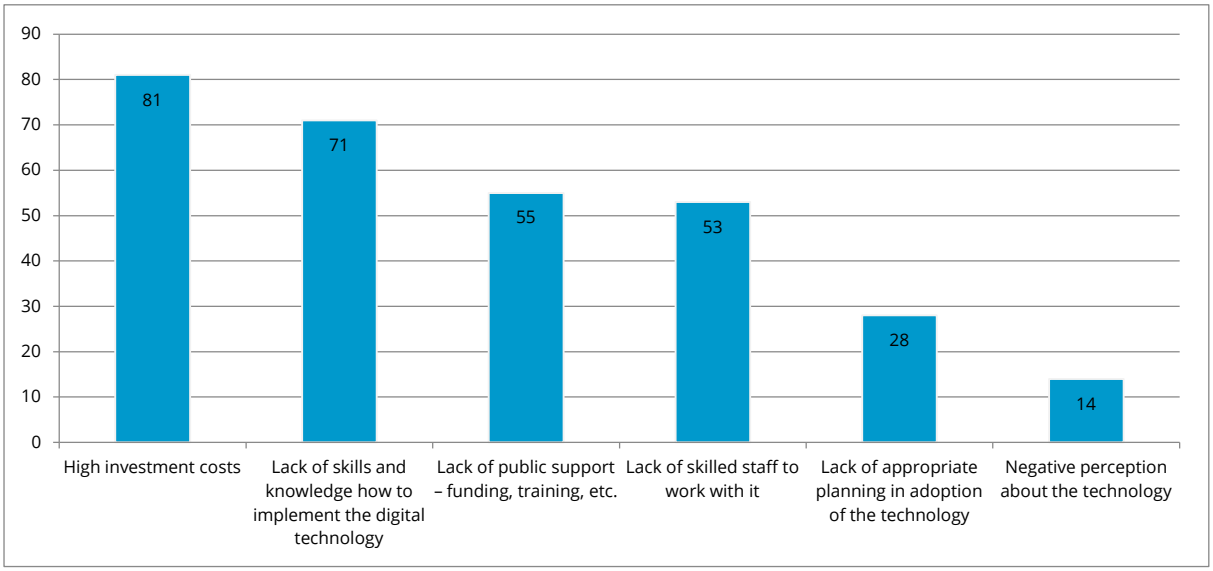

Figure 7: Barriers to adopting more advanced digital technologies (n=302)

The most significant **barrier to adopting more advanced digital technologies** among women entrepreneurs in the Danube region is **high investment costs**, which suggests that the financial burden of acquiring and implementing new technologies is a major deterrent. This is followed by a **lack of skills and knowledge on how to effectively implement these technologies**, indicating a need for more educational resources and training programs. Additionally, the **lack of public support, such as funding and training**, is another critical barrier, underscoring the importance of governmental and institutional backing to facilitate digital transformation.

Other notable barriers include a lack of skilled staff to work with advanced digital technologies and inadequate planning in the adoption process. Interestingly, negative perceptions about digital technologies were cited by only a small number of respondents, indicating a general optimism towards digital advancements1. The data suggests that while there is a willingness to embrace digital technologies, significant obstacles related to cost, knowledge, and support need to be addressed to enable broader adoption.

The significant impact on business was caused by **external factors that affected the entire economy of the Danube region**. These are the "events" of the **pandemic (COVID-19) and the crises resulting from the war in Ukraine**.

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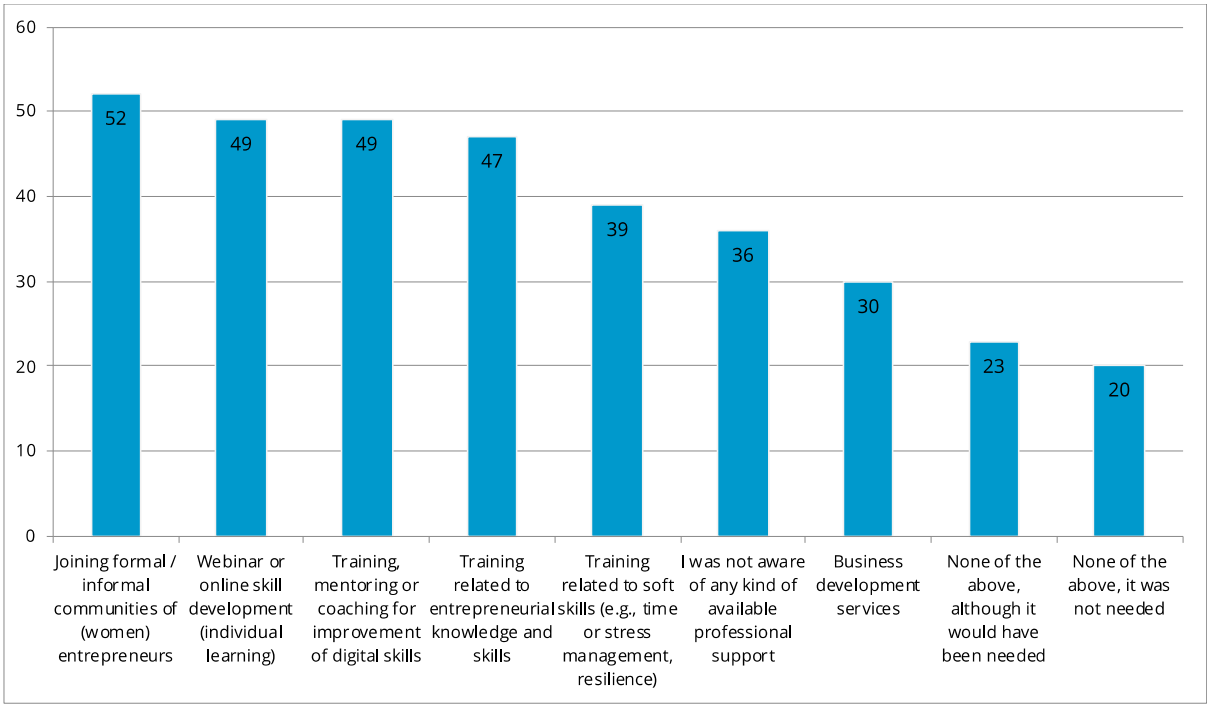

Figure 8: Types of support received for restarting the business after covid-19 and crisis from the war in Ukraine (n=345)

The most used forms of support by respondents to fight the negative effects from these "events" in all countries include joining formal or informal communities of (women) entrepreneurs, which highlights the importance of networking and peer support in business recovery. Furthermore, there is a notable demand for online training, such as webinars or online skill development sessions, which points to a growing preference for digital learning platforms. Training, mentoring and coaching to improve digital skills and entrepreneurial knowledge are also in high demand, indicating a strong need for continuous professional development in these areas.

It is important to notice that respondents value practical and accessible forms of support that can directly enhance their business operations. This includes training related to digital skills, which are crucial for modern business practices, and entrepreneurial knowledge, which helps in navigating the complexities of business management. The data suggests that women entrepreneurs are actively seeking resources that can provide them with the necessary skills and knowledge to adapt to new challenges and opportunities in the post-pandemic business landscape.

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4.3 Training needs and preferences of women entrepreneurs

A comprehensive survey was conducted to identify the training topics that women entrepreneurs consider most beneficial for facilitating a transition to a circular economy. The analysis of the survey results provides valuable insights. Approximately 82% of all the reposndents in the survey indicated their preferences among pre-selected topics.

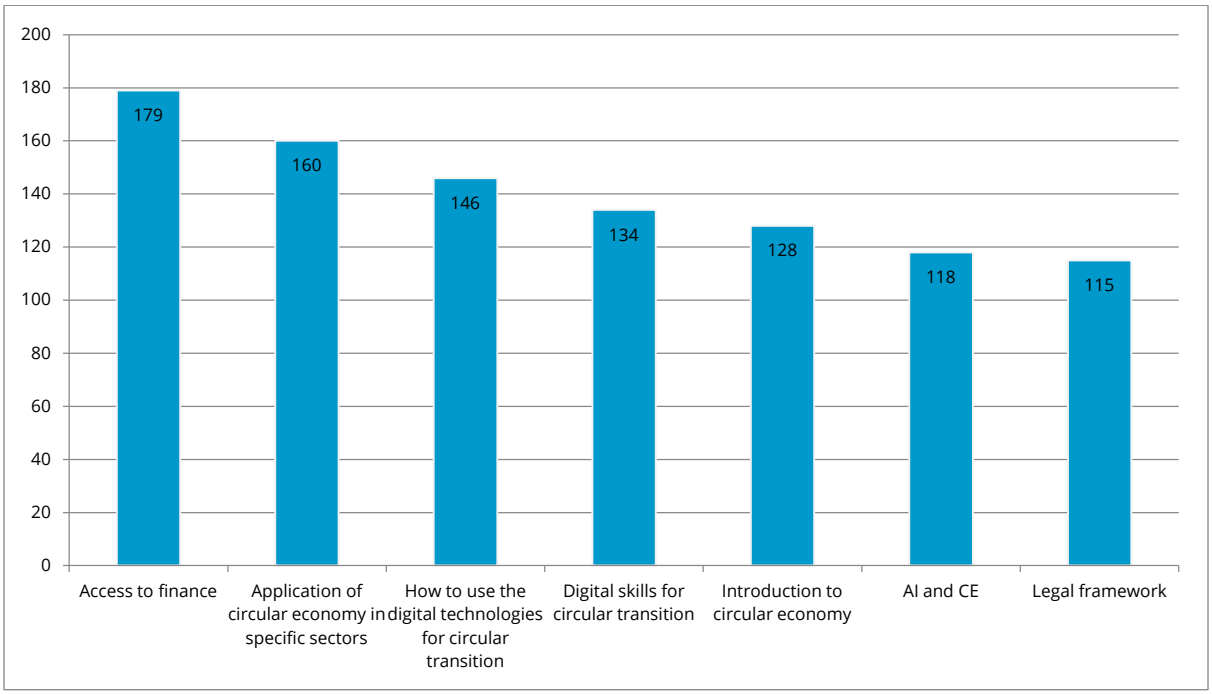

Figure 9: Preferred training topics to stimulate women entrepreneurs to transition to the circular economy (n=304)

The topic of **funding opportunities for transitioning to a circular economy** was identified as the most critical – preffered choice from 60% of all women responded to the question. This high level of interest highlights the crucial importance of financial resources in enabling entrepreneurs to adopt circular economy practices. The data indicates that access to funding is a significant concern and a potential obstacle to transition.

Another highly preferred topic is the **application of circular economy tools and measures in specific industries** (52%). This underscores the necessity for guidance tailored to specific industries, indicating that entrepreneurs are seeking practical,

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actionable insights tailored to their respective sectors. The necessity for specialised training addresses the specific challenges and opportunities presented by each industry.

Utilization **of digital technologies for transitioning to a CE** (prefferd by 48% of the respondents) highlights the crucial role of digital technologies in the transition process. The data indicates that entrepreneurs recognise the transformative potential of digital tools and are keen to leverage these technologies to enhance their circular economy initiatives. **Digital skills** (44%) for transitioning to a CE demonstrates a clear requirement for upskilling in digital competencies. The results indicate that entrepreneurs are aware of the importance of digital literacy and are seeking training to develop the necessary skills to support their transition efforts

Introduction to the CE, indicating a significant interest in foundational knowledge of 42% of the respondents. Women entrepreneurs are seeking to gain an understanding of the fundamental principles and advantages of the circular economy, which is crucial for making well-informed decisions and developing effective strategies.

The topic of **AI and its use in the CE** (38%) demonstrates a keen interest in cutting-edge technologies. The data indicates that entrepreneurs are interested in exploring the potential of AI in circular economy practices, with a view to driving innovation and efficiency.

Finally, the results show that there is a average interest (37%) in learning about legislation related to business and the circular economy, which underscores the importance of understanding the legal framework. Entrepreneurs are aware that adherence to pertinent legislation is vital for the effective implementation and long-term viability of circular economy practices.

4.4 Digital skills needed by women entrepreneurs to acquire or improve

The most required ICT areas for training are analysed based on indicated topics by 38% of all the respondents.

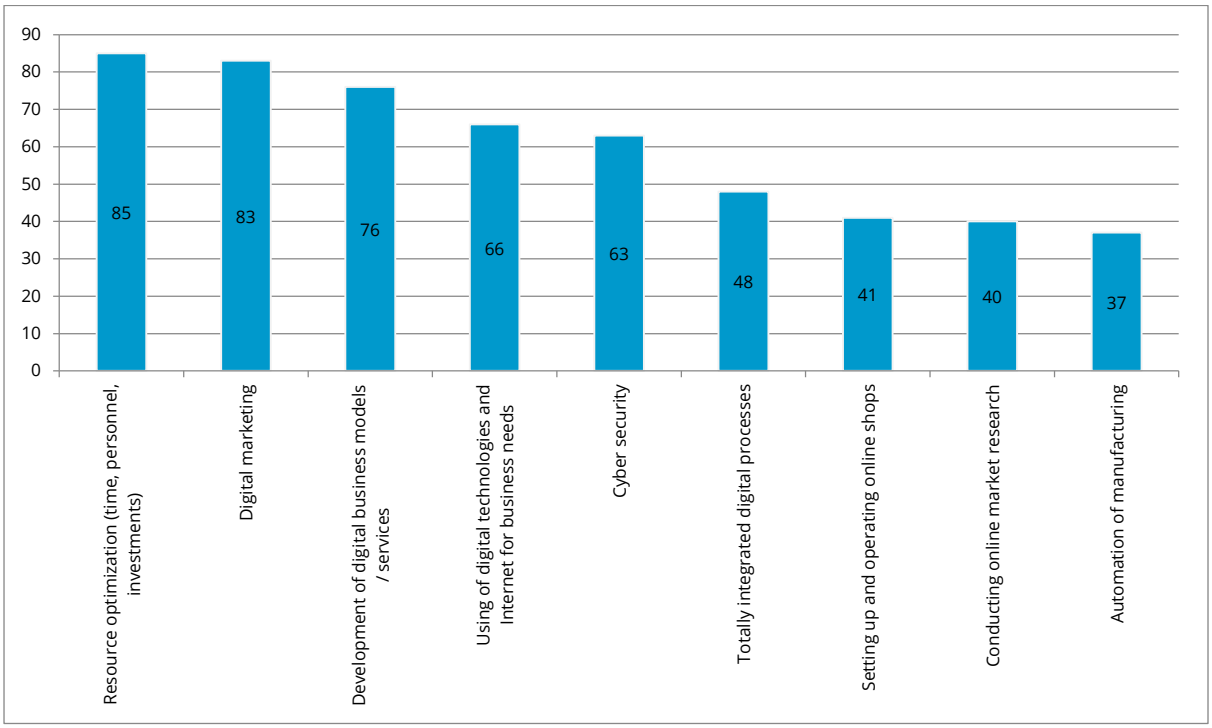

Figure 10: Most required ICT areas for trainings (n=122)

The most required ICT areas for training among women entrepreneurs is for resource optimization (time, personnel, investments) – 70% of all responses to the question. This is closely followed by digital marketing, which 68% identified as crucial for their business operations. Other significant areas include the development of digital business models and services (63%) and the use of digital technologies and the Internet for business needs (54%). Cybersecurity is also a notable concern, with 52% of the respondents highlighting the need for training in this area. Additionally, there is a demand for training in totally integrated digital processes (39%), setting up and operating online shops (34%), conducting online market research (33%), and automation of manufacturing (30%).

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It is very interesting to notice that even the topic for cybersecurity is not among the top 3 of most required areas, women entrepreneurs indicate that they mainly need to acquire or improve their skills exactly in this area (47% from all responses to this question).

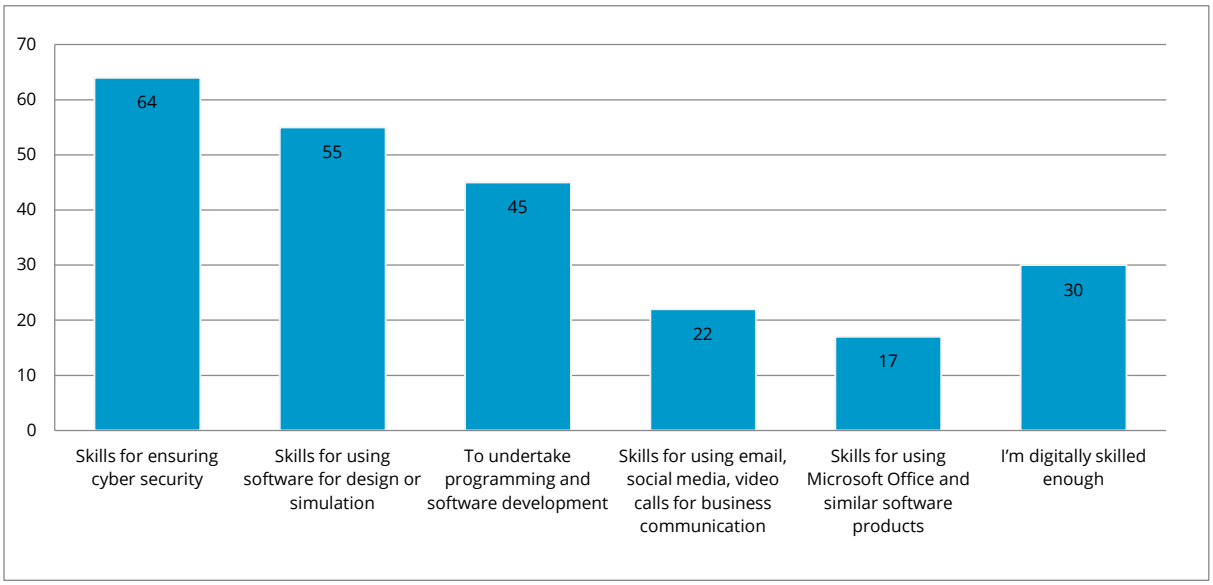

Figure 11: Digital skills needed to acquire or improve aggregated (n=137)

The next most sought-after skill is the ability to use software for design or simulation (40%). Furthermore, 33% of them indicated a requirement to acquire proficiency in programming and software development. These findings highlight the importance of technical proficiency in ensuring the security and efficiency of digital operations.

The figure also demonstrates that a considerable proportion of respondents are confident in their current digital skills, with 22% of the respondents indicating that they possess the requisite digital proficiency. However, there is still a notable demand for skills in using email, social media, and video calls for business communication, as well as Microsoft Office and similar software products. This suggests that while some entrepreneurs are proficient in basic digital tools, there is a clear requirement for more advanced technical training to support the transition to a circular economy.

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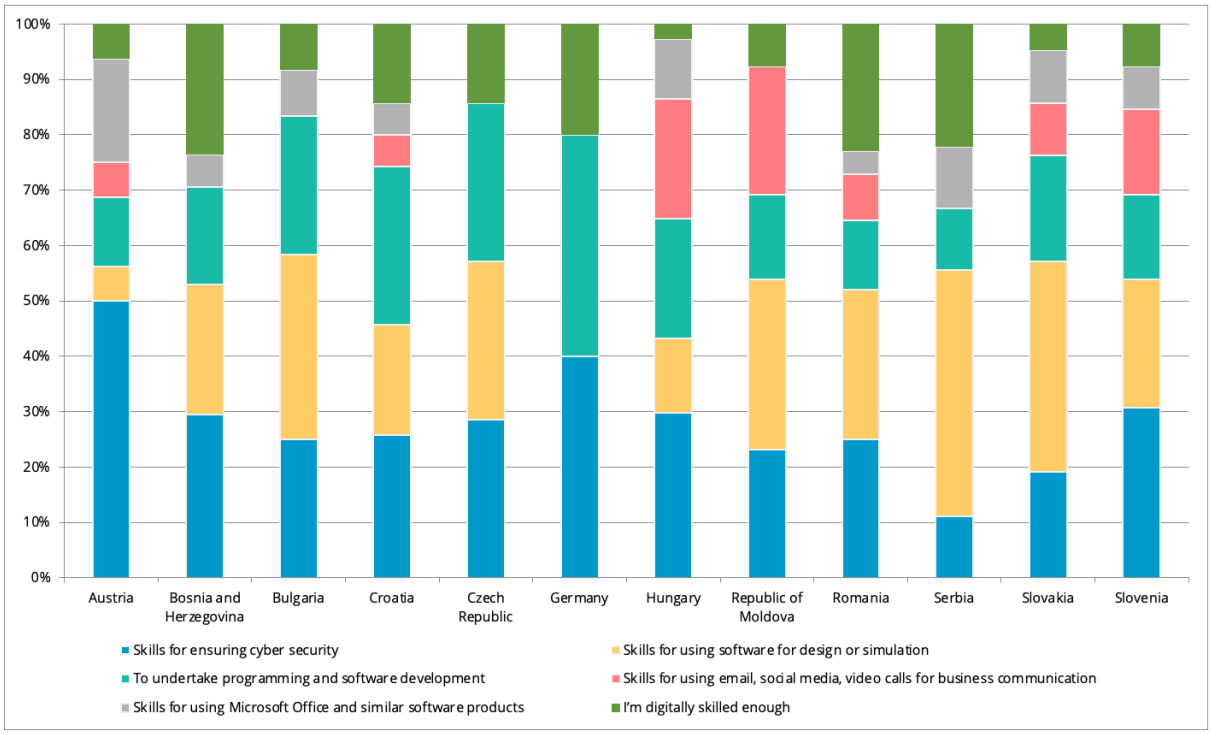

Figure 12: Digital skills needed to acquire or improve aggregated per country (n=137)

Note: The data for Germany is specific to the regions of Baden-Württemberg and does not represent the entire country.

The analysis of the digital skills needs per countries shows that the **composition of needs varies considerably between countries**:

- The first group (includes Czechia and Germany), places a strong emphasis on the necessity to enhance only advanced digital competencies, particularly in domains such as advanced software and cybersecurity. It is noteworthy that in Germany, over 20% of respondents consider themselves to have the requisite digital skills. This suggests that while Germany has a high level of existing digital competence. In contrast, the Czech Republic also exhibits a comparable requirement for advanced capabilities, though with a less developed foundation in digital expertise.
- The second group (Austria, Hungary, Moldova, Slovakia, Bulgaria and Slovenia) has a **balanced need for improvement across both basic and advanced digital skills**. This indicates that, while these countries have made progress in digital literacy, there is still a need for comprehensive upskilling across all levels of

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digital competencies. This balanced approach reflects the necessity to both reinforce fundamental digital skills and address more complex digital challenges.

- The third group (includes Bosnia and Herzegovina, Croatia, Romania, and Serbia), demonstrates a distinct **requirement to enhance advanced software capabilities while also strengthening basic digital literacy**. Unlike the first group, some respondents in this category also emphasise the necessity for education in basic digital skills, suggesting a mixed structure. It is notable that in Bosnia and Herzegovina, Romania, and Serbia, over 20% of respondents have demonstrated proficiency in digital skills. This indicates that while basic digital literacy is relatively widespread, there is a significant need for more advanced digital skills, including the use of software for design or simulation, programming, and software development.

4.5 Smart specialization strategies awareness

The S3 (Smart Specialization Strategies) in Danube region countries play a **crucial role in enhancing the women entrepreneurs ecosystem** by fostering innovation, digital transformation, and circular economy practices. These strategies prioritize regional strengths and align resources to support women entrepreneurs in accessing digital tools, skills, and networks essential for competitiveness. By promoting inclusive policies and facilitating the adoption of circular technologies, S3 initiatives contribute to sustainable growth and empower women entrepreneurs to lead in the evolving digital and green economies, ultimately driving regional economic resilience and gender equality.

Surpsingly women entrepreneurs are not familiar with S3 strategy in their region. region The region Baden-Württemberg from Germany shows the highest proportion of unawareness (100%), followed by Slovakia (97%). There is also a high proportion of unawareness of S3 in Bulgaria (88%), Romania (85%), Austria (81%), which is not the case for women entrepreneurs from Moldova and Croatia which seem to be best informed.

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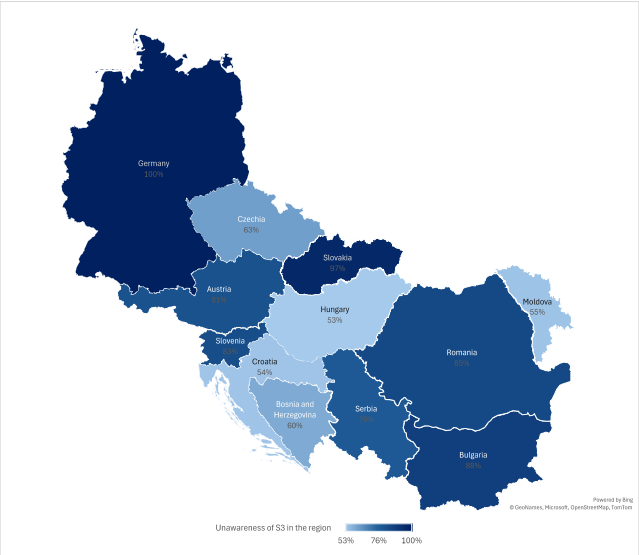

Figure 13: Unawarness of S3 in the region (n=259)

Note: The data for Germany is specific to the regions of Baden-Württemberg and does not represent the entire country.

4.6 Identified gaps from stakeholders perspective

In this section it is presented and analysed qualitative data collected through the interviews from stakeholders and successful business women for better understanding the broader ecosystem and support structures for WEs are made. Through them are explored perceptions and suggestions for facilitating a successful s3 and i4.0 transition under CE aspects of WEs in the countries of the Danube region. The stakeholders and successful business women were identified and interviewed in the period of May – July 2024. Totally 42 stakeholders and 12 women entrepreneurs were interviewed by project partners.

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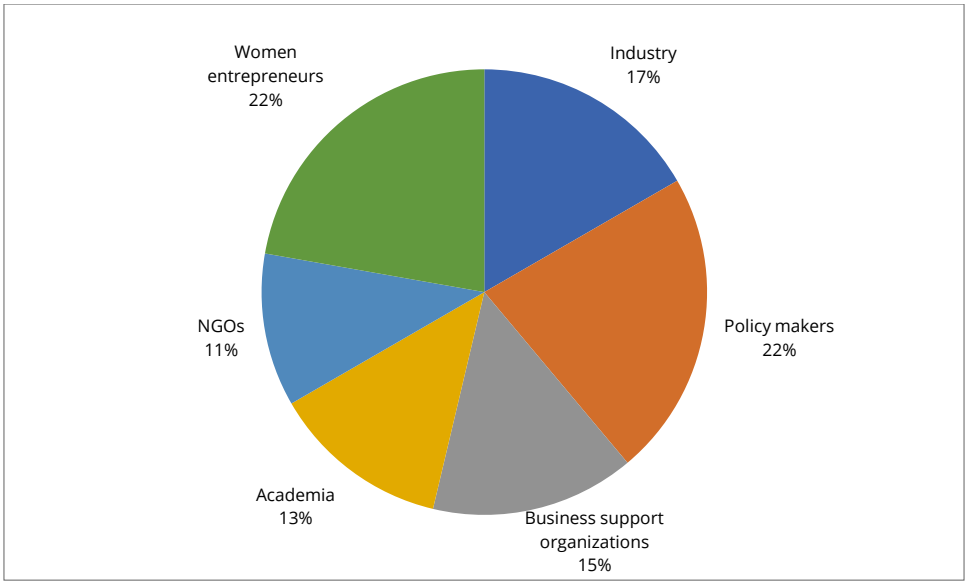

Figure 14: Structure of interviewed stakeholders and women entrepreneurs (n=42)

It is evident form the interviews that no specific policy measures to support the transition from a linear to a circular economy specifically for women entrepreneurs or to enhance their digital and circular skills.

All stakeholders are aware that the new technologies will drastically change business models, and the sooner companies realise this, the better. This change also offers great business opportunities for young people and start-ups. Digital technologies can make business processes more efficient, increase productivity and drive innovation. Women entrepreneurs gain access to new markets and business models, which strengthens their competitiveness.

The **main barriers to the digitalization and Industry 4.0 transition** for women entrepreneurs identified by stakeholders include several interconnected challenges:

- **Access to finance:** women entrepreneurs face difficulties in securing venture capital, grants, and other financial resources due to gender biases and a lack of tailored financial instruments.
- **Education and training**: There is a shortage of specialized training programs focused on advanced technologies and entrepreneurship, leaving women underprepared for Industry 4.0 and digital transformation. Entrepreneurs face challenges in acquiring specific knowledge on financing, market entry, and

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building networks with peers and experts, especially in a rapidly changing digital environment.

- **Networks and mentoring:** Women often lack access to networks and mentoring programs that could provide the necessary guidance, support, and opportunities for collaboration in the tech-driven sectors.
- **Policy and regulatory support:** The current policies and regulatory frameworks are insufficiently gender-sensitive, creating additional hurdles for women entrepreneurs in adopting new technologies and scaling their businesses.
- **Access to technology and infrastructure:** Limited access to advanced digital tools and infrastructure, particularly in rural areas, hinders women's ability to compete effectively in the digital economy.
- **Time constraints and caregiving responsibilities:** Social norms that view women as primary caregivers reduce the time available for business development and learning, further disadvantaging them in the entrepreneurial landscape. The digital transition is hindered by the need for advanced digital skills among team members and challenges in balancing work-life commitments, which affects participation in ongoing education and training.
- **Market access and business development:** Women entrepreneurs face challenges in entering new markets and forming strategic partnerships, which are crucial for business growth in the digital economy.

Addressing these barriers requires a holistic approach that includes improving access to finance, developing targeted training programs, enhancing networking opportunities, and advocating for supportive policies. Additionally, efforts should be made to increase digital literacy and provide adequate technological infrastructure to support women in their entrepreneurial endeavors.

Key initiatives like the EBRD's Go Digital in Bosnia and Herzegovina credit line were highlighted as critical in boosting digital capacities among women entrepreneurs and could be used as a good example.

In the **transition to a circular economy within the S3 and Industry 4.0 framework**, stakeholders identified several significant barriers:

1. **Specialized training deficiency:** There is a noticeable gap in training programs specifically designed for women entrepreneurs. These programs are crucial for equipping them with the skills necessary to navigate the complexities of advanced economic models like S3, Industry 4.0, and the circular economy.

2. **Insufficient financial support:** A lack of adequate funding is a major obstacle for women entrepreneurs. This financial gap hinders their ability to invest in necessary technologies and business models that promote sustainability and innovation, limiting their participation in the circular economy.

3. **Limited networking opportunities:** Women entrepreneurs struggle with accessing networking platforms that are essential for knowledge-sharing, collaboration, and business growth. Existing networks do not sufficiently meet the needs of women striving to engage in these new economic paradigms.

4. **Stakeholder colaboration issues:** A lack of colaboration among policymakers, industry experts, and educational institutions further complicates the support system for women entrepreneurs. This fragmentation leads to ineffective delivery of resources and support, leaving many women without the guidance they need.

5. **Skills development and understanding:** The need for skills development, including effective communication, collaboration, and understanding of legal frameworks, is critical. Empowering women entrepreneurs with these skills is essential for their successful transition to a circular economy.

6. **Balancing work and family responsibilities:** The demand for flexible workplaces and the struggle to balance work and family responsibilities are significant barriers. These challenges are compounded by difficulties in translating educational achievements into practical business applications.

Despite these barriers, women entrepreneurs in Slovakia, in particular, demonstrate a strong inclination toward sustainability and the circular economy. They are often driven by environmental responsibility rather than profit, especially in non-profit and small enterprise sectors. Recognized for their innovative ideas, women are seen as key drivers of societal progress and change, particularly in promoting green and rational business practices. However, overcoming the identified barriers is essential for enabling more women to lead in this transition.

The interviews highlight the importance of Smart Specialization (S3) as a crucial tool for sustainable economic growth, allowing for targeted investments in high-potential sectors. However, challenges such as inadequate coordination and financial resources were identified. Policymakers are seen as key players in driving S3 implementation by fostering political support and stakeholder coordination.

In the Czech Republic, the RIS3 strategy is part of the S3 framework, but perceptions vary. Some interviewees criticize the strategy for being overly lengthy and lacking sectoral focus compared to shorter, regionally focused strategies like those in the Netherlands. One expert suggested that greater decentralization could benefit regions with strong negotiation skills, allowing them to tailor the national strategy to their advantage.

Additionally, the interviewed successful women entrepreneurs noted some important barriers thay faced:

1. Awareness gaps: The need for access to information, adaptation to legislative changes, and expert advice is crucial. Despite available support in Austria, many entrepreneurs lack awareness about how to make their business models sustainable.
2. Consumer perception: Shifting consumer perceptions to favor recycled products remains a significant challenge, impacting the broader acceptance and success of CE products.
3. Supply chain and ethics: Finding reliable suppliers who meet environmental standards and ensuring ethical production was challenging, alongside logistical issues and e-shop optimization.

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5 Insights from WE.Circular countries

5.1 Austria

Country overview

Austria is a country in Central Europe and borders Germany, the Czech Republic, Slovenia, Italy, Slovakia, Hungary, Switzerland and Liechtenstein. The capital and largest city of Austria is Vienna. Austria has an area of approx. 84,000 km² . The population of Austria was 9,158,750 on January 1, 2024. The average age of the population is 43.4 years and women make up 50.7% of the population.

Austria's economy is structured around small businesses. In 2022, a total of around 601,300 companies in the market-oriented economy were classified as small and medium-sized enterprises (SMEs). The majority of these were micro-enterprises with fewer than ten employees (92% of all companies). 56 % were EPUs, i.e. self-employed persons without permanent employees.

An analysis by sector shows that most SMEs within the market-oriented economy are active in trade (16% of SMEs), the provision of professional, scientific and technical services (16%), health and social work (14%), accommodation and food service activities (8%), construction (7%) and the manufacture of goods (5%). These six largest SME sectors account for around two thirds of the companies and around 70% of the employees and gross value added of SMEs. Overall, around 38% of SMEs are run by women.

The proportion of women among the self-employed in SMEs differs significantly within the sectors. It is particularly high, for example, in the health and social work sector (70 %) and in the education and teaching sector (55 %). In contrast, only 12% and 13% of the self-employed in the information and communication and transport sectors are women.

Austria has made significant progress in the area of female entrepreneurship. In 2023, more than one in three companies in Austria (39.3%) was run by a woman. The average age at which a company was founded was 37.3 years (compared to 35.4 years for men).

Women entrepreneurs are clearly ahead, especially in the service sector: the specialist groups with the highest proportion of women are pedicurists, cosmeticians and masseurs (82.7 %), direct sales (81.1 %) and fashion and textile (79.7 %).

The ecosystem generally offers various support mechanisms for female entrepreneurs, but these do not focus specifically on circular and digital transition.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

When it comes to familiarity with CE principles, it is interesting to note that 59 % Women entrepreneurs already apply any circular technologies or models in their business. Minimizing waste and pollution in product and process design was mentioned most (59 %), followed by Repairing, refurbishing, reusing, and recycling products (41 %), Using renewable, recyclable, or biodegradable resources (29%) and Enhancing product lifespans through durability and repairability (29%). On the other hand, they seem to be less familiar with the concept of Encouraging product use as services e.g., leasing (only 6 %).

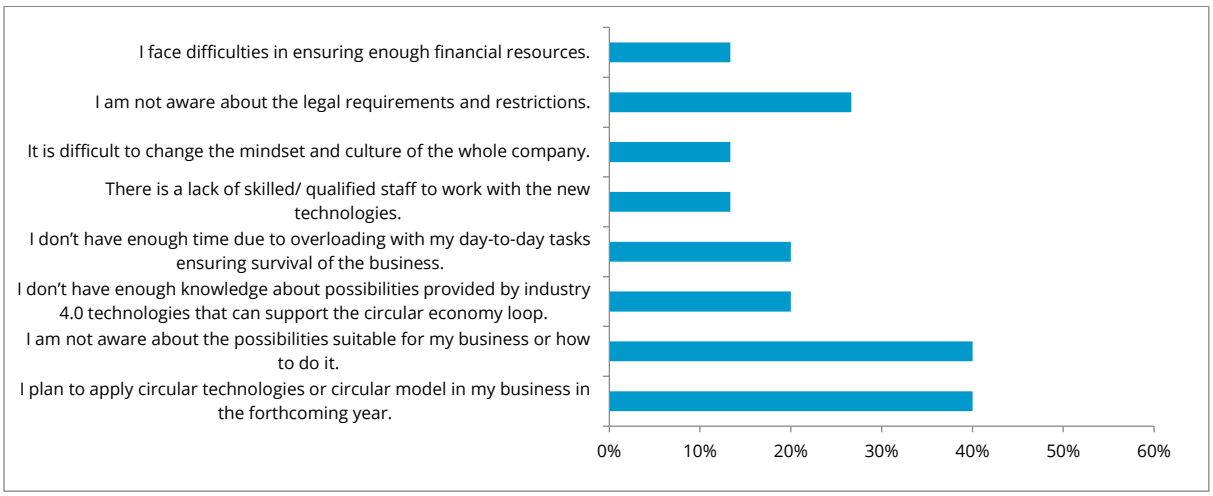

Figure 15: Faced challenges for CE application by women entrepreneurs in Austria

Around 41 % of female entrepreneurs do not yet apply circular strategies, although 40 % of them state that they will apply circular technologies or circular models in their business in the forthcoming year. Surprisingly, just as many are not yet aware about the possibilities suitable for their business or how to do it.

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When asked which **training topics would be most beneficial for stimulating the circular transition** of women entrepreneurs made the following ranking, starting from the most beneficial one:

1. Introduction to the circular economy
2. Application of circular economy in specific sectors
3. AI and circular economy
4. How to use the digital technologies for circular transition
5. Digital skills for circular transition
6. Access to finance
7. Legal framework

When it comes to digital technologies application in their business 76% of respondents confirmed application of such. Most of them use mobile technologies (employing mobile devices and applications to facilitate communication, remote work, and access to business applications and services), collaboration tools (adopting platforms for team collaboration, project management, and communication to enhance productivity and support remote work) and digital marketing tools (utilizing online platforms, social media, and analytics tools for targeted marketing, customer engagement, and sales optimization).

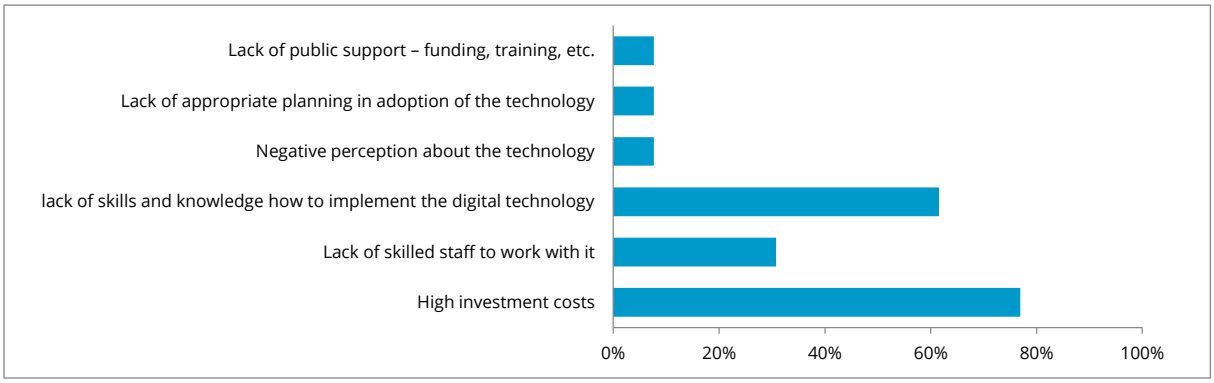

Figure 16: Barrieres for adopting of advanced digital technologies in Austria

When it comes to ranking the **most needed digital skills**, 38 % of women entrepreneurs indicated a need to obtain **skills for ensuring cyber security**. Surprisingly also 23 % want to acquire or improve skills in **using Microsoft Office and similar software products** and also 25 % undertaking **programming and software development**.

The most important topics for training in the field of digital skills and digital transition for female businesses, as identified by respondents, are ranked as follows, starting from most important one:

1. Cyber-Security
2. Development of digital business models / services
3. Digital marketing
4. Resource optimization (time, personnel, investments)
5. Totally integrated digital processes

A high number of respondents (74%) are not aware of the Smart Specialization Strategy (S3) in their region. Among those who are aware, only one company indicated involvement in regional, national and/or EU funding programs designed to support the S3 areas.

When evaluating the external impact of the crisis (COVID-19 and the war in Ukraine), it should be noted that 82% of the women who responded to these questions indicated that their business activities and strategies have been affected. Almost all of them used various types of support to "restart" their businesses, mainly by attending webinars or online skill development/individual learning (53%), utilizing business development services (33%) and joining formal/informal communities of (women) entrepreneurs (26%).

Stakeholders perspective

Currently, there are **no specific policy measures to support the transition from a linear to a circular economy specifically for women entrepreneurs or to enhance their digital and circular skills**.

All stakeholders are aware that the new technologies will drastically change business models, and the sooner companies realise this, the better. This change also offers great business opportunities for young people and start-ups. Digital technologies can make business processes more efficient, increase productivity and drive innovation. Women entrepreneurs gain access to new markets and business models, which strengthens their competitiveness.

There are already many funding programmes from major funding sources such as SFG, AWS and FFG that support these developments. Although politicians also emphasise the

advantages, it is also important to deal with the risks and dangers. Much more financial and human support is needed to tackle the difficulties and dangers of the IT/virtual world. The market does not work well here because large companies demand quick and cheap solutions, while small (female) companies first need to develop expertise and gain experience.

From the stakeholders' perspective, the following skills in particular will be necessary for women entrepreneurship:

- Digital literacy: understanding and applying digital technologies.
- Innovation skills: Developing and implementing new ideas.
- Sustainability management: Applying CE principles in business processes.
- Co-operation and networking skills: Building effective partnerships and networks.

Stakeholders recognise gaps in the support of women for the transition to s3 and i4.0 in particular:

- Access to finance: Better access to funding opportunities for sustainable and digital technologies.
- Education and training: Programmes that provide the necessary knowledge and skills.
- Networks and mentoring: Access to networks and mentoring programmes for sharing experiences and collaboration.
- Political support: Stronger political support and legal framework conditions to promote equality and take the needs of female entrepreneurs into account

But there are not only gaps in the support for women, a systemic approach must be taken in general: not just a focus on waste avoidance or waste separation, but a holistic view of the circular economy must be taken. This can be achieved, among other things, through educational networks that need to be created.

The first steps must be taken at the knowledge level. Expertise must be built up and the right mindset is required. First and foremost, awareness must be raised. Awareness of the circular economy can only be achieved with the appropriate level of knowledge through skills development.

In summary, digitalisation, Industry 4.0, the S3 strategy and the circular economy offer immense opportunities for companies and especially for female entrepreneurs. It is

crucial that targeted measures are taken to fully utilise the potential of these developments and promote a sustainable, innovative and inclusive economy.

Motivating Factors for Women Entrepreneurs

The most motivating factors for women entrepreneurs to apply circular business models indicated by respondents are management mindset, know-how, and personal commitment (41 %), the necessity for reducing the costs (35 %) but also role models, digital technologies, and also the necessity to respond to consumer expectations. Provided support through available policy measures was only mentioned by 6 % of the women entrepreneurs.

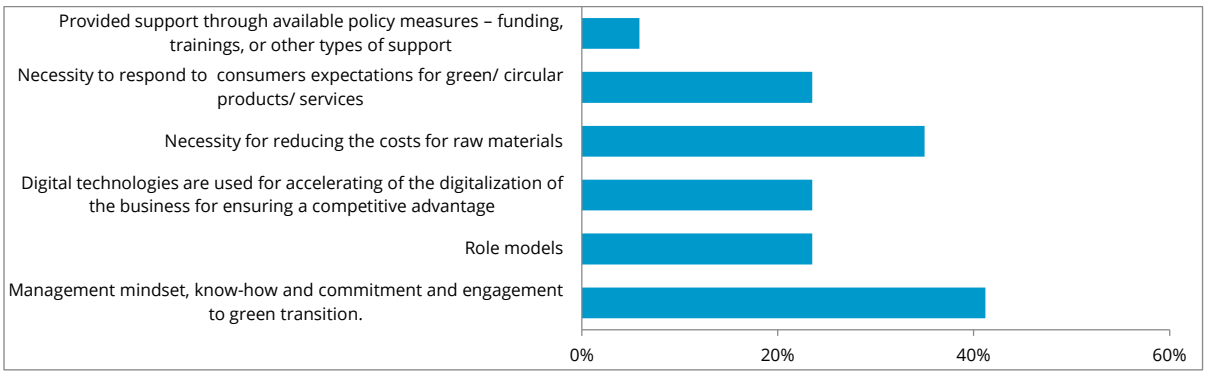

Figure 17: Motivational factors for CE aspects in Austria

The main motivation for women entrepreneurs for application of digital technologies is the possibility of ensuring of competitive advantage of the business (24%). The main barriers to adopting more advanced digital technologies in female-led companies are high investment costs (77%) and lack of skills and knowledge how to implement the digital technology (62 %).

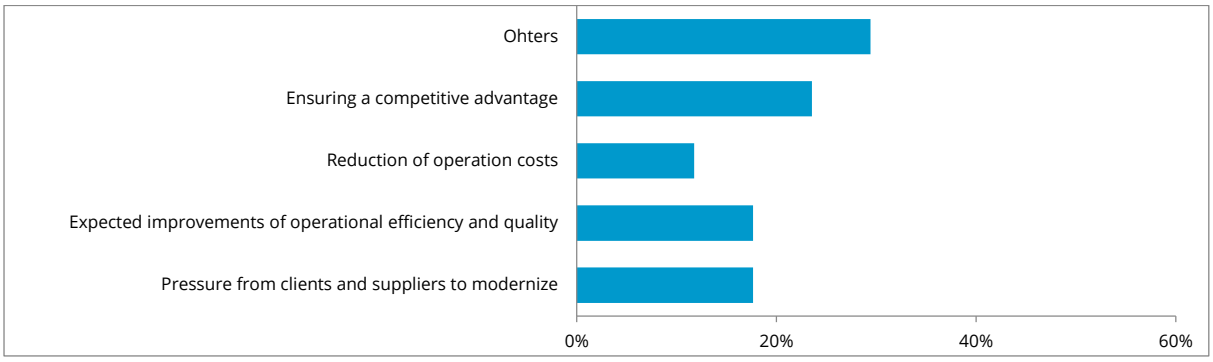

Figure 18: Motivational factors for digital technology application in Austria

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Recommendations

There is already good support for the Austrian economy to drive digital transformation and the circular economy, but there are still actions to be taken and derived, especially in relation to women entrepreneurship. Women entrepreneurs need specific support to improve their skills and business development in relation to digital and circular economy aspects.

It is crucial to provide appropriate, understandable and practical information on the application of circular business models as well as simplified and appropriate financing procedures tailored to women-led businesses. Women entrepreneurs are also interested in acquiring and improving digital skills, especially in the area of cyber security. The expectations of women entrepreneurs regarding the skills needed for circular and digital transformation in the near future are quite similar. They want to obtain general information on the circular economy and understand circularity, understand the role of AI in business processes, use digital marketing tools, introduce circular business models and acquire digital skills for circular transition.

Raising awareness to promote circular and digital change is certainly also a major challenge. Processes must be optimised, supported by a permanent optimisation mentality in order to find open, new and dynamic solutions. There is already a lot of support for change in Austria, but entrepreneurs often lack the awareness to make their business model sustainable. There is a need for platforms and communities for sustainable solutions and companies on the market.

Finally, it is recommended that policy makers should make more efforts to provide specific government measures to support women entrepreneurs in digital and circular transformation, skills development and the adoption of circular business models and technologies.

5.2 Bosnia and Herzegovina

Country overview

Bosnia and Herzegovina (BiH) is a Southeastern European country situated on the Balkan Peninsula, bordered by Croatia, Serbia, and Montenegro, with a small coastline along the Adriatic Sea. Covering approximately 51,129 square kilometers, BiH's landscape is largely mountainous, with the Dinaric Alps dominating much of its terrain. According to the 2013 census, the population of BiH is 3.53 million, with a diverse ethnic composition: Bosniaks (50.12%), Serbs (30.83%), and Croats (15.43%). The population has a slightly higher percentage of females, with 1.8 million women compared to 1.73 million men. The census data also highlights an aging population, particularly among women, who outlive men, particularly in the 65+ age group.

BiH's economy is predominantly driven by small businesses. In 2021, there were 39,285 firms, with 91.6% classified as small enterprises (0-49 employees), 5.6% as medium-sized, and only 1.7% as large. Most businesses fall into the small revenue category, with less than 20 million KM in annual revenue. In terms of female entrepreneurship, data is scarce and not systematically collected, particularly in the Federation of BiH. However, in Republika Srpska, women lead about 36% of enterprises, with strong representation in education and health sectors. Despite this, women are underrepresented in traditionally male-dominated fields like transport and construction.

BiH's entrepreneurial ecosystem is evolving, with efforts directed towards improving digital infrastructure, regulatory frameworks, and skill development. However, challenges remain, such as cultural preferences for stable public sector employment over entrepreneurial risk-taking, and a lack of comprehensive support systems for startups. The 2017 Global Entrepreneurship Monitor ranked BiH low across most indicators, citing fear of failure and the complex business startup process as significant barriers. Educational and institutional support for entrepreneurship in BiH is fragmented. While there are efforts to promote entrepreneurial skills, the lack of a strategic, holistic approach hinders the development of a robust entrepreneurial

culture. Innovation is also limited, with most entrepreneurial activities focused on basic needs rather than exploring new technological frontiers.

Financial support for entrepreneurship is another challenge in BiH. Research funding is largely directed at state universities, with limited mechanisms for technology transfer. The lack of targeted financial instruments for startups, particularly in high-tech industries, further stifles the growth of a dynamic entrepreneurial landscape.

Looking ahead, fostering a more dynamic entrepreneurial ecosystem in BiH will require cultural shifts towards embracing risk and innovation, educational reforms to integrate entrepreneurship into higher education curricula, and the establishment of supportive financial and institutional structures such as venture capital funds and innovation hubs.

BiH is also in the early stages of developing a Smart Specialisation Strategy (S3), aiming to align with EU innovation and technology frameworks. The strategy's development is crucial for enhancing the country's competitiveness, particularly in sectors where women-led businesses have the potential to lead in the digital and circular economy transitions. These sectors include administrative services and manufacturing, where digital platforms and sustainable business models can drive growth and innovation. However, financial barriers, such as high initial investment costs and limited recycling industry incentives, pose significant challenges to the circular economy in BiH.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

The transition to digital and circular business models offers significant opportunities and challenges for women entrepreneurs in BiH. The survey highlights the critical skills needed, barriers faced, and the overall readiness of these entrepreneurs to embrace these practices.

While half of the respondents believe they have adopted digital technologies, the other half do not, indicating a divide in digital readiness. Commonly used technologies include collaboration tools and cloud computing, but advanced technologies like AI, IoT, and blockchain are less adopted. Key barriers include the lack of skilled staff, high investment costs, and insufficient public support. Additionally, 45.45% of respondents highlighted the need for stronger cybersecurity skills.

Women entrepreneurs show varying levels of familiarity with circular economy principles. While many have implemented practices like waste minimization and the use

of renewable resources, challenges persist, particularly in adopting more complex models like "Product as a Service." Key motivators include a commitment to green transitions and reducing raw material costs, but barriers such as lack of awareness and time constraints highlight the need for more targeted support.

There is a strong demand for training in digital and circular economy practices, particularly in accessing finance and applying sector-specific principles. Legal frameworks and digital skills are also identified as crucial areas where support is needed. Entrepreneurs emphasized the need for strategic planning skills to better integrate circular practices into their business models.

Financial barriers are a significant challenge for women entrepreneurs, compounded by the rigidity of the financial system in BiH. Limited networking opportunities further hinder knowledge sharing and collaboration, indicating a need for more robust platforms to support digital and circular transitions.

Stakeholders perspective

Stakeholders in BiH provided valuable insights into the challenges and opportunities for women entrepreneurs transitioning to digital and circular business models. They emphasized the critical role of digital technologies in enhancing business competitiveness, yet highlighted significant barriers, including limited access to finance, technological infrastructure, and necessary skills. Collaboration between policymakers, industry leaders, and educational institutions is seen as essential to providing the resources and support needed for successful digital transformation.

In terms of Smart Specialization, stakeholders acknowledged its importance for sustainable economic growth but pointed out challenges such as insufficient coordination and limited financial resources. The formation of a Working Group by the Council of Ministers was noted as a positive step towards improving competitiveness and securing EU support.

For the circular economy, stakeholders recognized its potential to reduce waste and promote sustainability, but expressed concern that existing initiatives do not adequately focus on women entrepreneurs. They called for integrating circular economy principles into programs tailored specifically for women, emphasizing the need for targeted financial support and specialized training.

Stakeholders identified gaps in the support system for women entrepreneurs, particularly in their transition to S3 and Industry 4.0 within the circular economy. They recommended prioritizing skill development, increasing awareness of digital and circular economies, promoting networking opportunities, and ensuring access to financial resources. Comprehensive support systems, including tailored educational programs and strong policy advocacy, are seen as vital for helping women entrepreneurs successfully transition to sustainable, digital, and circular business models.

Motivating Factors for Women Entrepreneurs

The motivation behind women entrepreneurs in BiH transitioning to digital and circular business models is primarily driven by the need to secure a competitive advantage. According to the survey, 58.33% of respondents identified ensuring a competitive edge as their main motivator. This reflects a strategic approach where women entrepreneurs recognize that adopting new technologies and sustainable practices is essential to differentiate themselves in an increasingly competitive market.

In addition to competitiveness, 25% of the respondents highlighted the expected improvements in operational efficiency and quality as a significant driver. This shows that many women entrepreneurs are motivated by the potential to enhance the efficiency of their operations and the quality of their products or services, which digitalization and circular economy practices can offer.

A smaller percentage of women entrepreneurs, 8.33%, indicated that their motivation is influenced by policy measures such as funding and training. This suggests that while external support mechanisms are valuable, they are not the primary motivator for most entrepreneurs but do play a supporting role in their decision-making process.

Interestingly, no respondents cited pressure from clients and suppliers or the reduction of operational costs as key motivators. This underscores the fact that the drive to transition is more about strategic positioning and improving internal processes rather than external pressures or immediate cost savings.

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Recommendations

To support the successful transition of women entrepreneurs in BiH to digital and circular business models, several key recommendations have emerged from the data collected.

First and foremost, there is a pressing need to develop comprehensive training programs. These should focus on enhancing skills in data literacy, software development, and digital technologies, as well as providing specialized training in sustainable practices such as product design, waste management, and energy efficiency. Continuous education and innovation are crucial, so workshops and seminars that foster forward-thinking and adaptability to new technologies should be prioritized. In terms of sustainability and circular economy integration, efforts should be directed towards encouraging the design of products that are durable, repairable, and made from ecological materials. Initiatives aimed at optimizing resource use and improving waste management across supply chains will also be vital. Additionally, identifying and leveraging opportunities in green technologies and digital platforms will help women entrepreneurs build more sustainable business models. Digital transformation is another critical area, with recommendations focusing on supporting the adoption of advanced technologies like AI and process automation. Enhancing skills in digital marketing and online sales, along with the implementation of energy-saving technologies, will help women entrepreneurs remain competitive in an increasingly digital market.

Moreover, it's essential to facilitate networking opportunities that enable knowledge exchange and collaboration among women entrepreneurs. Ensuring access to crucial resources such as financial support, mentorship, and tailored educational programs will further assist in their transition to digital and circular economies.

Finally, there is a strong call for policy advocacy and institutional support. Policymakers and support organizations should work together to create comprehensive support systems that include financial assistance and infrastructure development. Promoting government policies that advance digitalization, industrialization, and sustainable growth will be key to fostering a thriving entrepreneurial ecosystem. Additionally, training in operational efficiency and management skills, including time and stress management, is essential to help women entrepreneurs adapt to rapidly changing market conditions and maintain their competitiveness.

5.3 Bulgaria

Country overview

The Republic of Bulgaria is a country located in South-eastern Europe. It is bordered by Romania to the north, Serbia and Republic of North Macedonia to the west, Greece and Turkey to the south, and the Black Sea to the east. The capital and largest city is Sofia; other major cities are Plovdiv, Varna and Burgas.

By 31.12.2023[2], the population is 6 445 481 persons. Male population was 3 097 698(48.1%) and female - 3 347 783(51.9%). Males prevail among the population aged up to 55 years.[3]

In 2021[4], there were approximately 381 457 SMEs operating in Bulgaria, with the vast majority of these (92.8%) being micro-sized enterprises that employed between zero and nine people.

The share of women self-employed in Q.1 of 2024[5] is 39.45% from the total amount of self-employed (191 400). This rate for women-managers of the companies for the same period is a little bit higher - 41%. In Bulgaria, women tend to run smaller, younger firms in different industry sectors, relative to the numbers of men doing so.

Digitalisation in the context of Industry 4.0 is included as a horizontal priority and is present in all five thematic areas of smart specialisation. Bulgaria ranks last among the EU countries in terms of the adoption of digital technologies in enterprises.

Bulgaria is among the least performing member states in the implementation of measures in the area of the circular economy, in accordance with the European action plan for the circular economy. Resource efficiency is usually measured by the "resource productivity" indicator, which leads the formation of the Resource Efficiency Index and indicates the use of material resources in terms of economic growth.

In 2020, resource productivity in Bulgaria remains one of the lowest among Member States, as well as compared to the EU average. Despite these low levels, resource

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[2] *National Statistical Institute. (2023) Population and Demographic Processes in 2023.* https://www.nsi.bg/sites/default/files/files/pressreleases/Population2023_en_ZYBLHGJ.pd

[3] *ibid*

[4] *Национален статистически институт (2022). Демография на предприятията 2021 г.* https://www.nsi.bg/sites/default/files/files/pressreleases/BDE2021_B2WX3YK.pdf

5 National Statistics Institute. (2024). Employed and employment rates - national level; statistical regions; districts https://www.nsi.bg/en/content/3996/employed-and-employment-rates-national-level-statistical-regions-districts

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productivity in our country in 2020 is growing by more than 30% compared to 2000, but represents 36.7% of the EU average. By all accounts, this growth in resource productivity is insufficient.

The number of enterprises active in the field of **waste collection and disposal** during the period under analysis was just under 600.

The Bulgarian ecosystem for supporting women entrepreneurs is well-developed and includes various organizations offering different types of support. However, most of this support is sporadic, tied to project implementations, and difficult to sustain after project completion.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

When it comes application of circular model or technology, the main challenges faced by Bulgarian women entrepreneurs include access to finance, followed by a lack of information about suitable opportunities and insufficient knowledge and skills in applying circular aspects. In addition to training and finances, they emphasize the need for suitable, understandable, and practical information on the application of circular business models, along with simplified and adequate funding procedures tailored to micro and small companies.

The primary barriers to adopting advanced digital technologies in female-owned companies are high investment costs, a lack of skilled staff, and insufficient public support in terms of funding and training. Financial support remains the primary missing resource, often linked to the additional time required to work towards Industry 4.0 goals, which may involve hiring new employees or finding suitable resources outside the company.

Importance of appropriate training for female businesses is noted during and after the times of crisis. They used different types of support to “restart” their businesses, mainly by joining formal/informal communities of (women) entrepreneurs, utilizing business development services, and participating in training, mentoring, or coaching to improve digital skills. Those who did not use specific support expressed regret, acknowledging that such options could have been beneficial for their companies.

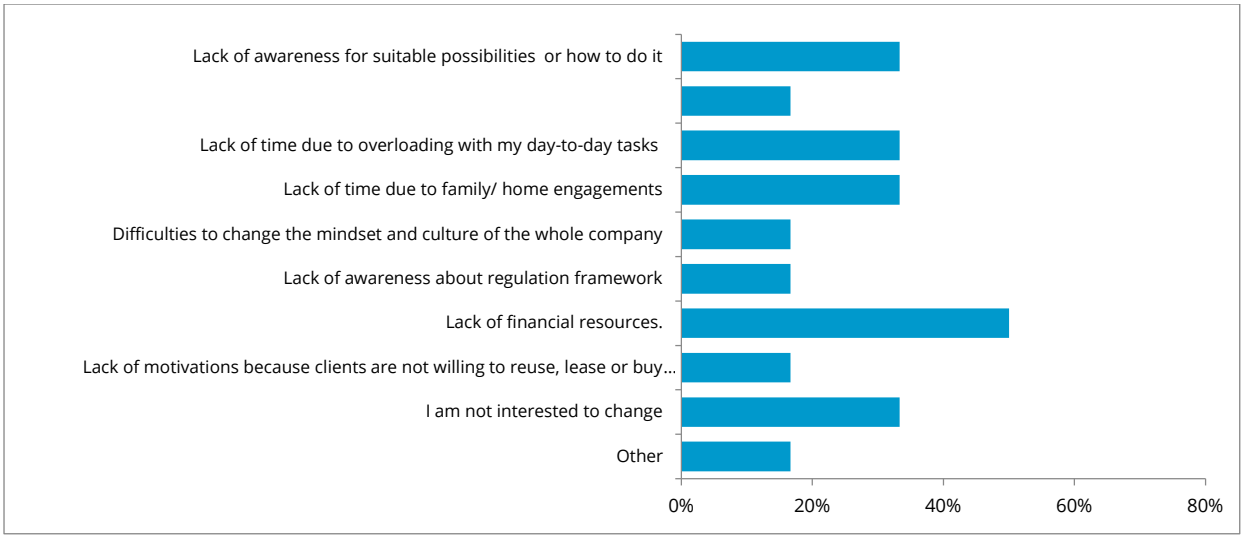

Figure 19: Faced challenges for CE application in Bulgaria

Analyzing the aspects in the success of development and application of circular technology, it could be seen that the most helpful for women entrepreneurs are mentoring, training, market research, networking and collaboration with experts and peers, as well as attracting financing from public grants, VC, investors.

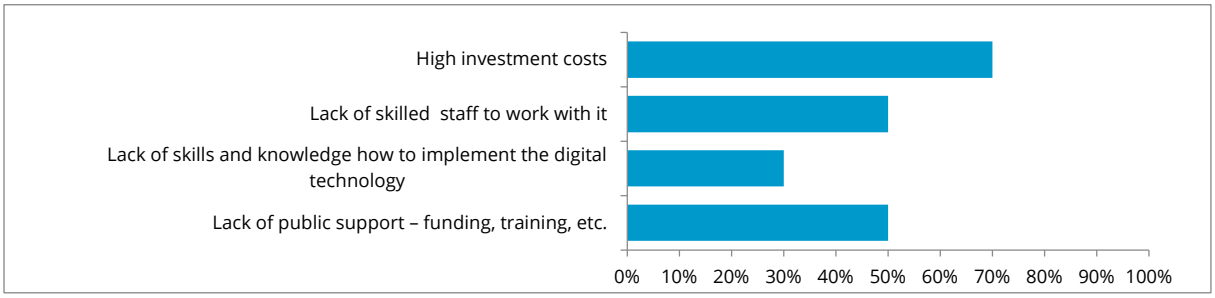

Figure 20: Barriers for adopting of advanced digital technologies in Bulgaria

The expectations of women entrepreneurs for skills needed in the near future for circular and digital transitions are quite similar.

The most important topics for them regarding circular transition include:

1. Access to finance;
2. Application of circular economy in specific sectors (e.g. Food and Agriculture, Textile and Fashion, etc.)
3. How to use the digital technologies for circular transition
4. AI and circular economy

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5. Digital skills for circular transition
6. Legal framework,

Additionally, the most important topics for training in the field of digital skills and digital transition for female businesses are:

1. Development of digital business models / services
2. Digital marketing
3. Using of digital technologies and Internet for business needs
4. Totally integrated digital processes
5. Resource optimization (time, personnel, investments).

Stakeholders perspective

The perspective of stakeholders is also very important for better understanding the broader ecosystem and support structures for women entrepreneurs.

Currently, there are no specific policy measures to support the transition from a linear to a circular economy specifically for women entrepreneurs or to enhance their digital and circular skills. However, key policy measures necessary for women entrepreneurs' digital and circular transition, as identified by the Ministry of Economy and Industry (MEI), include providing support for training, legal services, consulting, and mentoring. Additionally, financing options, loan guarantee schemes, and microcredits should be made available. Furthermore, there is a need for support measures to introduce specific circular and business models, such as reuse, repair, reverse logistics, and industrial symbiosis. MEI suggests that policymakers should also focus on facilitating the transition from selling products to providing services and increasing the share of separately collected and recycled waste on a sectoral basis.

In this regard, MEI plans to develop a National Industrial Strategy for the processing and mining sector 2025 - 2030. This strategy will address critical industrial policy topics, such as reducing the industry's carbon footprint, enhancing digitization in production, improving resource and energy efficiency, introducing circular production models, and attracting investor interest in industrial parks within the country. While the strategy won't specifically focus on women entrepreneurs, all companies operating in the processing industry sector or the extractive industry will still benefit from the planned measures.

It is suggested a special focus on the “Textile and Fashion”, "Food and Agriculture" sectors, as according them these are the most affected by the circular economy and digital transition.

Motivating Factors for Women Entrepreneurs

The primary motivations for Bulgarian women entrepreneurs to adopt circular business models include management mindset, know-how, and personal commitment to the green transition, followed by the necessity to reduce raw material costs and meet customer expectations for green products and services.

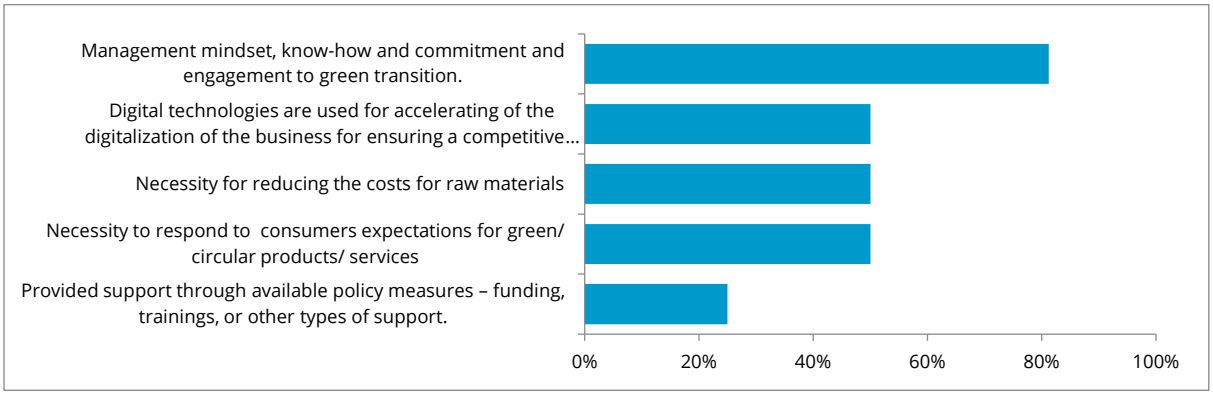

Figure 21: Motivational factors CE aspects in Bulgaria

Surprisingly, role models are not indicated as a driver for adopting circular practices.

In terms of digital technologies, the main motivations are securing a competitive advantage, improving operational efficiency and quality, and reducing operational costs.

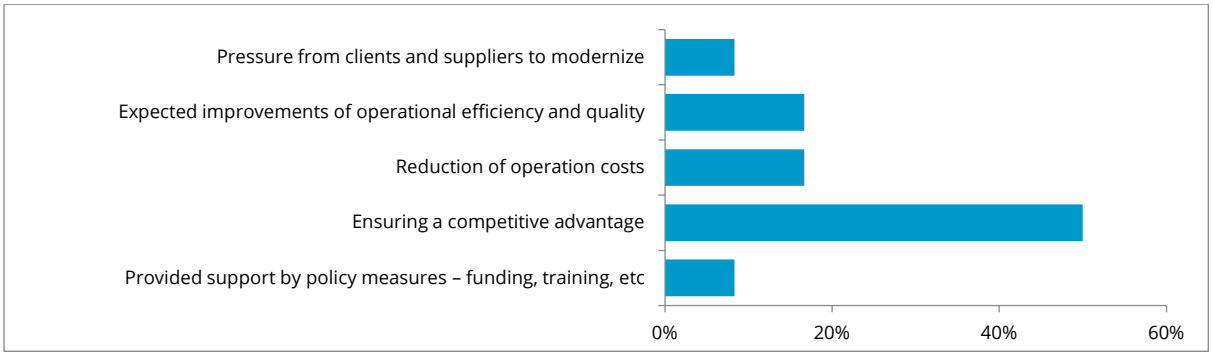

Figure 22: Motivational factors for digital technology application in Bulgaria

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Recommendations

It is crucial to provide suitable, understandable, and practical information on the application of circular business models, along with simplified and adequate funding procedures tailored to female micro- and small companies. Women entrepreneurs are also interested in obtaining or improving their intermediate-level digital skills, including software design or simulation, cybersecurity, and programming and software development.

The expectations of women entrepreneurs for skills needed in the near future for circular and digital transitions are quite similar. They seek to understand the role of AI in business processes, find consultants in process digitization and data analysis, use digital marketing tools, ensure cybersecurity, adopt circular business models, learn recycling methods and ways to test recycled products, optimize time, resources, and materials, and improve work efficiency.

Finally, it is recommended that policymakers should put more effort into providing specific governmental measures to support women entrepreneurs in digital and circular transitions, skill development, and the adoption of circular business models and technologies.

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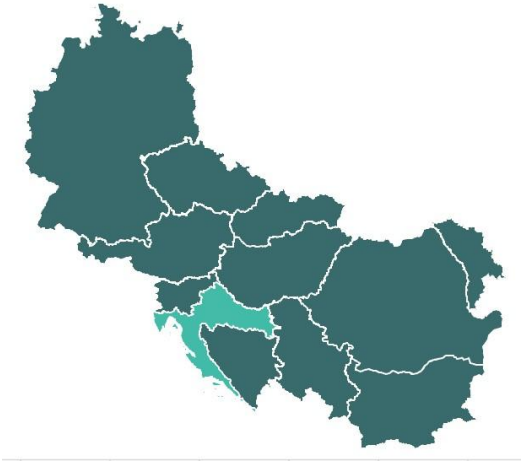
5.4 Croatia

Country overview



Croatia, located in Southeast Europe, is a country with a population of approximately 3.9 million, of which women constitute 51.8%. The country is part of the European Union and has a diverse economic landscape that includes a strong services sector, alongside growing industries in technology and innovation. While women represent around 30% of entrepreneurs in Croatia, they face significant challenges, including limited access to finance, markets, and the necessary skills for transitioning to digital and circular economy models. The national strategies, such as the S3 and I4.0, aim to foster innovation and economic development, emphasizing digital transformation and sustainability.

Research revealed that digital skills among women entrepreneurs are generally limited to basic tools like Microsoft Office. However, more specialized knowledge — such as programming, cybersecurity, and the integration of advanced digital tools — remains scarce. In terms of circular economy practices, there is awareness of its importance, but practical implementation is inhibit by financial and educational barriers. The national policy frameworks, including the Croatian National Development Strategy 2030, aim to address these gaps by promoting digital skills, gender equality, and innovation in key sectors.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

The main challenges faced by women entrepreneurs are the lack of advanced digital skills and circular economy knowledge. Many women entrepreneurs use basic digital tools (e.g., Microsoft Office), but they need specialized knowledge in programming, cybersecurity, and digital business tools. Additionally, transitioning to circular economy practices is inhibit by limited education and financial resources, making it difficult for women entrepreneurs to adopt sustainable business models. Women entrepreneurs face several challenges in implementing CE models. Key barriers include a lack of advanced knowledge and skills, high financial costs, limited access to resources, and time constraints, particularly for small businesses. Workforce shortages and internal

resistance to change also hinder CE adoption. Additionally, navigating complex regulations and policies further complicates the transition. These challenges highlight the need for stronger support systems and resources to enable a sustainable entrepreneurial ecosystem in Croatia. There is increasing awareness among WEs of the importance of transitioning to circular economy practices, but there is insufficient support in terms of both education and financial resources. Many women entrepreneurs are aware of basic sustainability practices, such as recycling and reducing waste, but lack the technical knowledge to implement more advanced circular economy models. Financial constraints also limit their ability to invest in sustainable technologies and systems that would help their businesses transition.

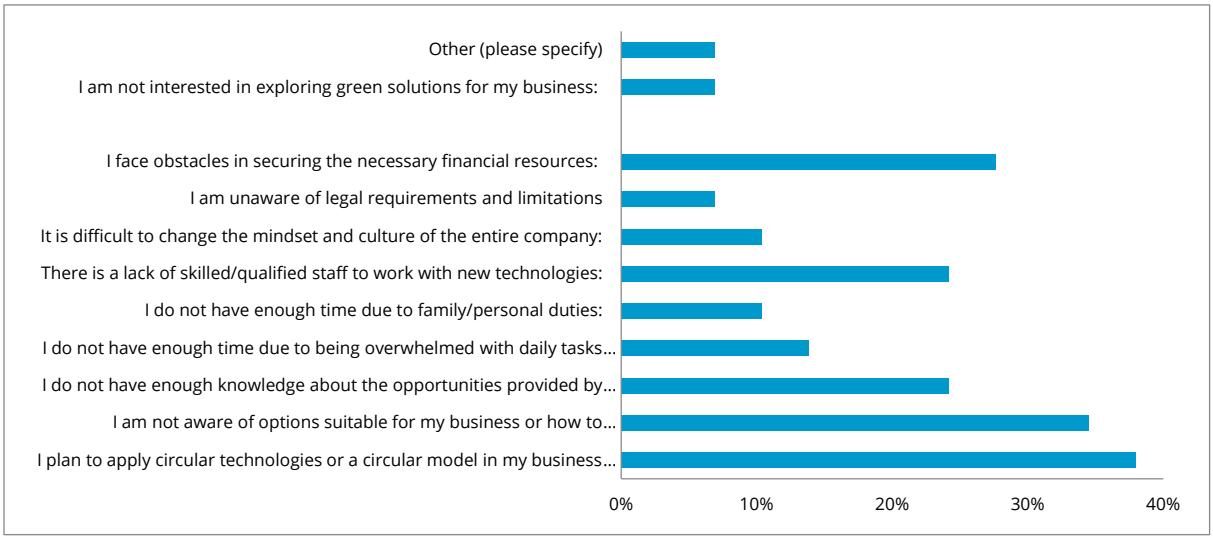


Figure 23: Faced challenges for CE application in Croatia

The survey among WEs highlighted significant gaps in advanced digital skills. While many WEs are proficient in basic tools (e.g., email, Microsoft Office), there is a lack of knowledge in critical areas such as programming, cyber security, and the use of specialized software for design or simulation. These skills are essential for the transition to Industry 4.0 and to fully capitalize on digital opportunities for business growth and innovation.

One of the primary challenges WEs face in adopting new technologies is the high cost of investment. Digital tools and advanced technologies, such as AI, IoT, and automation, often require substantial upfront costs, which many women entrepreneurs find difficult to finance. Moreover, the shortage of skilled staff further exacerbates this challenge, as businesses struggle to hire or train employees with the necessary digital skills.

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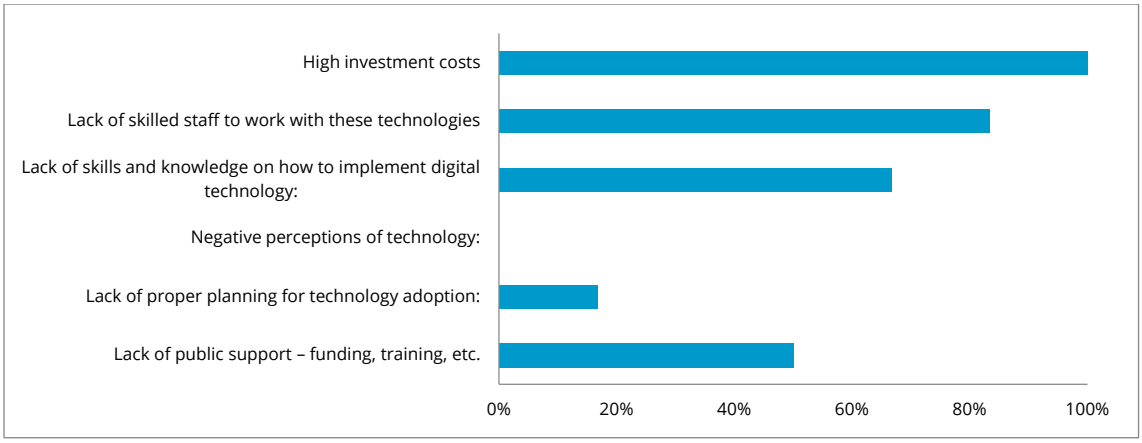

Figure 24: Barriers for adopting of advanced digital technologies in Croatia

WEs reported a lack of public support in terms of access to grants, subsidies, or technical guidance for adopting digital and circular economy models. Many feel that current government programs do not provide enough financial assistance or technical know-how, especially in smaller and emerging sectors. This gap is a major barrier to both digitalization and the circular transition.

Stakeholders perspective

Interviews with stakeholders indicate significant gaps in educational support for women entrepreneurs, particularly in areas like digital literacy and circular economy practices. Stakeholders noted that existing training programs are often not tailored to the specific needs of women entrepreneurs, who require practical, hands-on training that integrates both digital and sustainability elements.

Stakeholders emphasized the need for greater financial support for WEs, particularly in terms of grants and low-interest loans that can facilitate the adoption of advanced digital tools and circular economy models. High investment costs remain one of the major obstacle, and many WEs struggle to secure the financial backing necessary to implement new technologies and sustainable practices.

Many women entrepreneurs are unaware of the programs and incentives available through initiatives like S3 and I4.0. Stakeholders suggested that more awareness campaigns are needed to inform WEs about the opportunities for digital transformation and circular economy transitions. Additionally, limited access to professional networks and mentorship programs was identified as a gap that needs to be addressed to help WEs overcome the challenges they face.

Stakeholders pointed out that beyond financial support, WEs need technical assistance to implement digital and circular economy models effectively. This includes access to specialized training programs and technical advisory services that can guide businesses through the complex processes of digitalization and sustainability transitions.

Motivating Factors for Women Entrepreneurs

Successful women entrepreneurs have emphasized the importance of leveraging innovation hubs and digital transformation to maintain their businesses' competitiveness and growth.

The research highlights that leadership mindset and commitment, digital tools, role models, economic benefits, and policy support are among the main motivators driving the adoption of CE practices among women entrepreneurs.

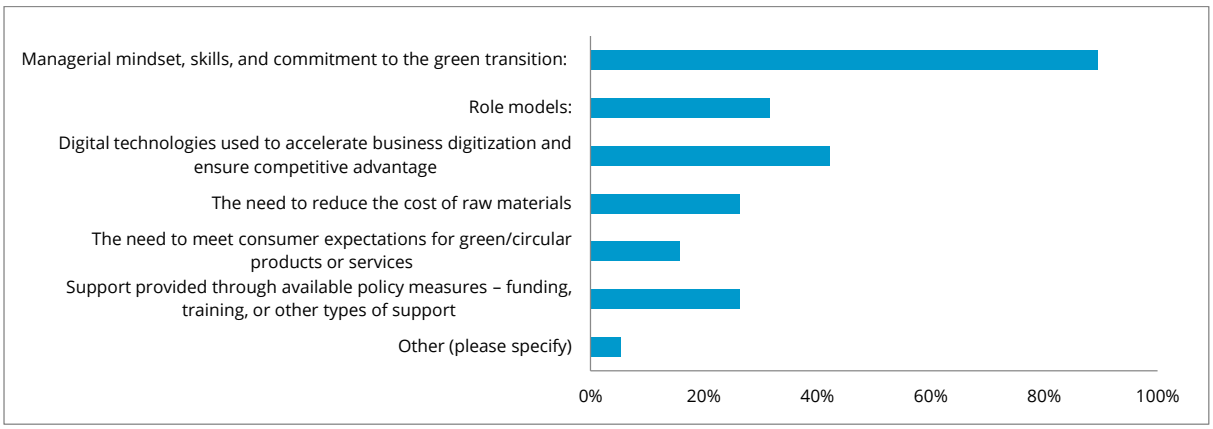

Figure 25: Motivational factors CE aspects in Croatia

According to the research, the primary motivational factor for adopting digital technologies among women entrepreneurs is the potential for improving operational efficiency and quality. Many businesses see digital tools to streamline processes, reduce manual tasks, and enhance overall productivity. Additionally, respondents are motivated by the opportunity to secure a competitive advantage, believing that integrating digital technologies will help them stay ahead in the marketplace. Cost reduction is also an important factor, for adopting digital tools to lower operational costs through automation and optimization. External pressures, such as demands from clients or suppliers, play a smaller role. Overall, the research shows that internal business improvements, rather than external pressures, are the main motivators for digital technology adoption.

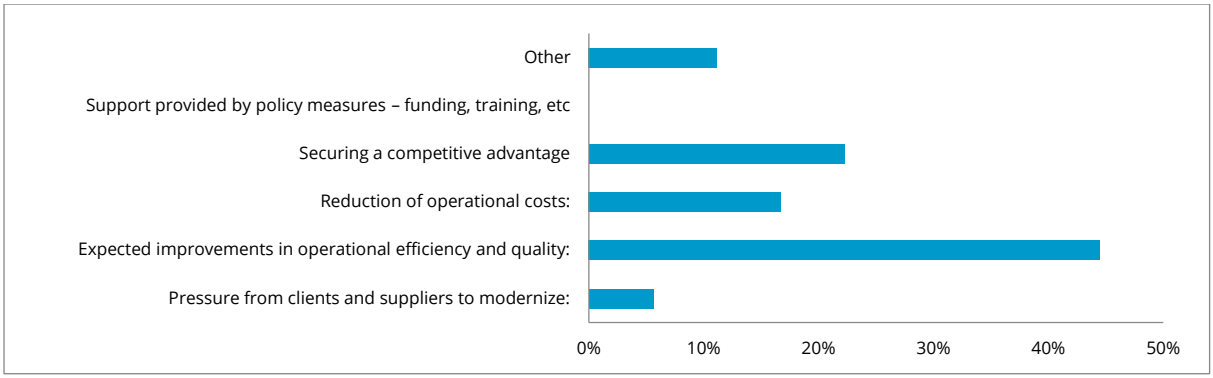

Figure 26: Motivational factors for digital technology application in Croatia

The significant motivation factor, but not the most important, for many women entrepreneurs is the availability of financial support in the form of grants, low-interest loans, and public funding programs. These resources would enable businesses to invest in both digitalization and circular economy models, particularly when the upfront costs are high.

Mentorship and access to professional networks play an important role in the success of women entrepreneurs. Many successful WEs have emphasized the importance of guidance from experienced mentors, as well as participation in innovation hubs and business networks that provide opportunities for collaboration and resource sharing.

WEs are increasingly motivated by the competitive advantages offered through innovation, especially by adopting advanced technologies and aligning with sustainability goals. Women entrepreneurs who have successfully integrated digital or circular economy practices have been able to differentiate their businesses, improve efficiency, and expand their market reach.

For many WEs, the desire to contribute to environmental sustainability and social responsibility is one of the significant motivational factors. Circular economy practices, such as waste reduction and resource optimization, not only improve business performance but also allow entrepreneurs to align their operations with broader social and environmental goals.

Recommendations

- Raise awareness about existing programs (e.g., S3, I4.0) through targeted campaigns that highlight opportunities for women entrepreneurs to adopt digital and circular economy practices.

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- Create specialized training programs focused on critical digital skills (e.g., programming, cybersecurity) and circular economy practices, with practical applications for women entrepreneurs.
- Provide financial incentives, such as grants and low-interest loans, to help women entrepreneurs overcome the high costs of adopting advanced technologies. Offer technical support to guide the implementation of these technologies.
- Promote the development of innovation hubs and networks that encourage collaboration between women entrepreneurs, universities, and industry experts, facilitating the exchange of knowledge and resources.
- Highlight successful women entrepreneurs who have embraced digital and circular transitions to inspire others and provide practical examples of implementation.

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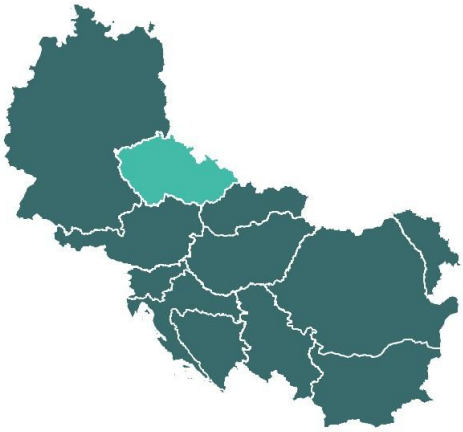
5.5 Czech Republic

Country overview



The population of the Czech Republic is approximately 10.9 million, of which 50.71% is female. The country has a diverse economy, with manufacturing, services and technology sectors making a significant contributions.

There is a lower prevalence of women in self-employment and business ownership roles in the Czech Republic compared to men. In 2020, 11% of employed women were self-employed, which is slightly above the OECD average but significantly lower than the 19% of employed men. The entrepreneurial ecosystem is dominated by SMEs and self-employment across various sectors. Female entrepreneurs account for 36% of entrepreneurs in the Czech Republic and 33% of those with a trade licence (self-employed). The Trade sector has the highest percentage of self-employed women at 21%, followed by Professional scientific and technical activities at 15% and Agriculture at 13%. There is lower female representation in sectors like Construction and Transport/storage.

The 2018 Metro International Own Business Study[6] shows, that the Czech Republic has the second lowest percentage of women interested in starting their own business, with only 21% of women expressing an interest and only 6% of women believing they are "very likely" to start their own business out of 10 world countries surveyed. It appears that the culture of female entrepreneurship in the Czech Republic is not as strong as in the other countries surveyed. The findings of the European Parliament's study[7] signify that Czech women face the disadvantages (McCracken et al., 2015) such as: low rate of request financial assistance, little usage of bank debt finance, such as loans or overdrafts, additional challenges related to the disproportionate burden of childcare and lower self-confidence and optimism, affecting entrepreneurs ability to succeed. Moreover, the study by Dvouletý, O. et al. (2022) examines the characteristics of self-employed Czech women and suggests that a cultural shift in the Czech labor market has

6 Metro Team (2019). Every Female Business Owner is Unique. (online). Available at: https://politics.metroag.eu/topics/independent-businesses/women-and-business-ownership-2019?dt=20190307

7 Women's Entrepreneurship: Closing the Gender Gap in Access to Financial and Other Services and in Social Entrepreneurship

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enabled women to live flexibly in families, establish relationships, and start their own businesses. The study also indicates that migrant women are more likely to be self-employed than Czech women.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

The survey of women entrepreneurs (WEs) in the Czech Republic identified several key areas where skill development is required (Figure 1). A significant proportion of WEs have identified a requirement for advanced digital skills, including data analysis, digital marketing and e-commerce. These skills are essential for market analysis, audience reach and online business expansion. Furthermore, proficiency in cybersecurity and programming is essential for safeguarding business data and streamlining processes.

With regard to skills related to the CE there is a clear requirement for education on CE principles, including waste reduction, resource efficiency and sustainable business practices. It is also essential to provide training on how to finance the transition to a circular economy, including accessing grants and loans. Moreover, an understanding of the role of artificial intelligence in optimising CE practices can provide a competitive advantage for WEs.

Figure 27: Faced challenges for CE application in Czech Republic

The survey revealed a number of barriers preventing WEs from implementing digitalisation into their businesses. One of the main obstacles to adopting advanced digital technologies such as 3D printing, blockchain, and AI is the high investment cost, which many WEs lack the financial resources to overcome. Furthermore, there is a shortage of technical expertise, which presents a challenge to the effective implementation of digital tools. This includes a lack of knowledge in areas such as cybersecurity, programming, and data analysis, which presents a challenge for businesses.

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Resistance to change within traditional business models alo presents a challenge to digital transformation. Many WEs are reluctant to adopt new technologies due to a lack of certainty and a fear of failure. Furthermore, there is a lack of funding available for digitalisation projects. It is often difficult for WEs to secure financial support from banks and investors, which restricts their ability to invest in digital tools and technologies.

The following steps can help to improve the situation. Better understanding of sustainable practices, resource efficiency and waste reduction strategies. Establishment more robust support networks to facilitate the exchange of knowledge and best practices among WEs. Mentorship programmes and networking opportunities can help to bridge this gap.

It is also essential that WEs receive guidance on how to comply with environmental regulations and standards. Furthermore, accessing financial resources for circular economy projects represents a significant challenge. It is essential that WEs have access to funding and financial incentives to support their transition to sustainable practices.

The survey findings indicate a range of adoption levels for digital technologies among WEs. Mobile technology, cloud storage and digital marketing tools are widely adopted by businesses and are essential for communication, data storage and customer engagement. Nevertheless, more sophisticated technologies such as 3D printing, blockchain and AI are not being fully exploited due to their high costs and the lack of expertise required to utilise them effectively.

Stakeholders perspective

Interviews with key stakeholders have identified a number of critical needs and gaps in the skills required for women entrepreneurs to successfully transition to a circular and digital economy. Stakeholders highlighted the value of ongoing learning and bespoke training programmes in addressing these skill gaps.

1. Insufficient knowledge about the technological options available

Many WEs lack sufficient knowledge about the technological options available for implementing CE practices. This encompasses an understanding of sustainable practices, resource efficiency and waste reduction strategies. Stakeholders emphasised the necessity for comprehensive training programmes that provide in-depth coverage of these areas.

2. Insufficient Financial Resources:

Securing financial resources for CE and digitalisation projects represents a significant challenge for WEs. Stakeholders have highlighted that many women entrepreneurs encounter difficulties in accessing the funding and financial incentives required to adopt new technologies and sustainable practices. It is crucial to provide training on financing options and how to secure grants and loans.

3. Digital Skills Development:

There is a pressing need for digital skills development among women entrepreneurs. Whereas mainly cybersecurity and programming as areas where training is required. These skills are essential for safeguarding business data, streamlining processes and harnessing digital technologies to their fullest potential.

4. Support Networks and Mentorship (non-financial support):

The lack of robust support networks and mentorship opportunities is a significant barrier to the successful transition of WEs to a circular and digital economy. Stakeholders highlighted the need to establish robust support networks that facilitate knowledge sharing, collaboration and mentorship. These tools are referred to as non-financial and, according to stakeholders, are even more important for the development of the Czech WEs ecosystem than financial support.

Motivating Factors for Women Entrepreneurs

The survey and interviews with WEs in the Czech Republic revealed several key motivation factors driving the adoption of CE technologies and models. A significant motivating factor for many WEs is the attitude, expertise and dedication of their management towards ecological transformation. This commitment to sustainability and environmental conservation is a key driver of the adoption of CE practices. This was identified as a primary motivation by approximately 35.1% of respondents. Interestingly, stakeholder interviews show that women are generally more open to more environmentally and socially sustainable business models.

Another significant factor is the use of digital technologies to accelerate business digitisation and ensure a competitive advantage. Approximately 18.9% of WEs indicated that utilising digital tools and platforms enables them to maintain a competitive

advantage in the market. Furthermore, the actions of other successful companies provide significant motivation for WEs. The positive outcomes and benefits achieved by peers provide further encouragement for the adoption of similar practices, as evidenced by the 18.9% of respondents who cited this factor.

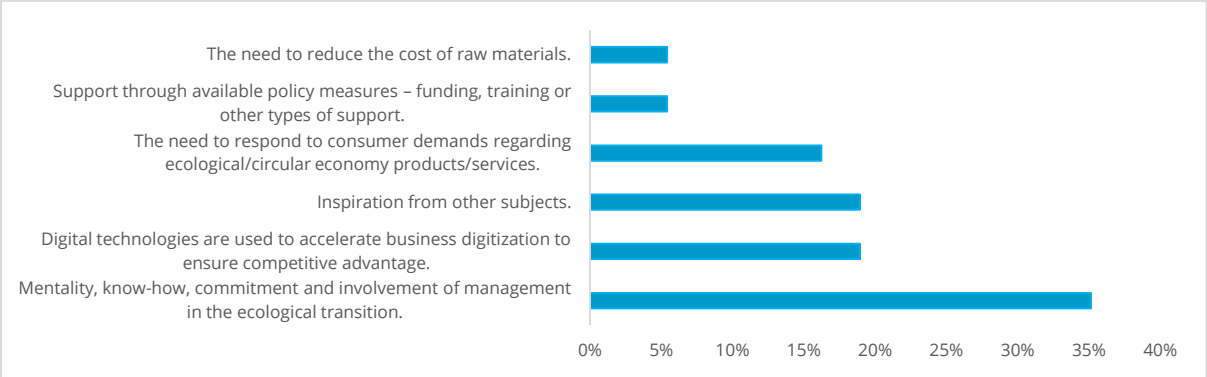

Figure 28: Motivational factors CE application in Czech Republic

The necessity to respond to consumer demands for ecological and CE products and services is a further key motivating factor for many WEs. There is an increasing demand from consumers for sustainable options, and businesses must adapt to meet these expectations. While less frequently cited, the availability of policy measures, including funding, training, and other forms of support, serves as a motivating factor for WEs to implement CE technologies. This factor was identified by 5.4% of respondents. Finally, the objective of reducing the cost of raw materials drives some WEs to adopt CE practices. By reducing waste and optimising resource use, businesses can achieve cost savings, a factor also mentioned by 5.4% of respondents.

Access to experienced mentors who provide guidance and support is crucial for the success of WEs. Mentorship programmes help women entrepreneurs navigate the challenges of adopting new technologies and sustainable practices. These programmes offer professional, process, and community support, creating a nurturing environment for growth.

Recommendations

Following an in-depth analysis, a series of recommendations have been put forward to provide support for WEs in the Czech Republic, with a particular focus on digital and circular transitions. These recommendations are designed to address the specific challenges faced by WEs.

Firstly, it is essential to **enhance training programs focused on digital skills and CE principles tailored for WEs** in order to meet their specific needs. Training programmes should be comprehensive and cover areas such as data analysis, digital marketing, e-commerce, cybersecurity and programming. Furthermore, training on CE principles, including waste reduction, resource efficiency, and sustainable business practices, is essential. Furthermore, these programmes should provide guidance on financing options, such as accessing grants and loans, to support the transition to a circular economy.

Another crucial recommendation is to **increase access to funding**. It is essential to provide financial support and incentives to encourage digitalisation and the adoption of circular practices among women-led businesses. The creation of bespoke financial products designed to meet the specific requirements of WEs can assist in overcoming the obstacle of high investment costs associated with advanced technologies. Providing WEs with improved access to financial resources will enable them to overcome financial barriers and invest in digital and circular economy projects. This should include the provision of grants, loans and financial incentives to support digitalisation and CE projects. Improving knowledge of financial options is also a separate area.

It is also essential to reinforce the **support networks** in place. The creation of robust support networks, comprising incubators, associations and local initiatives, will facilitate mentorship, training and networking opportunities. Mentorship programmes that provide access to experienced mentors can assist WEs in overcoming the challenges associated with adopting new technologies and sustainable practices. Networking events, associations, and community groups provide an ideal platform for WEs to connect, share experiences, and support each other.

Another key recommendation is to improve **access to childcare facilities**. Many women entrepreneurs encounter difficulties in reconciling their professional and familial obligations. The provision of additional childcare facilities would afford women the opportunity to dedicate more time to their businesses and entrepreneurial activities. This can be further enhanced by the promotion of part-time and flexible working hours, which will assist women in balancing their professional and familial responsibilities.

Finally, promoting **women's self-confidence** in business is also a very important area. It is this that can be strengthened through various non-financial instruments and is central to the comprehensive development of the WEs ecosystem.

5.6 Germany (Baden- Württemberg)

Country overview

Baden-Württemberg is one of Germany's most economically dynamic regions, with strong industrial sectors in automotive, engineering, and manufacturing. The region is renowned for its innovative and entrepreneurial ecosystem, particularly in technology-driven fields like information and communication technology (ICT), life sciences, and environmental technologies. With a population of approximately 11.1 million, Baden-Württemberg is characterized by a highly skilled workforce and relatively low unemployment rates.

Female entrepreneurship in Baden-Württemberg accounts for about 30% of business ownership, with women playing an increasingly significant role in emerging sectors such as digital technology and CE industries. Although various support systems are in place for female entrepreneurs, significant barriers to digital and circular economy transitions remain, particularly related to financial challenges and a lack of specialized skills.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

Many women entrepreneurs are already engaged in the circular economy, especially in sectors like technology, electronics, textiles, and fashion. However, the transition is not without its hurdles. A significant portion of respondents (approximately 70%) cited the high cost of adopting circular economy technologies as their main challenge. This financial burden particularly affects smaller enterprises, which lack the capital to make necessary investments in CE technologies such as waste reduction systems or resource-efficient manufacturing processes.

Another prevalent issue is the lack of foundational knowledge regarding circular economy principles. While many women entrepreneurs are motivated to embrace sustainability, they need training and support to effectively implement circular models. This knowledge gap hinders their ability to align their business operations with circular economy goals and policies.

The adoption of digital technologies varies significantly among sectors. Healthcare, ICT, and electronics report higher rates of digitalization, whereas sectors like textiles and consumer goods struggle with integration. A key finding from the survey is that 100% of respondents identified high investment costs as the primary obstacle to adopting digital tools. These costs include both the initial outlay for technology and the ongoing expenses for maintenance and training.

In addition to financial barriers, many women entrepreneurs lack the specific digital skills needed to successfully navigate digital transformation. The need for proficiency in fundamental digital tools such as Microsoft Office, cybersecurity, and digital business models was cited by a majority of respondents. While some larger businesses have integrated mobile technologies and collaboration tools, smaller businesses lag significantly in digital adoption.

Respondents expressed a clear need for targeted financial and advisory support to help them transition to digital and circular practices. These include:

- Grants and subsidies to alleviate the financial burden of technology adoption.
- Mentorship programs to guide entrepreneurs through the complexities of circular and digital transitions.
- Workshops and training programs specifically designed to address the knowledge gaps in circular economy practices, digital skills, and resource optimization.

Stakeholders perspective

Stakeholder interviews highlighted several key gaps in the support structures available to women entrepreneurs, particularly in their efforts to transition to a circular economy and adopt digital technologies.

1. Economic Barriers The financial barriers identified in the survey were echoed by stakeholders, who pointed out that small businesses are disproportionately affected by the high costs of technology adoption. These businesses often lack access to venture capital or sufficient cash flow to invest in new systems, making it difficult for them to compete in the digital and circular economy.

2. Lack of Tailored Advisory Services A recurring theme in the interviews was the absence of personalized advisory services for women entrepreneurs. While general support structures exist, they are often not designed with the specific needs of female entrepreneurs in mind. Stakeholders suggested that more targeted mentorship and consulting programs could help bridge this gap, especially in niche sectors like circular economy and Industry 4.0.

3. Low Awareness of Smart Specialization Strategy (S3) Many women entrepreneurs are not familiar with the Smart Specialization Strategy (S3), which aims to align regional economic activities with innovation and sustainability goals. The lack of awareness and alignment with S3 priorities limits their ability to benefit from regional initiatives that could provide both financial and advisory support. Stakeholders recommended that increasing outreach and education around S3 could help women entrepreneurs better align their business strategies with regional innovation goals.

4. Regulatory Pressures as a Driver Stakeholders also highlighted the role of regulatory pressures as a significant motivator for businesses to adopt circular practices. They pointed out that regions with stricter environmental laws tend to have more innovative companies in the circular economy, suggesting that a stronger regulatory framework could further incentivize businesses to transition to sustainable practices.

Motivating Factors for Women Entrepreneurs

The key motivators driving women entrepreneurs toward the adoption of circular and digital business models are a mix of environmental sustainability and economic incentives. A managerial commitment to sustainability was identified by all respondents as a primary motivator. This aligns with broader trends in the region, where businesses are increasingly recognizing the importance of adopting environmentally friendly practices.

In addition to sustainability, economic viability plays a crucial role in decision-making. Many women entrepreneurs acknowledge that circular economy practices, while costly to implement, offer long-term financial benefits through resource optimization and waste reduction. Regulatory pressures also serve as a motivator, particularly in sectors where compliance with environmental regulations is mandatory.

Interestingly, respondents were less motivated by external pressures such as customer demand or competition. Instead, personal commitment to environmental goals and internal business strategy were the driving forces behind their transition to circular economy practices.

Recommendations

Based on the findings from the survey and interviews, the following recommendations are proposed to support the digital and circular transitions of WE:

1. Develop Tailored Training Programs: Introduce training programs focused on foundational and advanced digital skills as well as circular economy practices. These programs should include practical, sector-specific examples to enhance understanding and applicability.

2. Enhance Financial Support Mechanisms: Increase the availability of grants, subsidies, and microloans to alleviate the high costs associated with adopting digital and circular technologies. Financial incentives should also be introduced to encourage businesses to use recycled materials and adopt sustainable practices.

3. Strengthen Networking and Collaboration Platforms: Foster stronger networks that connect women entrepreneurs with industry experts and mentors. Mentorship programs and networking events can facilitate knowledge exchange, enabling entrepreneurs to learn from successful peers and industry leaders.

4. Increase Awareness of S3: Conduct targeted outreach and workshops to raise awareness about the S3. Educating women entrepreneurs on the benefits of aligning their business strategies with regional priorities can help drive innovation and growth in key sectors.

These recommendations aim to address the current gaps in support structures, skill development, and financial accessibility, creating a more enabling environment for women entrepreneurs in Baden-Württemberg as they transition to sustainable, digital business models.

5.7 Hungary

Country overview

Hungary is a country located in Central Europe. It shares borders with Slovakia to the north, Ukraine to the northeast, Romania to the east and southeast, Serbia and Croatia to the south, Slovenia to the southwest, and Austria to the west. Its capital and largest city is Budapest, with other significant cities including Debrecen, Szeged, Miskolc, and Pécs.

As of december 31, 2023, the population was approximately 9,640,000. The male population was 4,641,600 (48.1%), while the female population was 4,998,400 (51.9%). Among the population under 55 years of age, the proportion of men is slightly higher.

In 2021, around 530,000 small and SMEs operated in Hungary, with the vast majority (94%) being micro-enterprises employing 0-9 people. In the first quarter of 2024, female self-employed entrepreneurs made up 38.2% of all self-employed individuals (about 203,000). The proportion of female business leaders was slightly higher during the same period, around 40%. Businesses led by women in Hungary are often smaller and younger than those led by men and operate in a variety of industries. Female entrepreneurs are often active in sectors such as commerce, services, hospitality, and education, but they are less represented in the technology sector and heavy industry. Many female entrepreneurs are also active in creative industries, healthcare, and the beauty industry. Their proportion is higher in large cities, especially Budapest, where more opportunities and support are available. In rural areas, women often play leading roles in family businesses, mainly in agriculture, tourism, and handicrafts.

Digitalization and Industry 4.0 are also important priorities in Hungary, present in various thematic areas. However, Hungary ranks in the middle of EU member states in terms of the adoption of digital technologies by businesses.

Hungary is also lagging behind the EU average in implementing measures related to the circular economy, despite ongoing efforts to improve resource efficiency. The resource productivity indicator, which measures the use of material resources for economic growth, stood at 47.2% of the EU average in 2020. Although this represents a more than

25% increase compared to 2000, it is still insufficient to reach the EU average. The number of businesses operating in waste collection and disposal in Hungary was around 700 in 2020.

Female entrepreneurs often face difficulties in accessing financing. Women-led businesses tend to be smaller and have less capital, making it harder for them to secure loans and investments. The state and various civil organizations attempt to alleviate this issue through targeted support programs and low-interest loans.

The ecosystem supporting female entrepreneurs in Hungary is well-established, with numerous organizations and initiatives providing various forms of support. However, these supports are often project-based, and their sustainability after the project's conclusion is uncertain.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

The interviews with women entrepreneurs addressed the challenges and needs of women entrepreneurs in the circular economy and digital transition, and respondents stressed the importance of access to information, adaptation to legislative changes and expert advice. They stressed the importance of public support and suggested mentoring and conferences on the subject.

Although Hungarian women entrepreneurs would be open to making the transition to a circular economy, they face difficulties and gaps even at the most basic levels. Digital skills for the circular transition are what they need most, according to the survey. Circular economy initiatives often require significant initial investments. Many female entrepreneurs face challenges in securing the necessary financial resources to implement and sustain sustainable practices. Additionally, the regulatory and support environment in Hungary does not always encourage the spread of circular economy practices. Targeted policy measures and financial incentives are often lacking, which hinders female entrepreneurs' participation in this sector.

Stakeholders perspective

The needs and challenges related to digital and circular skills for Hungarian female entrepreneurs encompass various aspects. Understanding and applying the principles of the circular economy, such as waste reduction and resource efficiency, is particularly important. The integration of circular economy technologies also plays a central role,

but many businesses struggle with the necessary expertise and resources. Digital skills development is also crucial, with a focus on data management and automation. However, access to appropriate digital training is often limited, which can hinder keeping pace with technological advancements.

Targeted training programs addressing both circular economy and digital transformation are essential but may not always fully meet the specific needs of female entrepreneurs or include practical elements. Mentorship programs are significant for providing advice and networking opportunities, though there may be a shortage of experienced mentors or well-structured programs.

Funding opportunities and financial support mechanisms are also limited, which can impede female entrepreneurs' ability to implement circular economy initiatives and digital technologies. Effective communication and awareness campaigns are necessary to highlight the benefits of circular economy and digital transformation. Lastly, supportive regulatory environments and incentives are crucial to promote the wider adoption of circular economy practices and digital technologies. Addressing these challenges requires coordinated efforts from government bodies, educational institutions, and industry organizations.

Motivating Factors for Women Entrepreneurs

Among Hungarian female entrepreneurs, a particularly strong motivation is the commitment to sustainability and environmental awareness, such as waste reduction and the application of energy efficiency. Community responsibility, including supporting local communities, is also important to them. The pursuit of innovation and the introduction of new technologies play a key role, especially in the context of the circular economy and digital transition. Female entrepreneurs are motivated by the fact that implementing sustainable practices and Industry 4.0 technologies can provide business advantages, enhance their competitiveness, and open up new markets. Additionally, access to mentoring, learning opportunities, and support are also crucial factors for Hungarian female entrepreneurs.

Factors that are less motivating may include aspects not directly related to sustainability, community responsibility, or innovation. For example, purely profit-driven approaches or short-term business goals do not hold as much appeal. Additionally, a strong focus on rapid growth or economies of scale, which often involves sidelining sustainability and community values, is also less motivating for them.

Recommendations

Supporting the skills development and transition of female entrepreneurs in Hungary to the S3 and I4.0 fields requires several steps. First, it's essential to assess the current situation to understand their skills and identify gaps. Then, targeted training programs should be developed, offering both practical and theoretical knowledge.

Launching mentorship programs and building supportive networks are also crucial to help female entrepreneurs effectively adapt to the demands of S3 and I4.0. Additionally, access to funding opportunities should be ensured, and awareness campaigns should increase interest in new technologies and business models.

Finally, the government must create a regulatory environment that supports female entrepreneurs in transitioning to S3 and I4.0. These measures can contribute to the long-term success of female entrepreneurs in Hungary.

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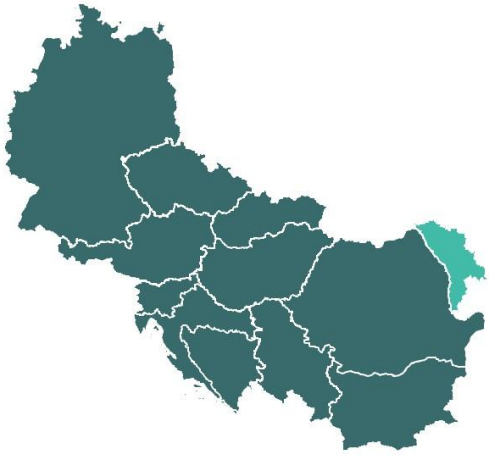
5.8 Moldova

Country overview



Moldova is a small landlocked country in Eastern Europe, bordered by Romania to the west and Ukraine on the other sides. The country spans approximately 33,846 square kilometers and has a population of around 2.6 million. Moldova's landscape is characterized by rolling hills, fertile plains, and river valleys, supporting an agricultural economy. The gender distribution shows that 51% of the population are women and 49% are men, with a substantial working-age population (68% between 15-64 years), crucial for economic activity.

The country's entrepreneurial ecosystem is still developing, with only 30% of businesses owned by women, indicating that women are underrepresented in entrepreneurship. Additionally, educational attainment is relatively high: 55% of women and 50% of men have completed secondary education, and 30% of women hold higher education degrees, contributing to a skilled workforce. However, despite their education, women still face challenges in accessing business opportunities and resources.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

Digital Skills Deficit: A significant proportion of women entrepreneurs in Moldova are struggling to keep pace with technological advancements, particularly in digital tools and platforms. Financial limitations make it difficult for them to invest in modern digital technologies that could improve business operations.

Barriers to Circular Economy Transition: Many women entrepreneurs are familiar with certain circular economy principles, such as minimizing waste and enhancing resource efficiency. However, there are gaps in their knowledge about more advanced concepts like the "product as a service" model or recovering materials at the end of the product lifecycle. This points to the need for further education and support in implementing comprehensive circular economy practices.

Financial Constraints: Women entrepreneurs face more difficulties than men in accessing financial resources, which hinders their ability to invest in both digital and

circular transitions. Although there are existing programs, many of them are not continuous or sufficient to cover the needs of these businesses in the long run.

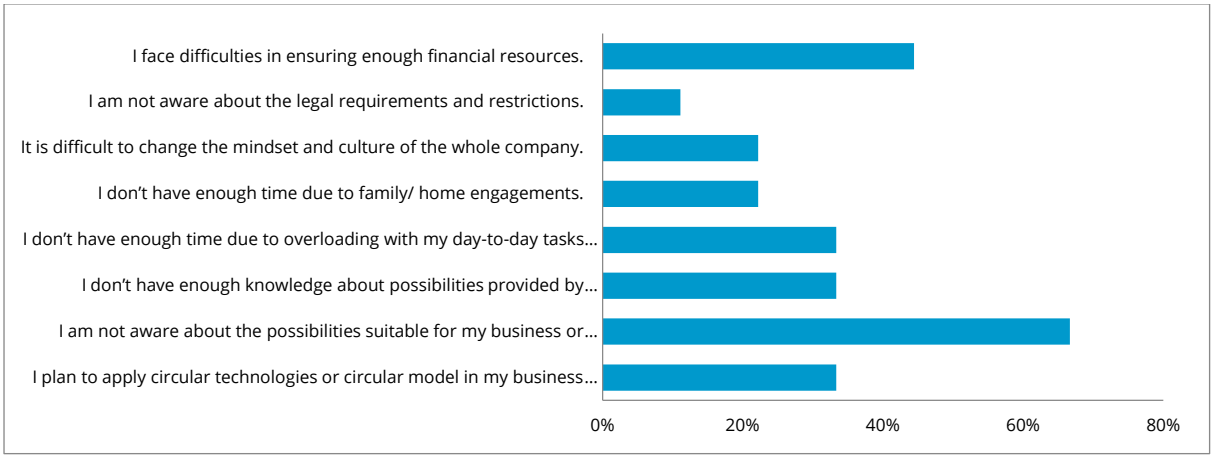


Figure 29: Faced challenges CE application in Moldova

Key skills needs identified are:

1. **Cybersecurity**: Over 50% of respondents identified a significant need to improve cybersecurity skills due to the growing risks in the digital space.
2. **Digital Marketing**: 83% of the surveyed women entrepreneurs indicated the need for training in digital marketing, highlighting the importance of enhancing online presence and customer engagement strategies.
3. **Software and Simulation Tools**: 66% of respondents indicated that learning how to use software for design or simulation would benefit their business efficiency and innovation capabilities.

Stakeholders perspective

Inadequate Support Structures: Stakeholders confirmed that current support systems are not fully addressing the needs of women entrepreneurs, especially regarding the transition to digital and circular economy models. A clear gap exists in networking opportunities and legal support for women entrepreneurs, who often face challenges navigating complex regulatory frameworks.

Networking Opportunities: One of the major challenges identified by both women entrepreneurs and stakeholders is the lack of sufficient networking platforms. Limited access to networks where women entrepreneurs can share knowledge, collaborate with

peers, and gain mentorship further complicates their ability to innovate and expand their businesses.

Legal and Regulatory Support: Stakeholders emphasized that the current legal and regulatory frameworks are not sufficiently inclusive of women entrepreneurs' specific needs. There is a pressing need for more tailored policies that promote gender equality in entrepreneurship and provide easier access to funding for women-led businesses.

Motivating Factors for Women Entrepreneurs

The main drivers for adopting circular business practices among women entrepreneurs highlight a commitment to sustainability. The leading driver is management's commitment to a green transition (100.00%), raw material costs (42.86%) and meeting consumer expectations for green products (57.14%). Digital technologies and policy support (both 28.57%) are also crucial. Additionally, 28.57% are influenced by role models, and individual reasons include ethical principles, reusable packaging, and using business settings for student education

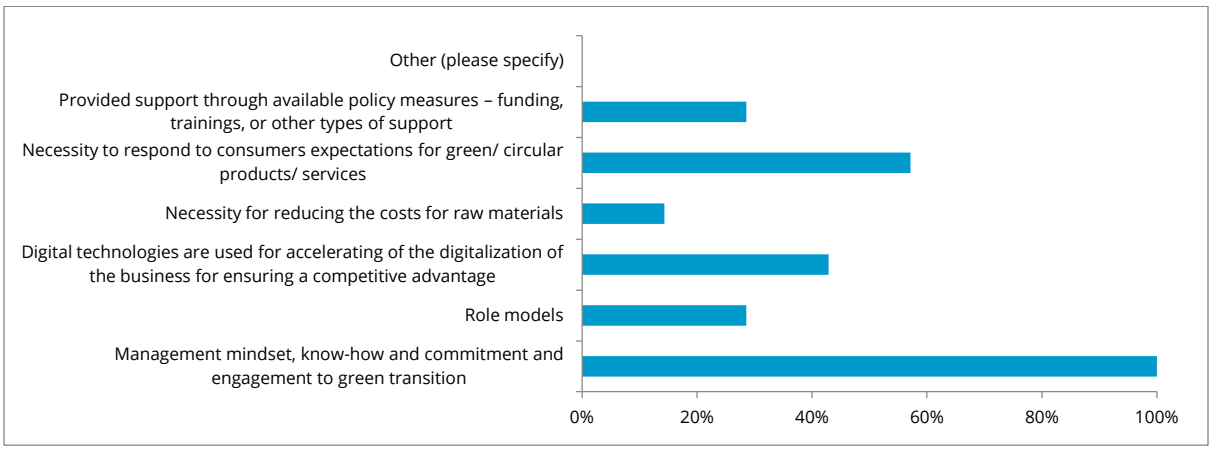


Figure 30: Motivational factor CE application in Moldova

The key reasons for female companies to modernize their operations were identified as:

1. **Reduction of operational costs** (33.33%) - Companies are focusing on optimizing resources and processes to lower expenses and improve profitability.

2. **Ensuring a competitive advantage** (33.33%) - Modernization is crucial for maintaining a competitive edge in the market by adapting to current demands and trends.

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3. **Expected improvements in operational efficiency and quality** (16.67%) - Investments in modernization aim to enhance efficiency and quality standards of products and services.

4. **Support provided by policy measures – funding, training, etc.** (16.67%) - Companies benefit from policy measures, including funding and training programs, to facilitate the modernization process.

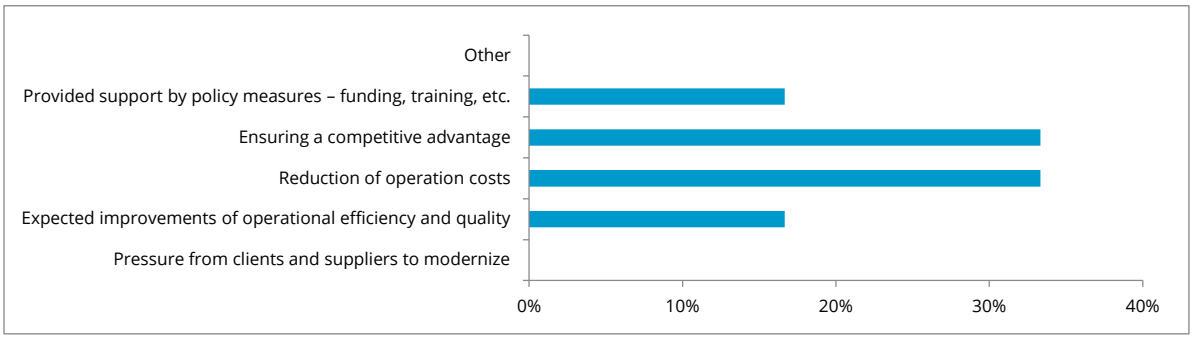

Figure 31: Motivational factor digital technology application in Moldova

Recommendations

Based on the findings, the following recommendations are proposed to support women entrepreneurs in the digital and circular transition:

- **Increase Financial Support**: Access to funding is essential for women entrepreneurs to invest in digital tools and circular innovations. Expanding financial aid programs and making them more accessible to women-led businesses is crucial. Public funding through grants, subsidies, and low-interest loans should be enhanced.

- **Expand Training and Development Programs**: Regular training on circular economy concepts, digital skills, and advanced technologies (e.g., cybersecurity, programming, and simulation tools) should be offered. Additionally, organizing workshops, events, and international exchanges will help reduce regional disparities and equip women with the necessary skills and knowledge.

- **Promote Sustainable Business Models**: More efforts should be made to promote sustainability as a key business issue. Encouraging the use of specialized

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software solutions for sustainability data management, and offering incentives for businesses adopting green practices, will further support the circular transition.

- Networking and Mentorship Opportunities: Creating more opportunities for women entrepreneurs to connect with industry experts, peers, and potential mentors is essential. Platforms and events that facilitate these interactions will enable knowledge exchange and foster collaborative growth.

- Policy Improvements: Policymakers need to develop and implement more gender-sensitive regulations that ease access to resources for women entrepreneurs. Legal reforms that promote inclusivity, along with streamlined procedures for accessing support, will further boost the success of women-led businesses.

5.9 Romania

Country overview

Romania is situated in Southeast Central Europe, bordered by Bulgaria, Serbia, Hungary, Ukraine, Moldova, and the Black Sea. With a population of approximately 21.8 million, Romania is the 12th largest country in Europe by area. The capital, Bucharest, is the largest city, followed by Cluj-Napoca, Iași, Timișoara, and others. Women make up 51.2% of the population, with a notable presence in higher education and entrepreneurship. The country's economy is predominantly driven by small and medium-sized enterprises (SMEs), with women majority-owning about 20% of these businesses.

Romania has a dynamic entrepreneurial landscape where women are making significant strides. Nearly 28.9% of all businesses are owned by women, placing Romania ninth globally in this regard. However, the country faces challenges in innovation and digitalization, with one of the lowest shares of innovative businesses in the EU. The entrepreneurial ecosystem, though growing, lacks sufficient support structures for women, particularly in accessing finance and digital infrastructure.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

The survey conducted among women entrepreneurs in Romania provides crucial insights into the current state of skills, digitalization, and the adoption of CE practices. With 51 responses, the survey captures the perspectives of WEs across various sectors, including health, manufacturing, technology, and fashion. The findings highlight significant gaps in digital skills, challenges in adopting CE practices, and the overall need for enhanced support structures.

The research identifies critical skills gaps among women entrepreneurs, particularly in the areas of digitalization and CE. Despite a high awareness of CE concepts (72.97%), there is a significant need for specialized training in digital marketing, cybersecurity, and the application of digital business models. The adoption of digital technologies is prevalent, yet advanced digital skills remain a challenge for many women entrepreneurs.

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The key challenges identified include:

- **Access to Finance:** Difficulty in securing financial support tailored to women entrepreneurs.
- **Digital Infrastructure:** Limited access to modern digital tools and high-speed internet.
- **Specialized Training:** A shortage of training programs specific to CE and Industry 4.0 (i4.0) transitions.
- **Networking and Mentorship:** A lack of structured networking and mentorship opportunities.

To address these challenges, the report recommends:

- **Developing Comprehensive Training Programs** focusing on CE and i4.0, including practical applications.
- **Establishing Networking and Mentorship Platforms** to connect women entrepreneurs with industry experts.
- **Enhancing Financial Support Mechanisms** such as grants and preferential loans tailored to women entrepreneurs.
- **Improving Access to Digital Infrastructure** to ensure that women entrepreneurs can compete effectively in the digital economy.
- **Promoting Inclusive Public Policies** that involve women entrepreneurs in the policy-making process, ensuring their needs are addressed.

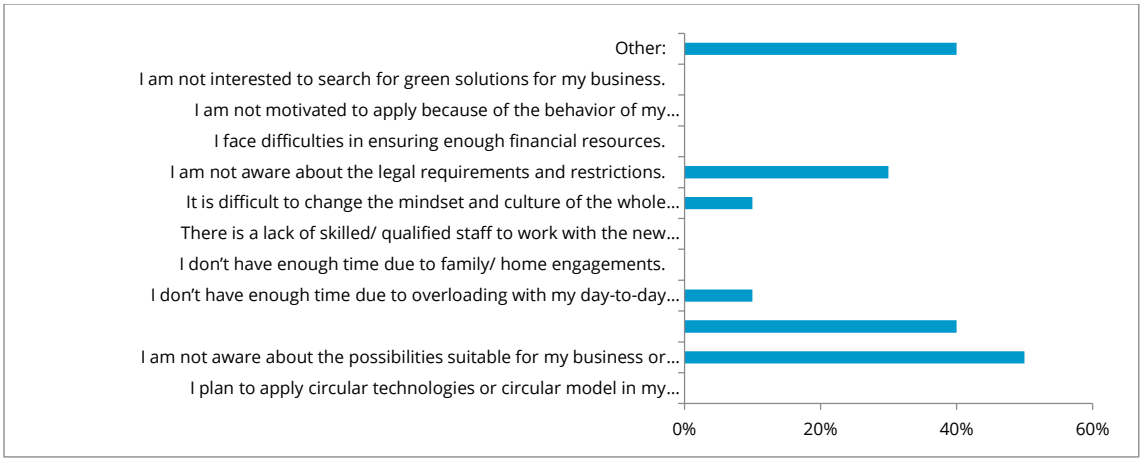

Figure 32: Faced challenges for CE application in Romania

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The survey results indicate a significant gap in digital skills among women entrepreneurs, despite a high level of awareness and initial adoption of digital technologies.

- **Adoption of Digital Technologies:** A substantial 87.5% of respondents reported using digital technologies, particularly mobile technologies, e-commerce platforms, and collaboration tools. This high adoption rate reflects a general recognition of the importance of digitalization for business growth and competitiveness.

- **Challenges in Digital Skills:** Despite the widespread use of basic digital tools, many women entrepreneurs reported deficiencies in more advanced digital skills. For example, 44.44% of respondents identified a need for improved cybersecurity skills, and 48.15% expressed a need for training in using design or simulation software. This highlights a critical gap in the digital capabilities required to fully leverage modern technologies.

- **Training Needs:** The survey revealed a strong demand for training in digital marketing (80.00%) and the development of digital business models (60.00%). These areas are seen as essential for expanding market reach and optimizing business operations. However, high investment costs (cited by 80% of respondents) and a lack of skills and knowledge on how to implement these technologies (40%) are significant barriers to digital adoption.

- **Motivations for Digitalization:** The primary motivators for adopting digital technologies include the potential for improving operational efficiency and quality (39.29%) and reducing operational costs (25.00%). Gaining a competitive advantage (21.43%) was also a key factor, though external pressures, such as client or supplier demands, were less significant.

The survey also explored the extent to which women entrepreneurs are engaging with circular economy (CE) practices and the challenges they face in doing so.

- **Familiarity with CE Concepts:** A strong majority (72.97%) of respondents reported being familiar with CE concepts, particularly those related to waste minimization and the use of sustainable materials. This suggests a broad awareness of the importance of sustainability in business practices.

- **Application of CE Practices:** Despite this awareness, the application of CE practices varies. While 72.97% of respondents are implementing some form of circular technology or model in their businesses, the focus is primarily on basic practices such as minimizing waste (80.77%) and using renewable, recyclable, or biodegradable materials (69.23%). More advanced CE practices, such as the sharing economy or integration with digital technologies, are less commonly applied.

- **Barriers to CE Adoption:** Several significant challenges were identified, including a lack of awareness about suitable CE opportunities for their businesses (50%) and insufficient knowledge about Industry 4.0 technologies that support CE (40%). Additionally, 30% of respondents were uncertain about legal requirements related to CE, indicating a need for clearer regulatory guidance and support.

- **Training and Support Needs:** There is a notable demand for sector-specific training in CE (67.65%) and access to finance for implementing CE practices (76.47%). Respondents also highlighted the need for digital skills related to CE (58.82%) and the integration of artificial intelligence (AI) into CE practices (52.94%). These needs reflect a desire to move beyond basic sustainability practices towards more integrated and advanced CE strategies.

The survey highlights several areas where women entrepreneurs require additional support to overcome the challenges they face in skills acquisition, digitalization, and circular transition:

- **Training Programs:** There is a clear need for comprehensive and accessible training programs that address both digital skills and CE practices. These programs should be tailored to the specific needs of women entrepreneurs and focus on practical applications that can be directly implemented in their businesses.

- **Financial Support:** High investment costs are a significant barrier to both digitalization and the adoption of CE practices. Respondents indicated a strong need for financial support mechanisms, such as grants and preferential loans, that are specifically designed to help women entrepreneurs invest in new technologies and sustainable business models.

Networking and Mentorship Opportunities: The survey results suggest that women entrepreneurs would benefit from structured networking and mentorship opportunities. These platforms could connect them with industry experts, peers, and mentors who can provide guidance on navigating the complexities of digital and circular transitions.

Stakeholders perspective

Stakeholder interviews conducted with industry experts and policymakers provide a nuanced perspective on the needs and gaps in skills acquisition for women entrepreneurs (WEs) in Romania, particularly concerning their transition to circular economy (CE) and digital practices. These insights also shed light on the motivation factors and support measures that have contributed to the success of women entrepreneurs.

Needs and Gaps in Skills Acquisition

- **Lack of Specialized Training:** Stakeholders emphasized a significant gap in specialized training programs tailored to women entrepreneurs, particularly in the areas of CE and Industry 4.0 (i4.0). The absence of sector-specific training hinders WEs from effectively adopting advanced technologies and sustainable practices.
- **Limited Access to Resources:** There is a recognized shortage of resources, including financial support and modern digital infrastructure, which are essential for WEs to compete in a rapidly digitalizing market. The lack of high-speed internet and advanced digital tools further exacerbates these challenges.
- **Networking and Mentorship Deficits:** Stakeholders pointed out that women entrepreneurs often lack access to robust networks and mentorship opportunities. This deficit limits their ability to gain industry insights, receive guidance, and connect with peers who can support their transition to digital and circular business models.

Successful women entrepreneurs, as highlighted in the interviews, are often driven by a strong desire to innovate, streamline business processes, and meet consumer demands for sustainability. The pursuit of operational efficiency and market differentiation are key motivators.

Key measures that have contributed to the success of women entrepreneurs include:

- **Access to Expertise:** Digital marketing expertise and IT consulting were crucial in helping WEs navigate the complexities of the digital transition.
- **Informal Networks:** Informal networks played a significant role in providing support and knowledge sharing, compensating for the lack of formal mentorship programs.

Flexible Learning Opportunities: Successful WEs benefited from flexible, self-directed learning opportunities that allowed them to balance business demands

Recommendations

Develop Specialized Training Programs - Focus on Circular Economy (CE) and Industry 4.0 (i4.0), tailored to women entrepreneurs with practical, actionable content.

Enhance Financial Support - Introduce grants and loans specifically for women entrepreneurs to support investments in technology and sustainability.

Improve Digital Infrastructure - Ensure access to high-speed internet and modern digital tools to help women-led businesses compete effectively.

Create Networking and Mentorship Platforms - Establish platforms connecting women entrepreneurs with mentors and industry experts for guidance and support.

Promote Inclusive Public Policies - Advocate for gender-equal policies that address the specific needs of women entrepreneurs in digital and circular transitions.

Offer Flexible Learning Opportunities - Provide accessible, flexible learning options, including online courses, to support ongoing skill development for women entrepreneurs.

5.10 Serbia

Country overview

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

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.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

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.

In response to the question "Which training topics would be most useful to stimulate the circular transition of female entrepreneurs?" the majority of respondents (68,18%) selected *Access to finance*. Same percentage of WEs picked *Application of circular economy in specific sectors* as the one of the most needed topics. The next in line is *Introduction to the circular economy* with 63,64%, then *How to use the digital technologies for circular transition* with 59,09%. Less WEs selected following three topics: *AI and CE* (45,45%), *Digital skills for circular transition* (40,91%) and *Legal framework* (27,27%).

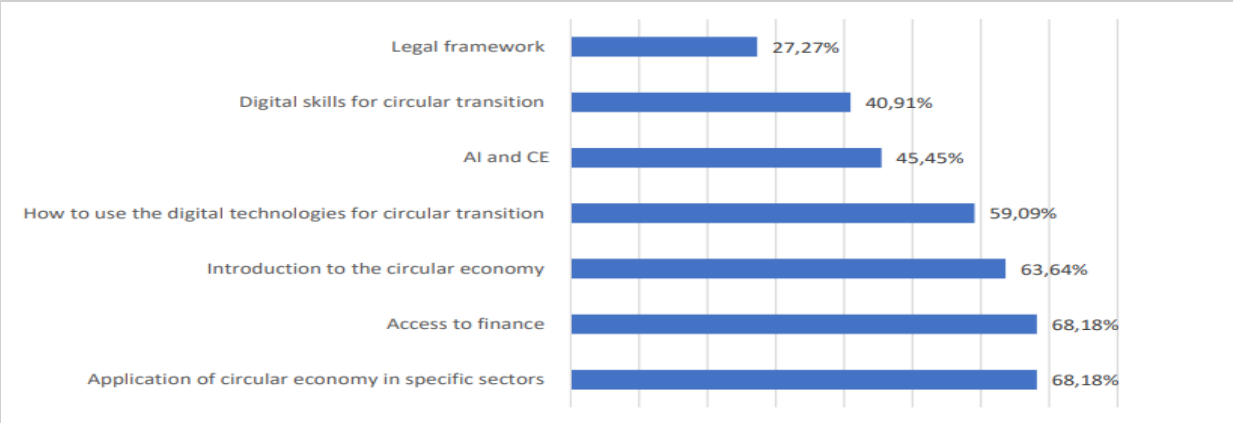

Figure 33: Needs for trainings for CE transition in Serbia

The survey gathered insights from ten respondents regarding the ICT training needs of WEs. The question posed was: "Which of the following ICT areas are most needed for training among female entrepreneurs?" The results reflect a diverse array of needs that highlight the areas where female entrepreneurs may benefit from further development to enhance their businesses. The most popular response was *Digital marketing*, selected by 6 respondents, accounting for 60% of the total replies. Following closely, *Resource optimization (time, personnel, investments)* was endorsed by 5 respondents (50%). This underscores a clear need for training in how to make the best use of available resources, which is crucial for the sustainability and growth of their businesses. Additionally, several respondents indicated a need for training in *Cyber security*, with 4 respondents (40%) selecting this option. Equally, the training areas of *Development of digital business models/services*, *Setting up and operating online stores*, and *Using digital technologies and the Internet for business purposes* also garnered attention,

each selected by 4 respondents (40%) or more. Specifically, 3 respondents (30%) identified a need for *Conducting online market research*, which is essential for understanding consumer behavior and trends in the digital marketplace. The need for *Fully integrated digital processes* was noted by 3 respondents (30%), emphasizing the importance of having cohesive systems that streamline operations across various digital platforms.

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 as follows: *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%).

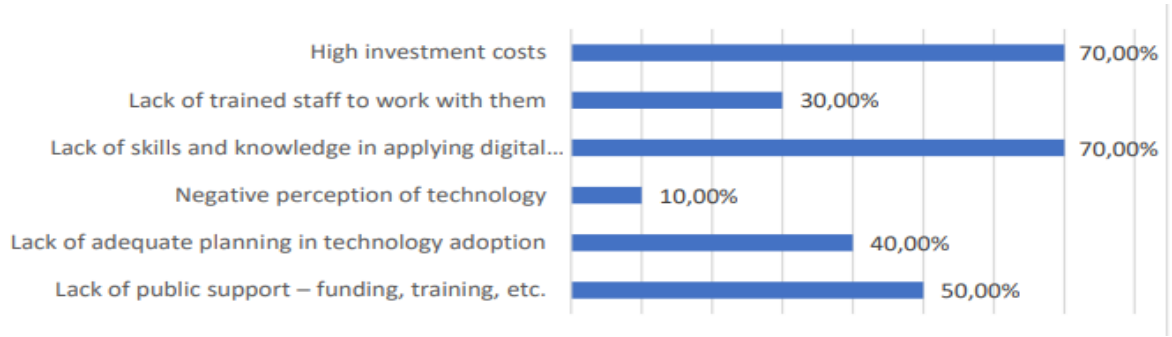

Figure 34: Barriers for adopting of advanced digital technologies in Serbia

Stakeholders perspective

The qualitative research involved interviews with five stakeholders, who are also members of the Serbian National Stakeholders Group. They represent various sectors: policy making, industry expertise, business support organizations/NGOs, academia, and training institutions. The stakeholders emphasized the importance of digitalization and Industry 4.0 for work processes but noted a lack of specific initiatives and funding for

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digital adoption among businesses. They highlighted examples of digital transformation, such as Serbia's e-governance portal and a textile recycling project, alongside the need for educational initiatives focused on circular economy principles.

The insights revealed a pressing need for enhanced support structures for women entrepreneurs, including better awareness campaigns, tailored training programs, and practical benefits to boost their participation in the circular economy and digital transition. Key challenges identified included insufficient access to funding, inadequate development of relevant skills (like ICT and managerial skills), and low awareness of sustainable practices. Stakeholders called for more effective communication and collaboration and suggested that policymakers increase awareness of the Smart Specialization Strategy.

Recommendations to address these challenges include providing training on circular economy and digital skills, fostering partnerships for leveraging opportunities, focusing on skill improvement in critical sectors (like agriculture and energy), and developing sustainable business practices. The stakeholders also advocated for the use of technology to enhance resource efficiency, innovate circular business models, and support data-driven sustainability initiatives.

Motivating Factors for Women Entrepreneurs

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.

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%).

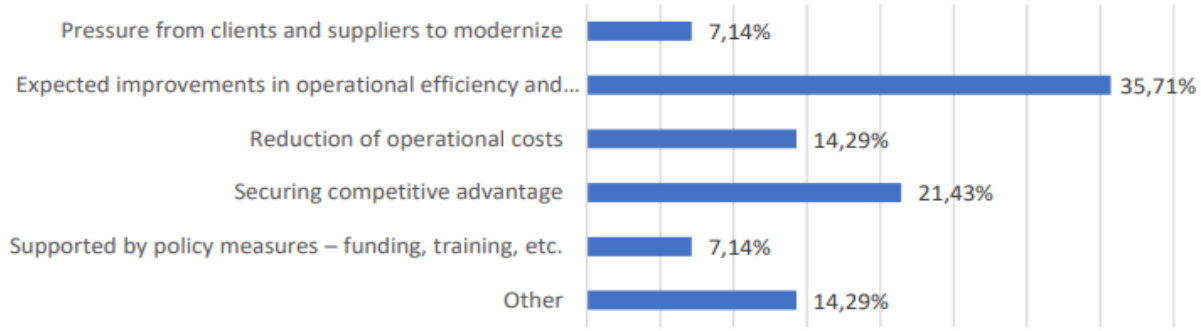

Figure 35: Motivational factors for digital technologies application in Serbia

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.

Recommendations

Following an extensive review of current practices, a set of recommendations and proposed actions have been established to support businesses in their transition towards a Circular and Digital Economy. These recommendations aim to address the **critical skills development, partnership opportunities, management capacities, and resource optimization** necessary for sustainable growth.

Firstly, it is crucial to implement comprehensive training and education programs focused **on Circular Economy principles, digitalization, innovation management, business communication, and marketing for employees**. These programs should be designed to equip employees with the essential skills required for navigating the complexities of the evolving economic landscape. Specifically, training should cover key areas such as **waste management, resource efficiency, digital tools, and effective marketing strategies**.

The data suggests a **clear prioritization of digital marketing and resource optimization**, while also highlighting substantial interest in **cybersecurity** and other critical digital skills. Overall, the responses present a robust overview of the training requirements that could empower female entrepreneurs, enabling them to leverage digital tools more effectively in their ventures. In conclusion, the results of this analysis signify a substantial opportunity to enhance the skill sets of female entrepreneurs in critical ICT areas that can drive their business success in an increasingly digital environment.

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 policy makers 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.

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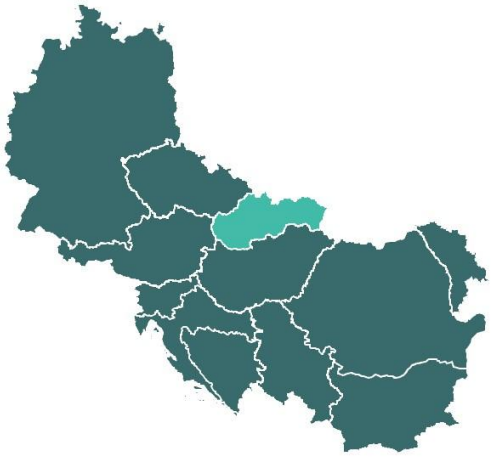
5.11 Slovakia

Country overview



Slovakia is a Central European country bordered by the Czech Republic, Poland, Ukraine, Hungary, and Austria. With an area of over 49,000 square kilometres, it is home to nearly 5.5 million people, of whom approximately 51% are women and 49% are men. The population is gradually aging, with the 30-44 and 60-74 age groups being particularly prominent. Women, on average, outlive men, especially from the age of 60 onwards. When it comes to the education situation, women in Slovakia are more likely than men to pursue higher education, as they consistently outnumber men across all levels of tertiary education. While most men achieve only upper secondary education, the majority of women continue to earn bachelor's degrees, indicating a higher overall educational attainment among females.

Despite these positive educational trends, women remain underrepresented in entrepreneurship. According to recent statistics, only 27.5% of Slovak entrepreneurs are women, a slight decrease from previous years. Women entrepreneurs are most active in the service, accommodation, and food sectors, while they are notably scarce in information and technology. Although Slovakia's digital and economic strategies recognize key sectors for growth, there is limited targeted support specifically addressing the needs of women entrepreneurs within these frameworks.

To address this gap, several initiatives and programs have been established to support women entrepreneurs in Slovakia. International projects like RE-FEM and GREEN aim to equip women with resources for business recovery and sustainability. Additionally, organisations such as the Association of Women Entrepreneurs and Managers and Top Centre for Women Entrepreneurs offer mentorship, networking, and training. Financial support is available through micro-loans, Euro funds, and grants targeting women, complemented by non-financial programs focused on digital skills and management training. National initiatives also emphasise increasing the number of women in ICT, with specific actions promoting advocacy, internships, and gender-inclusive leadership.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

The research gathered 39 valid quantitative responses and one qualitative response via interview. The research sample consists of women entrepreneurs in Slovakia across various sectors, with the majority representing service-oriented businesses such as consulting, tourism, and education. Most respondents have been operating for 3 to 10 years, indicating a focus on established businesses rather than start-ups. Over 84% of these businesses are micro-enterprises with fewer than 10 employees, followed by small enterprises. This distribution aligns with national data, where micro and small businesses dominate among women entrepreneurs. The study primarily reflects perspectives from experienced businesswomen in the service sector, providing valuable insights into their familiarity with key economic and technological concepts.

Regarding the **circular economy**, women entrepreneurs in Slovakia show moderate familiarity with its principles, particularly practises like repairing, reusing, and recycling. However, concepts like the sharing economy remain less understood. The construction, real estate, and waste management sectors exhibit the highest familiarity, while the food and agriculture sector scores the lowest. Over half of the respondents currently apply circular economy practices. Key barriers include a lack of knowledge and resources. Women entrepreneurs express a strong interest in practical training on applying circular models, financing transitions, and integrating digital technologies into circular practices.

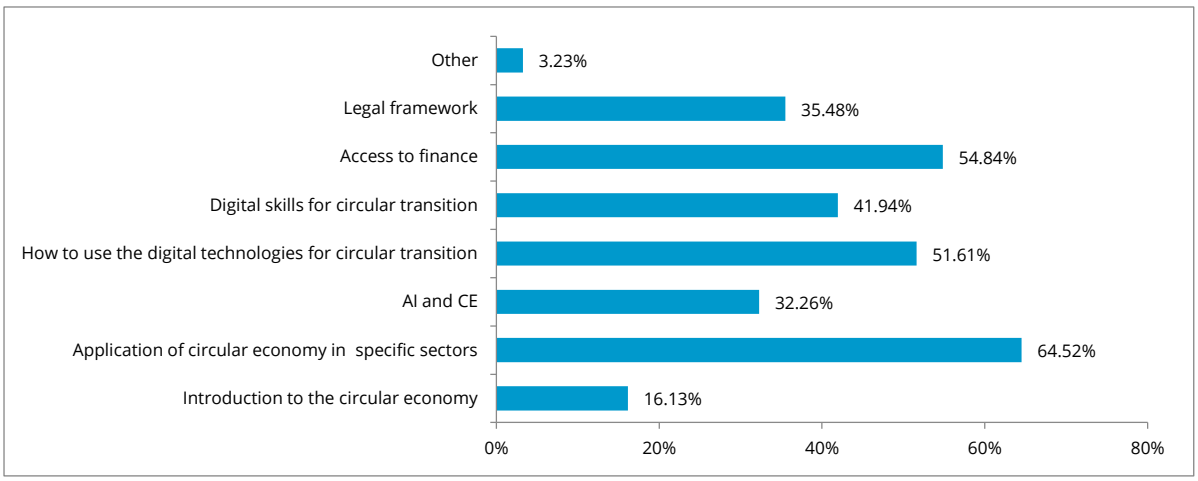


Figure 36: Needs for trainings for CE transition in Slovakia

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In the area of **digital transformation**, the research revealed that more than half of respondents do not actively implement digital technologies in their businesses. Among those who do, the adoption of mobile technologies and e-commerce platforms is most common, with minimal engagement in advanced technologies like robotics and big data. The main barriers include high investment costs, limited public support, and insufficient digital skills. Moreover, there is a lack of support in regions outside the Bratislava (BA) area, where traditional thinking still prevails. Also, companies often underestimated the inefficiency of managing data in Excel, highlighting the need for specialised software. Many respondents acknowledge the need to enhance their digital competencies, particularly design software, cybersecurity, skills for using Microsoft Office and similar. Women entrepreneurs indicate a strong demand for training focused on digital marketing, online business operations and e-shops, and optimizing resources through technology.

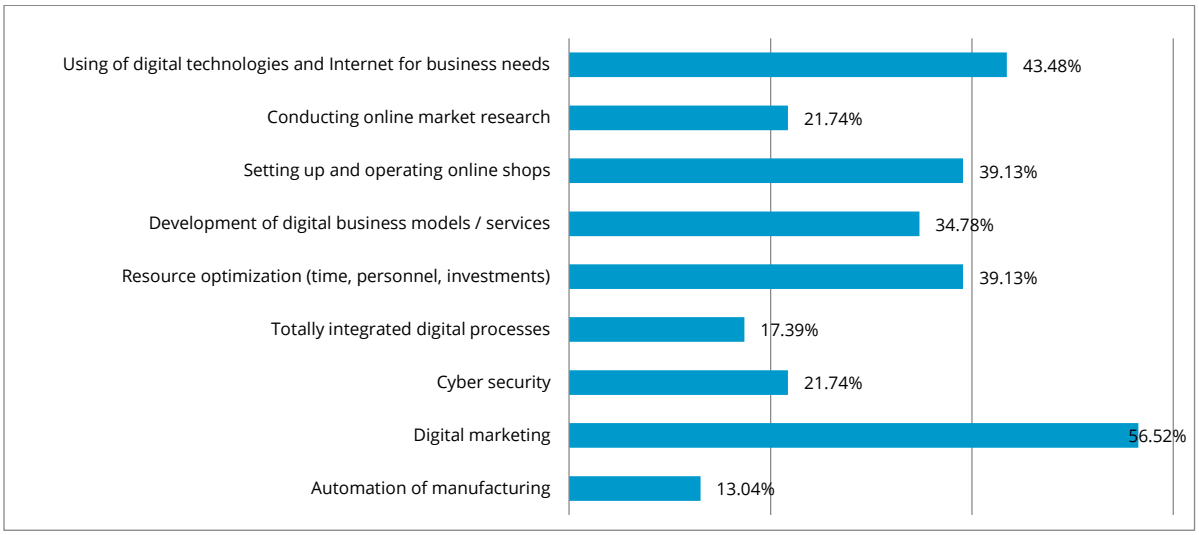

Figure 37: Needs for trainings for digital transition in Slovakia

We can conclude that the research reveals that while Slovak women entrepreneurs show moderate familiarity with circular economy and digital transformation concepts, significant knowledge and skill gaps persist. To effectively implement these models, **key skills are needed**: *management skills* for leading transitions, the *ability to educate employees* on the importance of these topics, and *analytical skills* for data-driven decision-making. Additionally, *digital skills* are crucial for implementing technology-driven solutions that support sustainability. Addressing these gaps through targeted training would empower women entrepreneurs to fully leverage sustainable and digital business opportunities.

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Stakeholders perspective

The research sample consisted of four stakeholders from various sectors: business support organisations for women entrepreneurs, industry experts in the circular economy, policymakers, and NGOs in sustainable tourism.

Regarding the **circular economy**, stakeholders noted that women entrepreneurs in Slovakia are naturally inclined toward sustainable practices, often integrating green principles into their businesses from the outset. They are seen as "transition brokers" who play a critical role in advancing societal and environmental goals. However, challenges remain, such as translating sustainability education into practical business applications and the need for greater flexibility in workplace structures. Competencies necessary for implementing circular business models include *strategic agility*, the ability to balance sustainability with business objectives, and *strong leadership* in promoting environmental values.

In terms of **digital transformation**, stakeholders highlighted the growing impact of technology on business environments, especially in service industries where digital sales and communication are crucial. To fully adapt to digital technologies, women entrepreneurs need *competencies in digital literacy*, *time management*, and *strategic integration* of digital tools into their operations. Strengthening these skills would enhance their ability to leverage digitalization for growth and competitiveness in the evolving market.

Motivating Factors for Women Entrepreneurs

The main motivators for which women entrepreneurs choose to use circular models in their businesses is the need to adapt to consumers' expectations. Equally important for women entrepreneurs is the need to reduce the cost of raw materials and the management setup and its commitment to green transition. Respondents mentioned their own beliefs and lifestyle as other reasons. On the contrary, the least motivating factor for women entrepreneurs is support through available policy measures.

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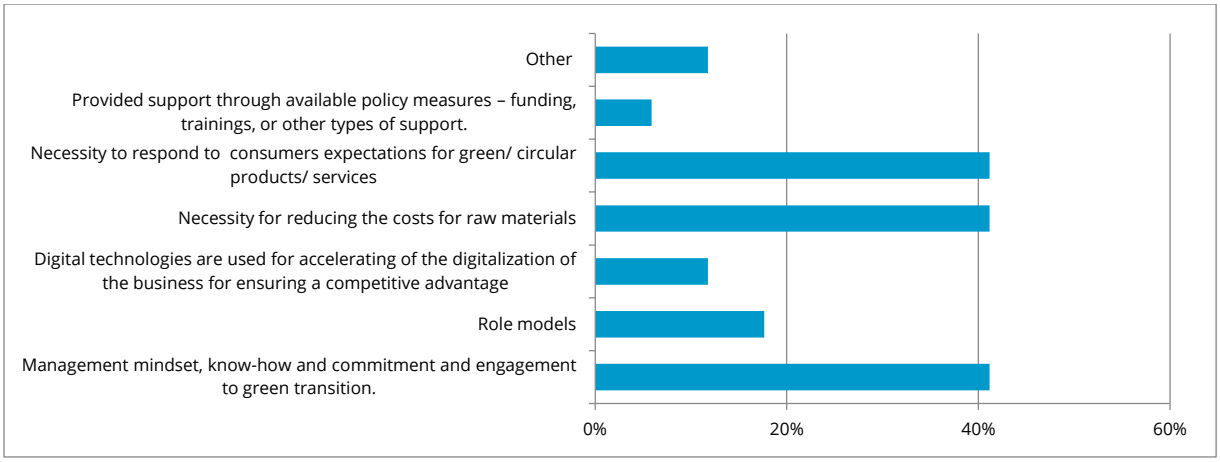

Figure 38: Motivational factors CE aspects in Slovakia

More than 50% of the motivations for moving towards digital transformation were cited by respondents of two factors: improving operational efficiency and reduction of operation costs. On the other hand, just under 5% of respondents indicated that they saw support by policy measures as a motivation for adoption resulting in policy measures as the least motivational factor.

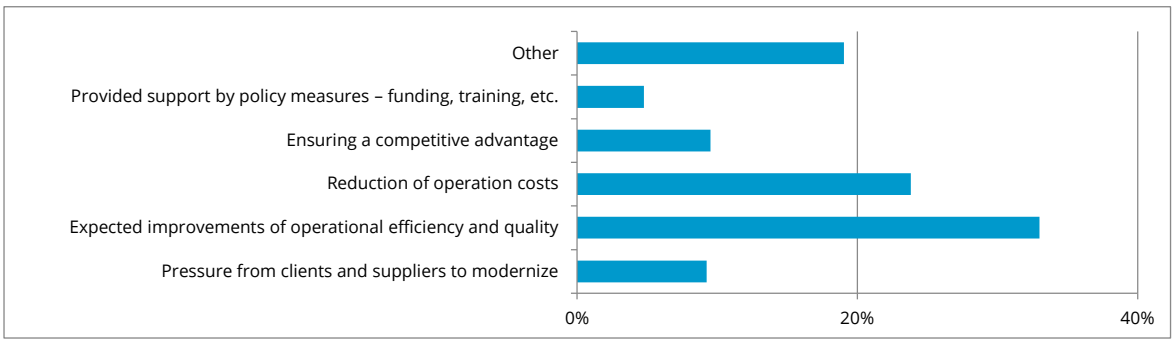

Figure 39: Motivational factors for digital technology application in Slovakia

We can conclude that the transition to a circular economy among women entrepreneurs in Slovakia is primarily driven by consumer demand, cost reduction, and a commitment to sustainability. In the area of digital transformation, the key motivators for women entrepreneurs include improving operational efficiency and reducing costs

Recommendations

To effectively support women entrepreneurs in their engagement with the **circular economy**, it is essential **to increase public support**, particularly in the form of financial assistance for initial consulting costs and the acquisition of Environmental, Social, and Governance (ESG) software. **Promoting events, workshops, and international exchanges**

can facilitate the sharing of knowledge and best practices, thereby bridging regional disparities. **Involving male entrepreneurs** in sustainability dialogues is vital, as they are frequently the key decision-makers in organizations. Simultaneously, **empowering women to assume decision-making roles** will foster a more inclusive environment. Emphasizing sustainability as a critical component of business will not only enhance its acceptance but also highlight the **need for specialized software solutions** to effectively manage sustainability data, facilitating a smoother transition to circular business practices.

In the context of **digital transformation**, it is crucial to showcase **successful women entrepreneurs as exemplars, thereby** inspiring others to pursue similar paths. Fostering an environment that values **openness, flexibility, and a growth mindset** is essential for cultivating the necessary skills among women entrepreneurs. Providing support for **access to training, advisory services, funding**, and the adoption of digital technologies—including artificial intelligence and data management—will enhance operational efficiency and reduce administrative burdens. Moreover, initiatives such as **women's entrepreneur awards** can serve to motivate and encourage participation. To foster a successful digital transition, it is vital to **streamline administrative processes** and provide **clear, accessible guidance on implementing digital solutions**, thereby empowering women entrepreneurs from the outset and enhancing their market competitiveness.

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5.12 Slovenia

Country overview

Slovenia, located in southern Central Europe, is a country characterized by a mountainous and forested landscape, covering 20,271 square kilometers. As of 2023, Slovenia has a population of 2.1 million, with a nearly equal gender distribution. Slovenia is among the European countries with a pronounced aging population, attributed to low birth rates and increasing life expectancy. The country's education system is robust, with a significant proportion of women (30.4%) attaining tertiary education, which surpasses the percentage of men (21.3%).

Despite these educational achievements, women in Slovenia face distinct challenges in entrepreneurship. Only 4.6% of women have established businesses in 2023, compared to 12.8% of men, reflecting a gender disparity that aligns with global trends. The share of female entrepreneurs has decreased from 37% in 2022 to 25% in 2023. Major barriers include limited access to finance, inadequate mentorship and networking opportunities, and challenges related to digital transformation. Furthermore, while the majority of women work in sectors like manufacturing, education, and trade, men dominate fields such as engineering and construction, indicating gendered occupational patterns.

Slovenia has several policy frameworks aimed at supporting women entrepreneurs and addressing gender disparities. Key strategies include the National Programme for Equal Opportunities for Women and Men (2023–2030), which aims to promote gender equality in various sectors, and the Slovenian Industrial Strategy (2021–2030), which encourages entrepreneurship among target groups, including women. The Digital Slovenia 2030 strategy focuses on promoting digital inclusion and reducing gender gaps, particularly in ICT education and employment. Despite these policies, women entrepreneurs still encounter significant challenges, particularly in accessing finance and navigating digital transformation.

To improve the entrepreneurial ecosystem for women, Slovenia has implemented various support mechanisms. SPIRIT Slovenia organizes entrepreneurship training for

potential and young women entrepreneurs, which is a prerequisite for applying for financial support. The Association of Slovenian Businesswomen also plays a vital role by organizing events such as "500 women entrepreneurs" and providing various support services. The country recognizes the need to increase the number of female ICT experts, and pilot training programs for women in ICT were launched in late 2023 as part of efforts to close the digital skills gap.

Moreover, Slovenia's efforts to transition to a circular economy are supported by the Strategic Research and Innovation Partnership (SRIP) for the Circular Economy, which connects businesses, educational institutions, NGOs, and the state. In April 2024, the Ministry of the Economy, Tourism, and Sport launched a tender to establish the Slovenian Center for a Circular Economy, which will support companies and promote green transition initiatives.

In conclusion, while Slovenia has made strides in supporting women entrepreneurs through various policies and initiatives, there remains a significant need for targeted interventions, particularly in finance, mentorship, digital skills, and circular economy engagement. Addressing these challenges will be crucial for fostering a more inclusive and dynamic entrepreneurial ecosystem in the country.

Digital and Circular Skills Needs and Challenges of Women Entrepreneurs

Key needs and challenges as identified during conducting suvey anong women entrepreneurs are:

- **Digital Skills and Knowledge**: Women entrepreneurs face significant challenges related to digital skills. Many have difficulty adapting to technological advancements, indicating a need for enhanced digital competency training.
- **Financial Constraints**: Financial limitations are a major barrier, with many women struggling to secure the necessary funding for digital transformation and the adoption of circular economy principles.
- **Inadequate Training Programs**: Although some training programs exist, they are not sufficiently robust or continuous to meet the evolving demands of a digital and circular economy. Tailored training addressing specific needs, particularly in high-tech sectors, is lacking.

- **Limited Networking and Support Structures**: There is a noticeable gap in networking opportunities and available support structures. This limits women entrepreneurs' ability to access resources, share knowledge, and gain support.

- **Challenges in Circular Economy Implementation**: Familiarity with circular economy concepts varies, with most women entrepreneurs being more familiar with strategies to minimize waste and prolong product lifecycles. However, their awareness of advanced models, like "Product as a Service," is lower.

Recommendations: Financial Assistance (increasing public support through financial aid, such as tailored financial instruments for women entrepreneurs, is crucial); **Enhanced Training** (implementing more targeted training programs that focus on leadership, strategic planning, and specific technical skills is recommended; programs should also focus on digital literacy to better prepare WEs for digital transformation); **Networking Opportunities** (the creation of platforms to facilitate connections among women entrepreneurs, industry experts, and investors is essential; additionally, mentorship programs that provide ongoing support would be beneficial); **Policy Advocacy** (there is a call for policies that address gender equality in entrepreneurship and create an enabling environment for women-led businesses, including policies that address systemic biases).

Key challenges and needs for women entrepreneurs in Slovenia regarding digital and circular skills are alos identified in a recent analysis. Women entrepreneurs face significant hurdles, particularly in adapting to technological advancements and securing financial resources for digital transformation. These challenges are compounded by a lack of technical skills and digital literacy, which restricts their ability to fully leverage Industry 4.0 (i4.0) technologies:

- **Digital Skills Gap:** A critical need for enhanced digital literacy and technical training has been identified, particularly in high-tech and innovation-driven sectors. Women entrepreneurs often lack confidence in digital competencies, such as cybersecurity and software development

- **Financial Barriers:** Tailored financial instruments are scarce, making it difficult for women entrepreneurs to secure necessary capital for transitioning to digital and circular economies

Recommendations: Tailored Financial Support (developing specific financial instruments for women entrepreneurs can help bridge the funding gap and support their transition to a circular economy); **Targeted Training Programs** (implementing education and training that focus on leadership, management, and strategic planning, alongside technical skills, will empower women entrepreneurs to succeed).

Stakeholders perspective

The analysis highlights several needs and gaps in the skills and support required for Women Entrepreneurs (WEs) in Slovenia, particularly as they transition toward the circular and digital economy:

- **Technical Training Gaps**: Existing training programs often fail to address the specific needs of WEs, especially in high-tech and innovation-driven sectors.
- **Digital Literacy**: Many WEs struggle with digital literacy, which is critical for embracing digital transformation.
- **Financial Constraints**: Financial instruments tailored to WEs are lacking, making it difficult for them to secure capital for transitioning to Circular Economy (CE) and Industry 4.0 (i4.0).
- **Limited Networking**: Networking opportunities are restricted, hindering knowledge sharing and collaborative support among WEs.
- **Legal and Regulatory Support**: There is a need for improved legal and regulatory frameworks to create a more inclusive entrepreneurial ecosystem.

Several motivation factors and support measures contributed to the success of women entrepreneurs like those at Puppilam, a small company focused on integrating circular economy principles. Key elements that supported their success include:

- **Financial Assistance**: This includes subsidies and vouchers, which were pivotal for companies like Puppilam.
- **Comprehensive Training Programs**: Entrepreneurship training, mentorship, and coaching provided critical support for developing skills and knowledge necessary for navigating the circular and digital economy.

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- **Commitment to Sustainability**: A strong commitment to sustainability was a significant motivational factor.

To address the identified needs and gaps, several recommendations were provided:

1. **Tailored Financial Instruments**: Developing financial products that specifically address the challenges faced by WEs can ease their access to capital.
2. **Targeted Training Programs**: Implementing training focused on both technical skills and leadership development is essential.
3. **Enhanced Networking Platforms**: Creating networks and mentorship programs that connect WEs with industry experts and investors will provide ongoing support.
4. **Policy Advocacy**: Advocating for policies that promote gender equality and remove systemic barriers can create a more enabling environment for women entrepreneurs.

Motivating Factors for Women Entrepreneurs

It follows from the analysis, that the primary reasons women entrepreneurs choose to implement circular models in their businesses are the *Management mindset, know-how and commitment and engagement to green transition the need to adapt to consumers expectations*; followed by *Necessity for reducing the costs for raw materials* and *Role models*. From the interviews it was also emphasized, that a significant group of women entrepreneurs are motivated by a personal commitment to sustainability and the circular economy as a lifestyle choice. Others are driven by the need to meet customer expectations, which push them to adopt circular models in their businesses.

It follows from the analysis, that the primary motivation for digital transition among women entrepreneurs is gaining a competitive advantage in the market. This is followed by anticipated improvements in operational efficiency and quality, as well as the reduction of operational costs.

Recommendations

Tailored Financial Instruments: Develop financial tools specifically designed to support women entrepreneurs (WEs), enabling them to secure the necessary capital to transition to circular economy (CE) and Industry 4.0 (i4.0) models.

Targeted Training and Education: Implement specialized training programs that focus not only on technical aspects but also on leadership, management, and strategic planning. These programs should address the unique challenges faced by WEs.

Enhanced Networking Opportunities: Create platforms for WEs to connect with industry experts and investors. Mentorship programs offering ongoing support and guidance are crucial.

Policy Advocacy: Advocate for policies promoting gender equality in the entrepreneurial ecosystem, addressing systemic biases and fostering a supportive environment for women-led businesses.

Public Support and International Collaboration: Increase public financial support and organize more events, workshops, and international exchanges to reduce regional disparities.

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6 Conclusions and recommendations

The **recommendations for supporting women entrepreneurs** in transitioning to circular economies and Industry 4.0 emphasize comprehensive, targeted actions:

- **Develop specialized training programs:** Create accessible training initiatives focused on digital skills, circular economy practices, and innovation management tailored to women entrepreneurs. These should also cover business communication and marketing skills. Emphasizing the importance of continuous skill development, particularly in:

  - Accessing financial instruments.
  - Innovation management.
  - Circular transition and digitalization, especially in sectors like Food and Agriculture, Textile and Plastics.
  - Circular economy and digital transformation tailored to women's needs.

  Offering flexible learning opportunities that accommodate work-life balance.

- **Enhance networking and mentorship:** Establish platforms that facilitate networking and mentorship, allowing women entrepreneurs to connect with industry leaders and gain valuable insights. Public-private partnerships and cross-sector collaborations should be encouraged.

- **Increase financial support:** Introduce targeted financial mechanisms like grants, preferential loans, and microcredits to help women invest in new technologies and circular business models.

- **Improve access to digital infrastructure:** Ensure that women entrepreneurs have the necessary digital tools and high-speed internet to participate fully in the digital economy.

- **Promote inclusive policies:** Focus on simplifying administrative processes and providing clear guidance for transitioning to circular business models. Increasing public support through financial assistance for initial costs, and promoting events, workshops, and international exchanges to bridge regional gaps. Engaging male entrepreneurs in sustainability discussions and empowering women in decision-making roles is also crucial.

- **Focus on key sectors:** Prioritize skill development and management training in sectors like agriculture, construction, and energy, where circular economy practices can be most impactful.

- **Highlight success stories and role models:** Promote examples of successful women entrepreneurs to inspire and motivate others. Implement awards and recognition programs to boost visibility and motivation.

- **Support flexibility and work-life balance:** Encourage policies and workplace practices that support flexible work arrangements, helping women balance professional and personal responsibilities.

- **Encourage government and private sector collaboration:** Increase involvement of the private sector in legislation drafting and promote voluntary commitments to enhance policy awareness and implementation.

- **Raise awareness and provide resources:** Increase efforts to spread awareness of circular economy benefits, provide accessible education, and ensure that resources are available to help women entrepreneurs seize new opportunities. Promoting sustainability as a key business topic to ensure broader acceptance and the need for specialized software to manage sustainability data efficiently

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