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National Skills Gaps and Needs Analysis: - Slovakia

June/2024

Slovak Business Agency (SBA)

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Abbreviations and glossary of terms

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

1 Executive summary

The most recent statistics from (April, 2024) the Statistical Office of the Slovak Republic show that the proportion of female entrepreneurs stands at 27.5%, which is the lowest figure in the past decade compared to the peak of 29.2% observed in 2018. Even though there has been a decline, the change is not drastic, indicating a stable trend over the last ten years.

In Slovakia, women entrepreneurs are increasingly adopting circular economy principles aimed at extending product life cycles through repair, refurbishment, reuse, and recycling. Based on respondent´s answers, they are most familiar with circular concepts in sectors such as construction and real estate and waste and water management. However, the rates of adoption show that while more than half of businesses use circular models, those currently not involved show no intention of participating in the future. Challenges persist among women entrepreneurs due to gaps in practical knowledge and guidance, leading to a need for training in application, financing, and digital technologies. Women entrepreneurs also perceive a significant gap in digital skills, emphasizing the need for training in digital literacy, sales, and management and soft skills.

In the area of digital transformation, nearly half of women entrepreneurs in Slovakia incorporate digital technologies into their operations, with a focus on mobile technologies and e-commerce platforms. The Technology, Electronics, and IT sectors are leading in digital adoption and employ innovations like the Internet of Things and cybersecurity technologies. Despite internal motivation for efficiency and cost reduction, obstacles such as insufficient support, high costs, and inadequate digital skills remain significant. There is high demand for digital marketing and optimization training, reflecting a shift towards enhancing online presence and operational efficiency amid reservations about Industry 4.0.

Externally, women entrepreneurs are significantly affected by crises such as the COVID-19 pandemic and geopolitical conflicts, impacting a majority of businesses. Surprisingly, a substantial portion of them is unaware of available support measures, highlighting communication gaps and underutilization of resources. Barriers to adopting smart specialization and digital strategies include lack of awareness, time constraints, readiness issues, and financial limitations, emphasizing the need for comprehensive policy

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interventions. Recommendations include raising awareness, providing targeted support, and improving communication channels to foster innovation and resilience.

In conclusion, while Slovak women entrepreneurs show leadership in innovation and sustainability, there is a critical need for enhanced support mechanisms and tailored training programs. Effectively addressing these challenges can empower women entrepreneurs to leverage circular economy practices, navigate digital transformations, and capitalize on smart specialization strategies, thus contributing significantly to societal progress and environmental stewardship. Bridging the skills gap in digital literacy, soft skills, and management will be crucial in enabling women entrepreneurs to thrive in an increasingly digital and sustainable economy.

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2 Introduction

This National Report for Slovakia is an integral component of the Transnational Skills Gaps and Needs Analysis, aimed at dissecting the unique barriers and opportunities that lie within Slovakia's 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, stakeholder interviews, and case studies, offering a nuanced understanding of the skills landscape in Slovakia. 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.

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3 Methodology

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.

Table 1: Methodology applied

Approached applied	Description of the performed task
Desk research	Review of quantitative data for Slovakia, reports, studies experts document is made in order to establish a baseline understanding of the current skills landscape for women entrepreneurs in Slovakia.
Survey among women entrepreneurs	The analysis incorporates results from survey conducted among women entrepreneurs from Slovakia. It was organized in the period 23/04/2024 – 27/05/2024. 120 of respondents were identified from different sectors and questionnaires were provided to them by SurveyMonkey platform. The survey provides both quantitative data and qualitative insights to analyze prevailing skills gaps and needs. 39 of responses are collected which is equal to 32,5% responding rate and could be accepted as quite sufficient for the main goal of the current Analysis.
Stakeholders interview	In-depth interviews with industry experts, policymakers, academia and support organizations for better understanding the broader ecosystem and support structures for WEs are made. Together eight potential respondents were contacted and four of interviews are done. Through them are explored perceptions and suggestions for facilitating a successful s3 and i4.0 transition under CE aspects of WEs in Slovakia.

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Successful case interviews	Successful case of interview with WE who have effectively implemented circular and digital transition are conducted aiming to be identified the motivational and successful factors which helped the WE through this process focusing on obtaining the necessary skills.

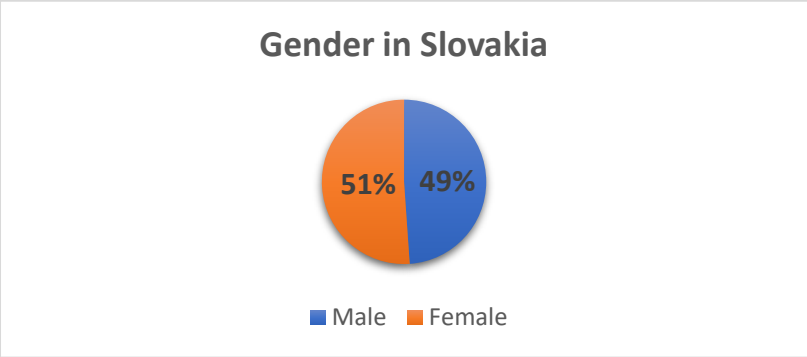
To effectively understand the dynamics of the skills gap and needs within Slovakia, a carefully curated sample of women entrepreneurs and female-led startups has been selected for this study. This sampling approach is designed to ensure a comprehensive analysis that reflects the diverse sectors and regions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

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

4 Slovakia

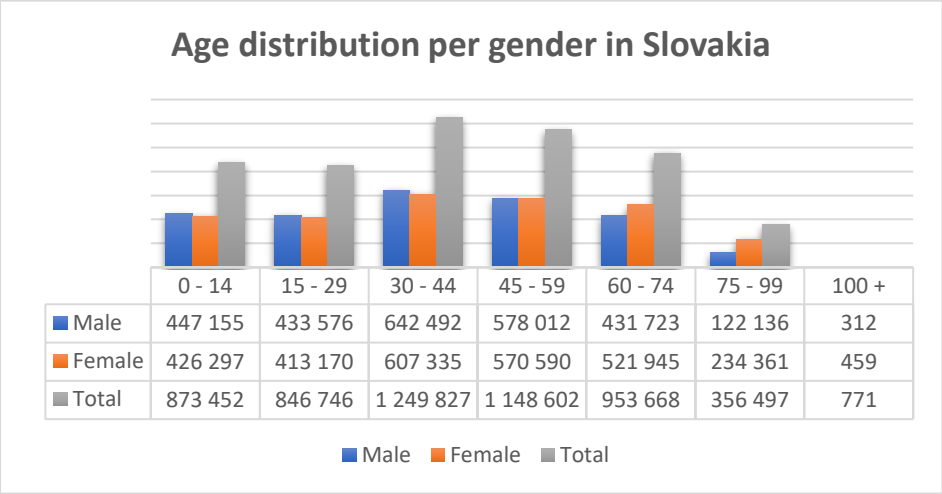
4.1 General presentation of Slovakia

Located in Central-East Europe, Slovakia shares borders with five neighbouring countries: the Czech Republic and Poland to the north, Ukraine to the east, Hungary to the south, and Austria to the west. This nation spans an area of more than 49,000 square kilometres and boasts a population of nearly 5.5 million individuals, with approximately 49% being male (2.6 million) and 51% female (2.7 million).



Source: Statistical Office of the Slovak Republic, last update 28.4.2024, authors elaboration

The **age distribution** in Slovakia shows that males and females have comparable numbers in the age categories between 0 to 59 years old.



	0 - 14	15 - 29	30 - 44	45 - 59	60 - 74	75 - 99	100 +
Male	447 155	433 576	642 492	578 012	431 723	122 136	312
Female	426 297	413 170	607 335	570 590	521 945	234 361	459
Total	873 452	846 746	1 249 827	1 148 602	953 668	356 497	771

Source: Statistical Office of the Slovak Republic, last update 28.4.2024, authors elaboration

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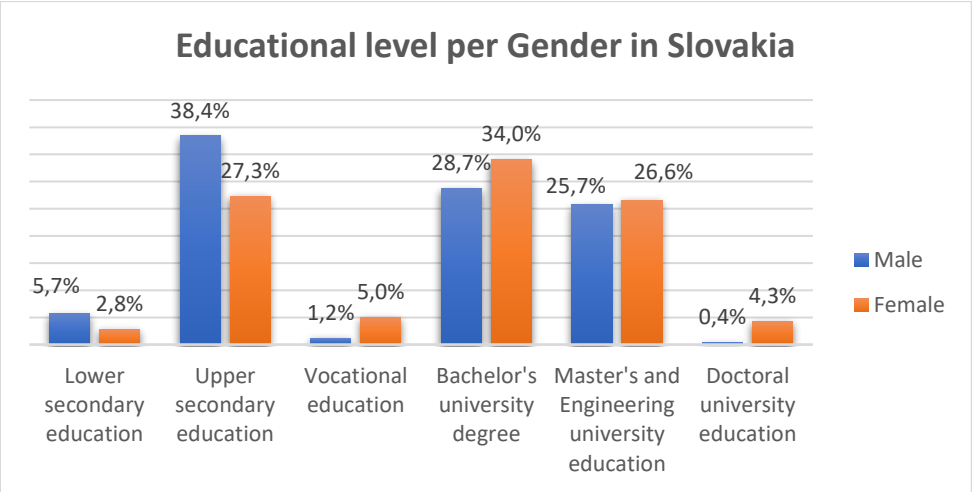
However, there are slightly more men than women in these age groups. The difference only becomes evident from the age of 60 onwards, when there are more women than men. Therefore, we can infer that women tend to live longer than men in Slovakia.

Slovakia's demographic landscape indicates an aging population, as evidenced by the preponderance of individuals in the 60-74 age group, representing those at or near retirement age, surpassing those within the 0-14 age group. Furthermore, the population aged 40-59 exceeds that of 15-29, implying that this aging trend will persist in the foreseeable future. Notably, the age bracket with the highest number of individuals is that of 30-44 years.

In Slovakia, the formal **education system** comprises six levels, which include lower and upper secondary education, vocational education, and three levels of university education, namely, Bachelor's degree, Master and Engineering degree, and Doctoral degree. According to the data on the adult population aged between 18 to 69, women are more significantly represented than men across all levels of higher education. This indicates that females possess a higher number of first, second, and third undergraduate degrees than males. It is noteworthy that a majority of males have completed upper secondary education, whereas the majority of females have attained a bachelor's degree.



Source: Statistical Office of the Slovak Republic, last update 31.10.2023, authors elaboration

As per the latest GEM (Global Entrepreneurial Monitor) statistical findings, the total **early-stage entrepreneurial activity** (TEA) has been observed to increase to 10.7% in the sample of the adult population (aged 18-65 years) in the year 2022. However, it is crucial to note that this level of TEA still falls short of the pre-covid levels.

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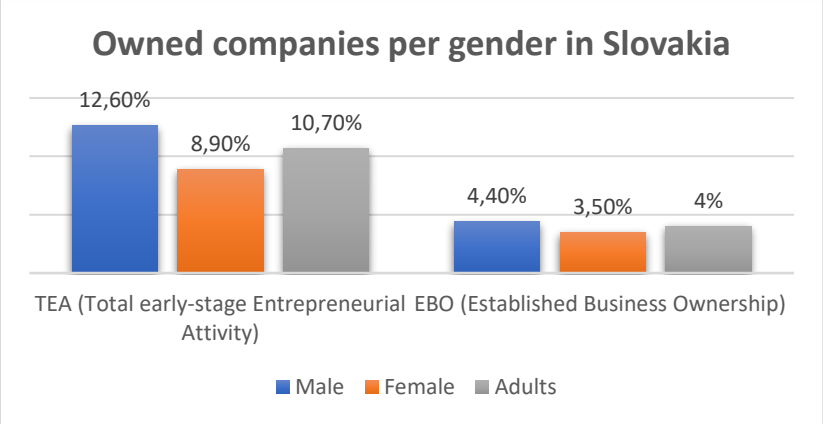

Source: GEM Global Report 2023/2024, authors elaboration

Notably, **established business ownership** (EBO) has been observed to decline from the previous year, indicating a negative trend in entrepreneurial activity. Gender-wise analysis of the data reveals that men exhibit more active involvement in both TEA and EBO categories than women.

4.2 Female entrepreneurial ecosystem in Slovakia

The latest data from the Statistical Office of the Slovak Republic show that only 27.5% of the total number of entrepreneurs are women. This is the lowest value in the last 10 years. However, the drop is not dramatic, as the highest value over the last 10 years was 29.2% (in 2018).

In terms of **sectors**, the most represented is the other services sector, where there are more women than men. Women and men are equally represented in services. Then there is a strong representation of women in accommodation and food service activities. On the other hand, in the Information and technology communication sector there is a lack of women compared to the average of the EU (less than 20% according to the European Institute for Gender Equality). Moreover, in 2017 more than 53% of EU firms that have tried to hire ICT staff reported difficulty in finding competent people for the tasks of the job they are looking for. In the Slovak Republic, this is up to 60% of companies. The least represented sector is manufacturing, where only two percent are women.

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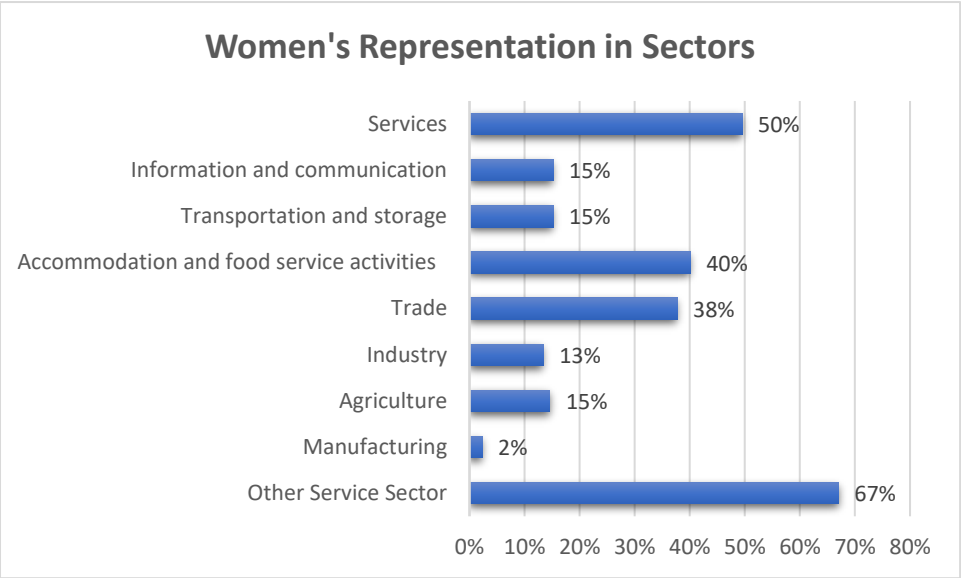

Source: Statistical Office of the Slovak Republic, 2022, authors elaboration

When it comes to focusing sectors, in the *Strategy of the Digital Transformation of Slovakia 2030*, there have been defined five priority areas for digitisation, where the various transformation priorities are to be directed between 2019 and 2030 - economy, society and education, public administration, territorial development, and science, research, and innovation. Regarding the circular economy, the Ministry of Environment of the Slovak Republic in collaboration with the OECD published a roadmap towards circularity. The roadmap highlighted the three most potential sectors where efforts should focus– Economic instruments for sustainable consumption and production, the Construction sector, and the Food and bio-waste value chain. However, these areas are chosen for the whole population. There is no specification for women.

As there are far fewer women entrepreneurs than men in Slovakia in the long term, there are **several projects and initiatives** that seek to support women entrepreneurs. For example, the international RE-FEM project aims to help women entrepreneurs eliminate the impact of the COVID-19 pandemic on their businesses. Or the international GREEN project, which educates entrepreneurs about sustainability and the European Green Deal. There are also several organisations such as the Association of Women Entrepreneurs and Managers and the Top Centre for Women Entrepreneurs, which provide advice, contacts, and exchange of experiences. Several events are organised which both help to educate women entrepreneurs and are also a place to recognise them. For example, AmCham Slovakia organises events to award women in the IT business. As

well as, the Aj Ty v IT, NGO, that supports women and girls in the field of information technologies via education and capacity building.

There are several **financial support programs** in Slovakia, mainly Euro funds, grants from banks such as Slovenská sporiteľňa, but also smaller grants such as the She is Next initiative or Grant Up, which are specifically aimed at financial support for women entrepreneurs. In addition, the Slovak Business Agency offers micro-loans for entrepreneurs. This service applies both for male and female entrepreneurs. Especially suitable for start-up companies without historical data. Start-up entrepreneurs are more likely to obtain a microloan from the SBA than from banks because of missing historical data.

However, there are also **non-financial support initiatives**, such as training and courses in management and digital skills. For example, the organization E-Women, which trains women in digitalization. Or the Digital Coalition, which focuses not only on women but also on seniors or marginalized groups. There are also other initiatives at the national level to support women, stemming from *Slovakia's Digital Transformation Action Plan for 2023-2026*. Slovakia has set a main objective in this context to increase the number of female ICT specialists and to support the more active inclusion of women in the digital society. It aims to achieve this goal through three main actions: (1) support for advocacy campaigns to increase positive perception and awareness of opportunities for women in ICT, (2) establishment of summer internships for high school girls, (3) a study mapping the current state of EU legislation to support the creation of opportunities for women's participation in decision-making positions.

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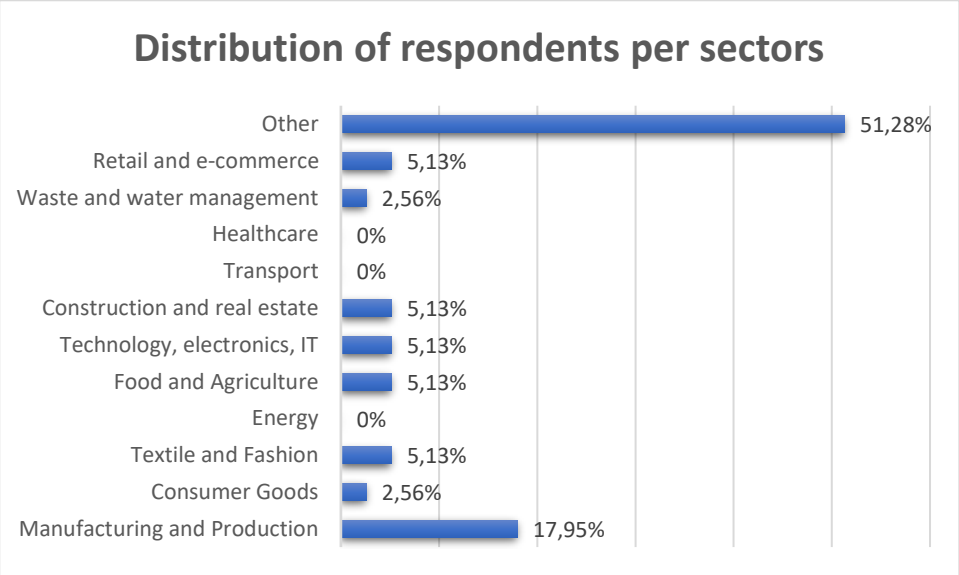
5 Analysis of skills gaps and needs of women entrepreneurs for digital and circular transition

In total, we received 57 responses to the questionnaire. Excluding irrelevant responses we stay with 39 answers. The distribution of respondents per sector is in line with the representation of women entrepreneurs in the Slovak economy. Most women enterprises are in other service sectors and we also receive most answers from this sector. Respondents from the "Other" sector are mainly engaged in services, consulting, tourism, education, event management, marketing, art, and design.



Source: authors elaboration

The majority of respondents have been in the market for between 3 and 10 years. We can also see that the respondents' answers are more about established businesses rather than start-ups and emerging businesses.

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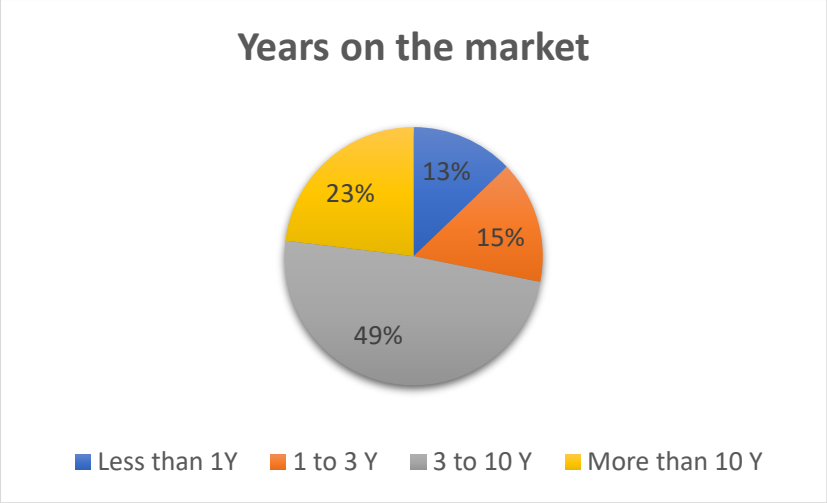
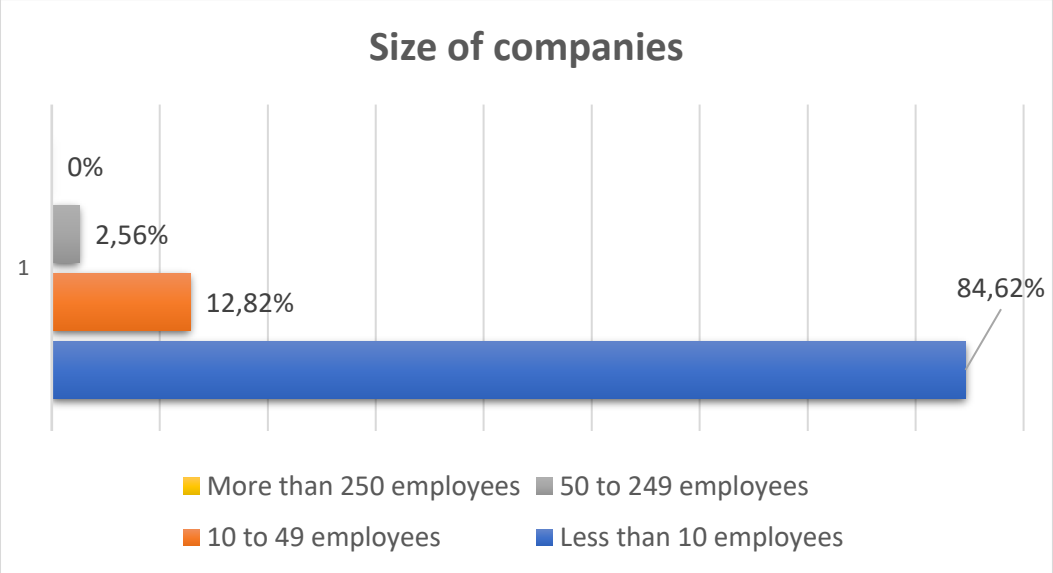


Source: authors elaboration

In terms of size of companies, over 84% were micro enterprises with less than 10 employees, almost 13% were small enterprises with up to 49 employees and almost 3% were medium enterprises with a maximum of 249 employees.



Source: authors elaboration

The distribution of women entrepreneurs in terms of the size of their companies is also in line with quantitative data reflected in the situation in Slovakia, where most entrepreneurs own micro and small businesses.

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5.1 Circular Economy (CE)

Regarding familiarity with the concept of the circular economy, the weighted arithmetic averages show that overall familiarity is between 3 and 4 on the Likert scale (scale 5 means completely familiar). The table below shows the evaluation of each concept.

Concept	Weighted Average
The general concept of the circular economy (CE).	3,06
The concept of designing products and processes in a way that minimizes waste and pollution.	3,47
Strategies to keep products and materials in use for as long as possible, through practices like repairing, refurbishing, reusing, and recycling.	3,66
The concept of regenerating natural systems, aiming to restore, renew, or revitalize their own sources of energy and materials.	3,41
The idea of rethinking business models to encourage the use of products as services (e.g., leasing rather than owning) to maximize the utilization of resources.	3,28
The concept of Product as a Service, where businesses retain ownership of the product while selling the usage or service it provides.	3,25
The use of renewable, recyclable, or biodegradable resource inputs to support circular production and supply chains.	3,34
Strategies for recovering and regenerating products and materials at the end of their service life.	3,56
Strategies and designs intended to extend the lifespans of products through durability, repairability, and upgradeability.	3,28
The concept of the sharing economy as a way to reduce ownership and increase the utilization rate of products through sharing.	2,91
The role of digital technology in enabling circular economy practices, such as through platforms for sharing, leasing, or tracing product materials.	2,97

Source: authors elaboration

Respondents have the lowest familiarity with the *concept of the sharing economy as a way to reduce ownership and increase the utilization rate of products through sharing*. Conversely,

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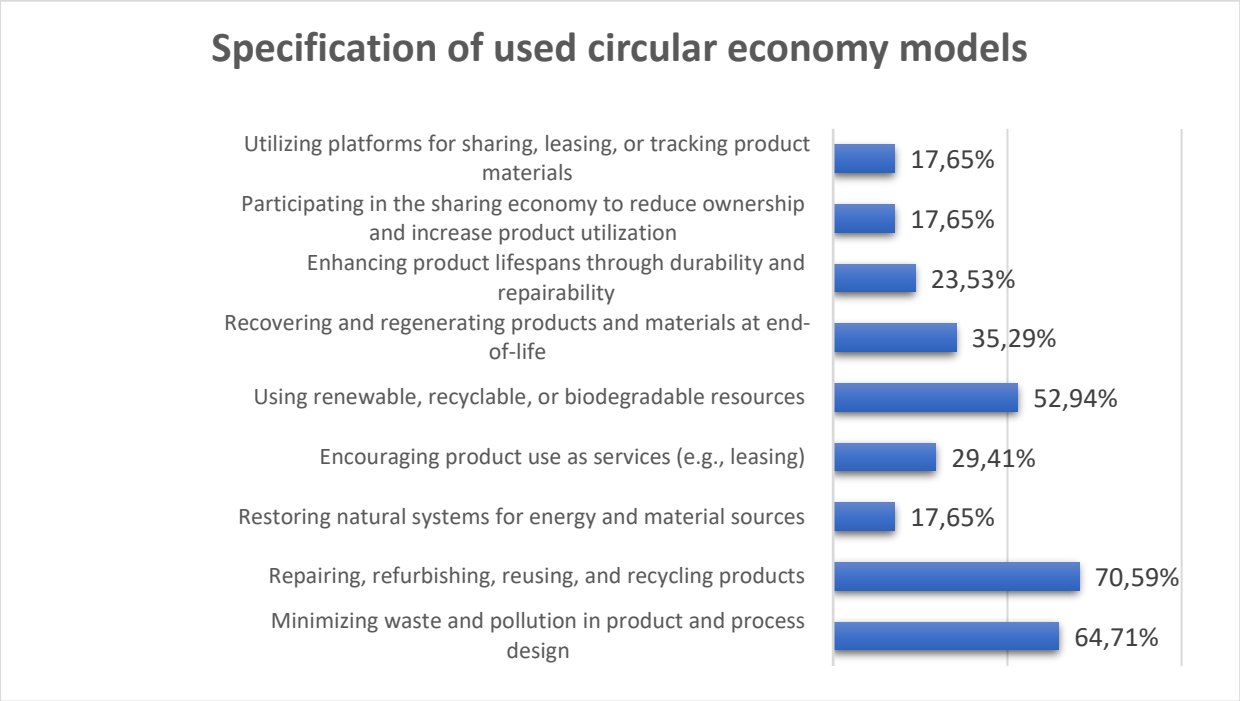
the *strategy to keep products and materials in use for as long as possible, through practices like repairing, refurbishing, reusing, and recycling*, is the most familiar. We also conducted an industry analysis, weighted averaging the responses by industry and the overall average across all the concepts listed. We concluded that the highest familiarity with the concept of circular economy is in the Construction and real estate sector (3.55) and Waste and water management (3.36). The sector with the lowest familiarity with the circular economy concept is Food and Agriculture (2.64). The most represented sector, "Other", has a weighted average value of 3.19.

More than 53% of respondents stated that they use circular technologies or models in their business. The 3 most used circular economy models in Slovakia are - (1) Repairing, refurbishing, reusing, and recycling products, (2) Minimizing waste and pollution in product and process design and (3) Using renewable, recyclable, or biodegradable resources.



Source: authors elaboration

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 or the management

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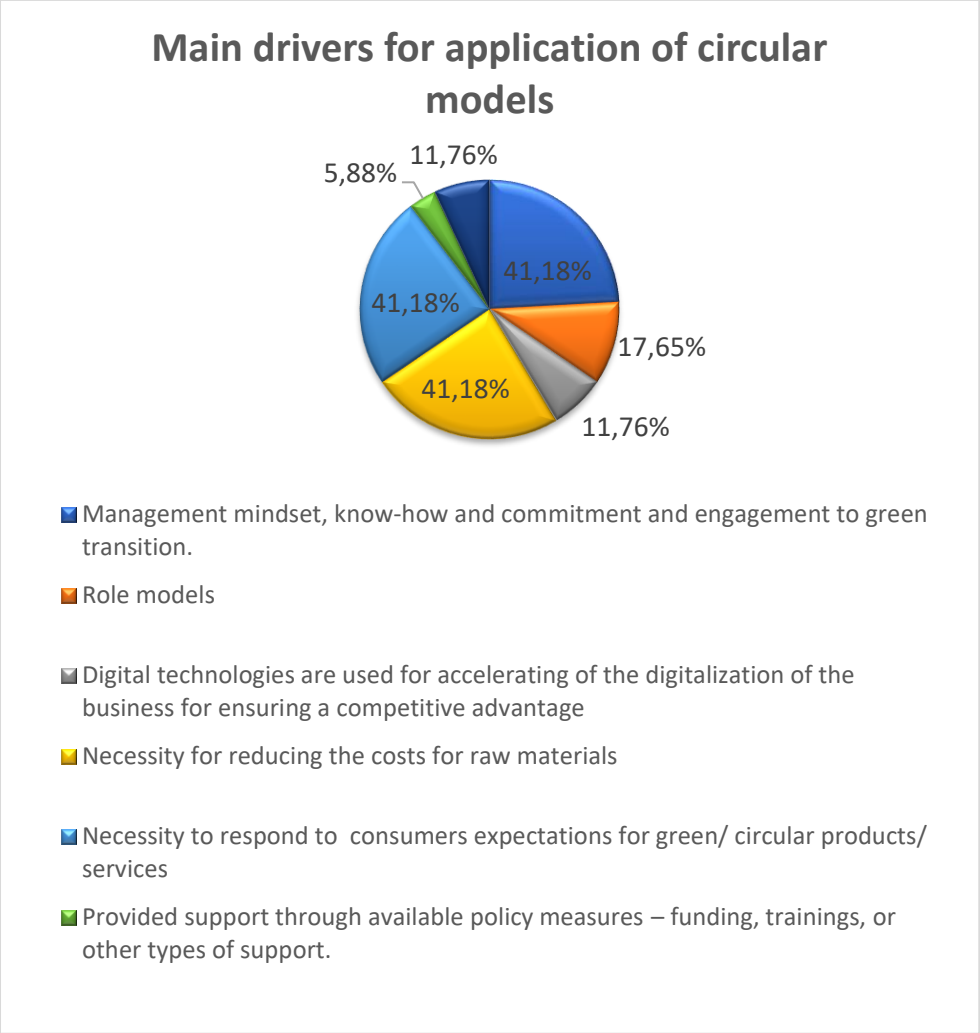
setup and its commitment to green transition. Respondents mentioned their own beliefs and lifestyle as other reasons. On the contrary, the least motivating factor for women entrepreneurs is support through available policy measures.



Source: authors elaboration

On the positive side, none of the respondents has the attitude that it is explicitly uninterested in finding circular solutions for its business. On the other hand, it may be alarming that none of the respondents who are currently not using circular economy models are even planning to use these models in the future.

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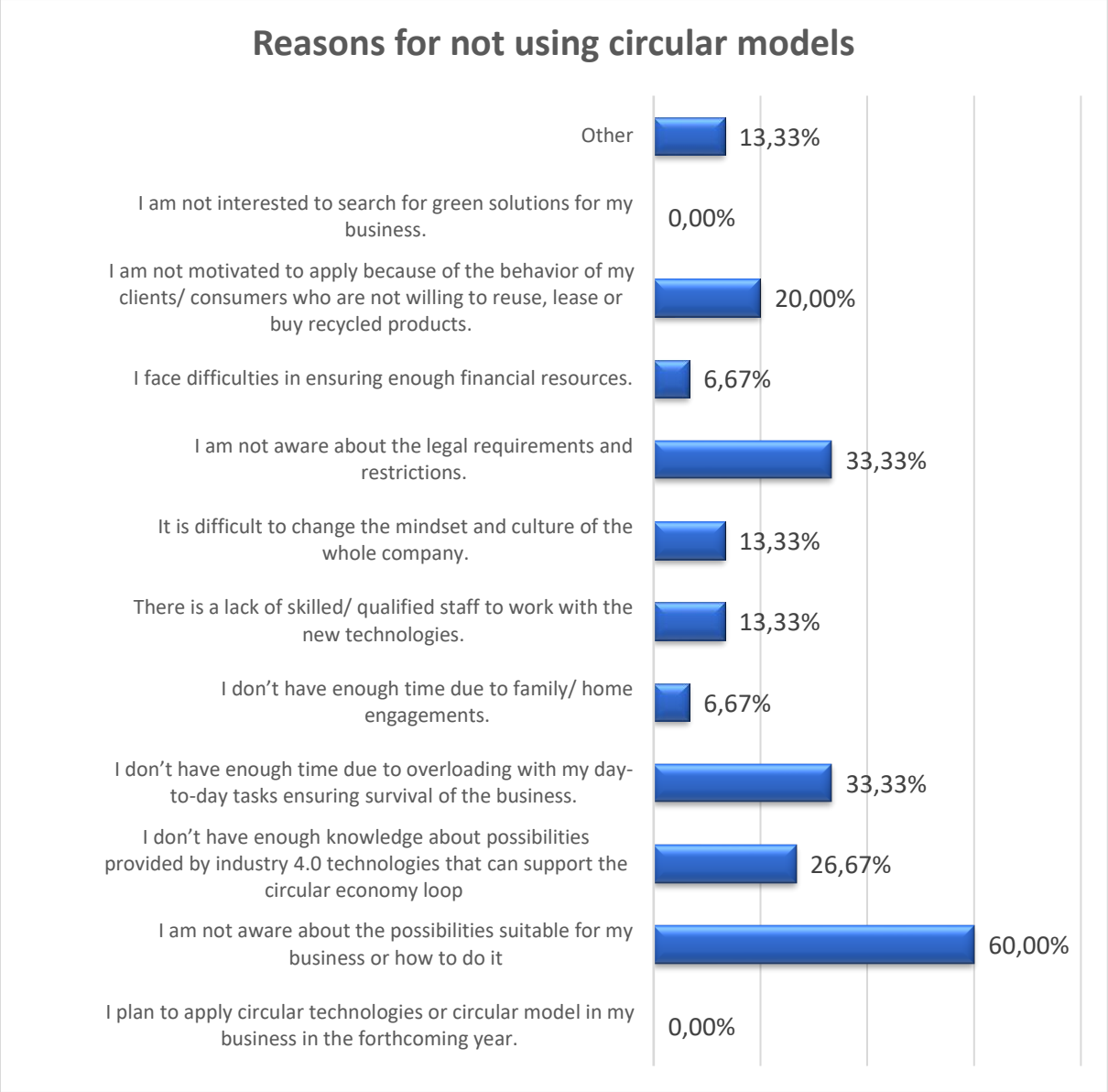
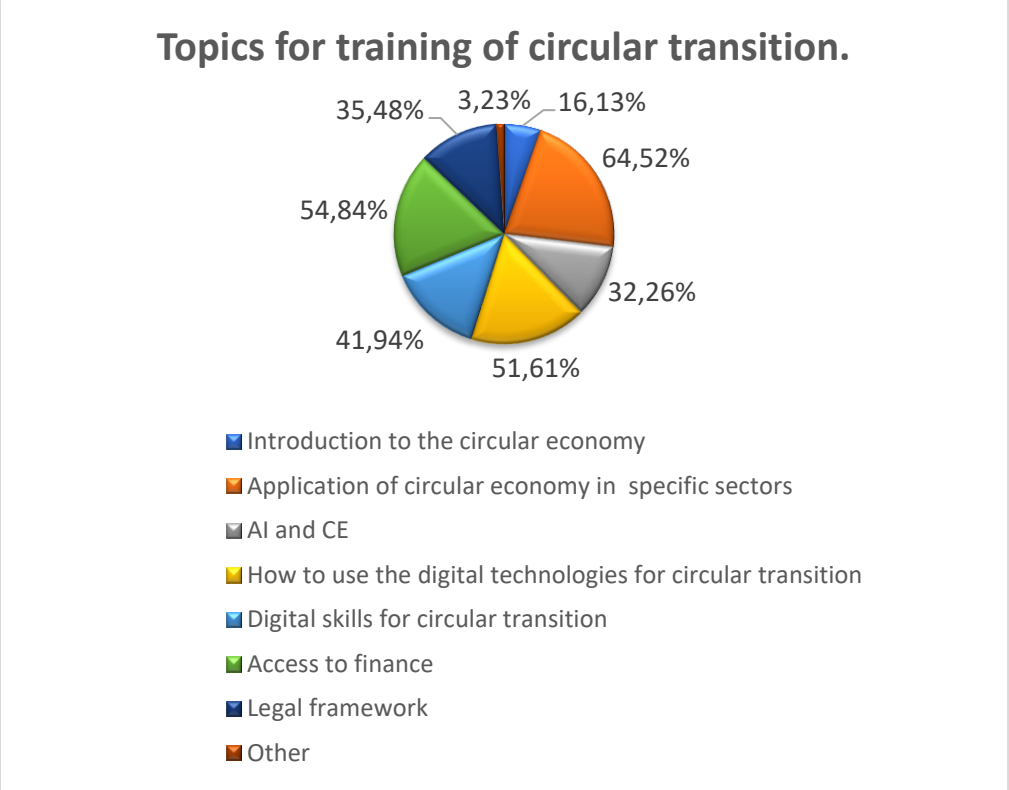


Source: authors elaboration

The most recurring reason why women entrepreneurs in Slovakia do not use circular business models is that they do not know about such opportunities for their businesses or they do not know how to do it. Related to this are the topics for training that they would find most beneficial. These are practical topics such as the application of circular economy in relevant sectors, how to finance this transition to circular models, and how to use digital technologies for circular transition.



Source: authors elaboration

Regarding the circular economy, we observe two main camps of motivation among the respondents, firstly those who are pursuing this topic out of their conviction and see it as a lifestyle, and secondly those who are trying to update their business models to meet customer expectations. On the other hand, women entrepreneurs would also like to incorporate the circular economy model into their businesses, but they do not know how. This is also reflected in the intention of training in this area, where women entrepreneurs would most welcome practical training.

5.2 Industry 4.0 (i4.0)

In the survey, more respondents indicated that they did not consider their business to be one in which they would implement digital technology (51.61%). Thus, compared to the circular economy, more women entrepreneurs are adopting circular business models rather than digitalisation. The table below summarizes the degree of technology adoption by women entrepreneurs, with 5 being the highest degree of adoption.

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Type of technology	Weighted Average
Mobile Technologies: Employing mobile devices and applications to facilitate communication, remote work, and access to business applications and services.	4,67
Collaboration Tools: Adopting platforms for team collaboration, project management, and communication to enhance productivity and support remote work.	4,21
E-Commerce Platforms: Using online platforms for buying and selling goods and services, including websites and mobile apps tailored for e-commerce.	4,33
Cloud Computing: Utilizing cloud services for storage, computing power, and business applications allows for scalability, flexibility, and remote access to resources.	3,87
Digital Marketing Tools: Utilizing online platforms, social media, and analytics tools for targeted marketing, customer engagement, and sales optimization.	4,27
Big Data and Analytics: Leveraging large sets of data to analyze trends, patterns, and insights for informed decision-making and strategic planning.	3,27
Artificial Intelligence (AI) and Machine Learning (ML): Implementing AI and ML for automation, predictive analysis, customer service (through chatbots), and personalization of services.	2,87
Internet of Things (IoT): Connecting devices and machinery to collect and exchange data, enabling smart operations, enhanced monitoring, and efficiency improvements.	2,71
Blockchain: Adopting blockchain technology for secure, transparent, and tamper-proof record-keeping and transactions.	2,21
Cybersecurity Technologies: Implementing advanced security solutions to protect data, networks, and operations from cyber threats and breaches.	3,07
Augmented Reality (AR) and Virtual Reality (VR): Implementing AR and VR for immersive experiences, training, product demonstrations, and customer engagement.	2
3D Printing: Utilizing additive manufacturing technologies for prototyping, production, and customization of products.	1,64
Robotics and Automation: Incorporating robots and automated systems for manufacturing, warehousing, and repetitive tasks to increase efficiency and reduce costs.	1,57

Digital Twin Technology: Creating virtual replicas of physical systems to simulate, monitor, and analyze their performance in real-time.	1,33

Source: authors elaboration

Of those respondents who use digital technologies, mobile technologies, and e-commerce platforms have been adopted the most. In contrast, digital twin technologies and robotics and automation have the lowest adoption. Collaboration tools and e-commerce platforms have the highest degree of adoption in the' Other' sector.

In the **Retail and e-commerce sector**, a trio of technologies - mobile technologies, e-commerce platforms, and cloud computing - have the highest degree of adoption. The **Waste and Water management sector** has the highest degree of adoption of mobile technology. The **Construction and Real estate** sector has the highest adoption rate in all three as does the Retail sector, but in addition digital marketing tools.

The **Technology, electronics, and IT sector** unsurprisingly has the highest overall adoption score, with the Internet of Things and cybersecurity technologies appearing for the first time in addition to the aforementioned types of technology. In the **Manufacturing and Production sector**, big data technology and 3D printing, in addition to the aforementioned technologies, achieved the highest adoption rates.

In terms of business size, micro-enterprises have the highest average familiarity with digital technologies (3.4), followed by small enterprises (2.96) and lastly medium-sized enterprises (2.6).

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

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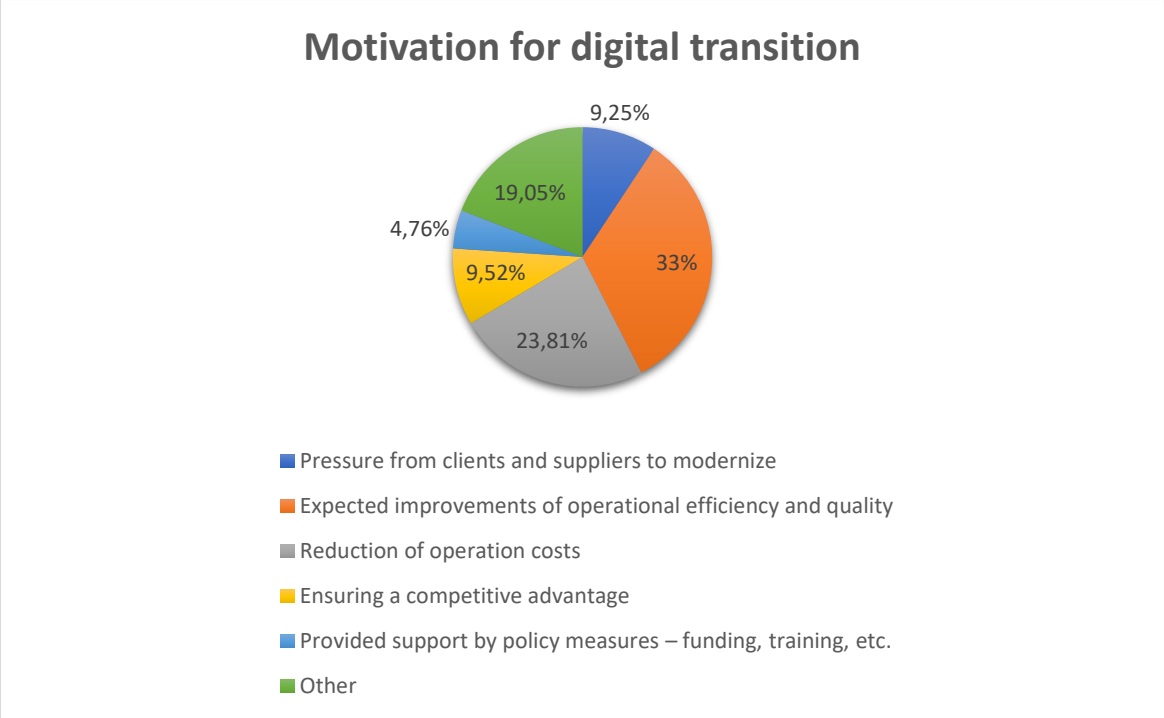
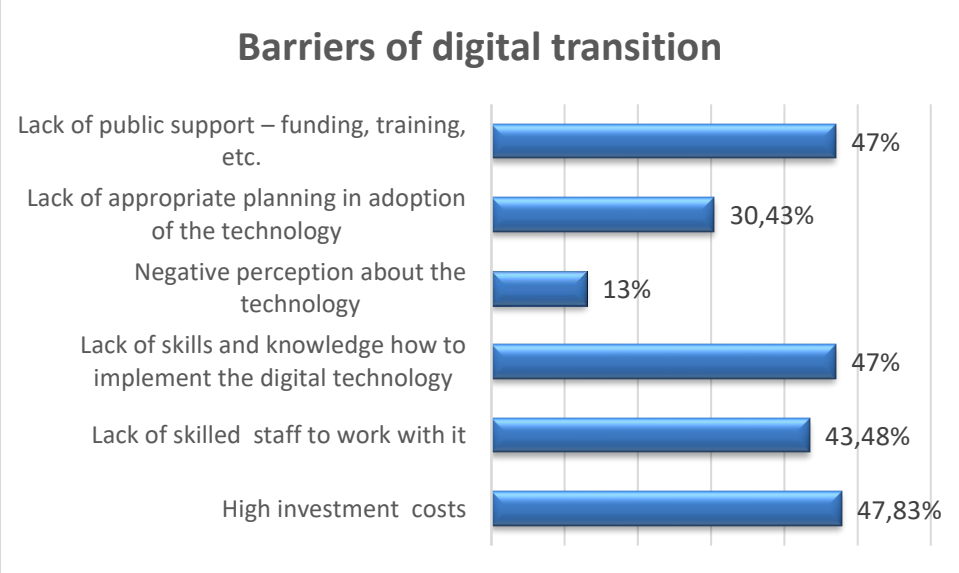


Source: authors elaboration

Women entrepreneurs in Slovakia consider lack of public support, high investment costs, and lack of skills to implement technologies as the biggest barriers to digital transformation. On the other hand, only 13% of respondents perceive negative perceptions of technology as a barrier.



Source: authors elaboration

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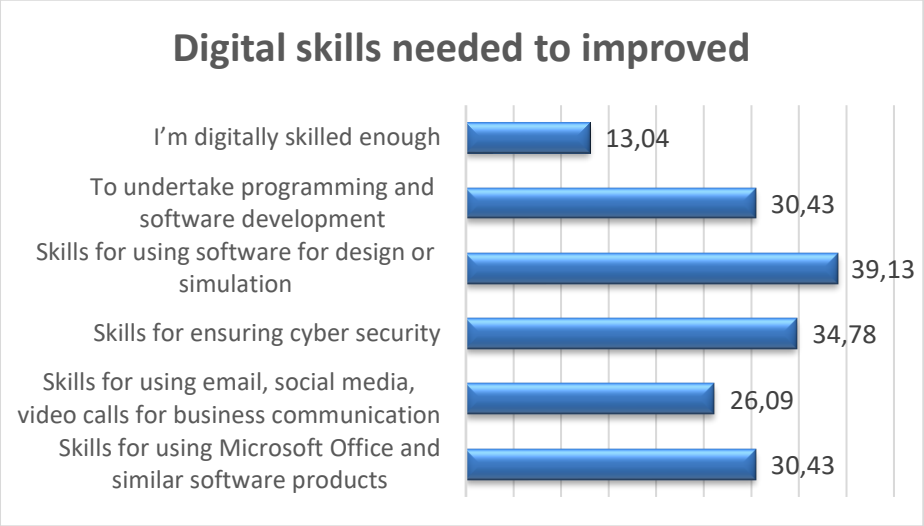
Women entrepreneurs perceive a lack of digital skills as a barrier to the adoption of digital transformation. Only 13% of female respondents perceive that they have sufficient digital skills. Female respondents are least confident in the skills for using software for design and simulation, as up to 39% think they need to improve in it. Further, female respondents perceive that they need to improve in cyber security skills.



Source: authors elaboration

The most demanded area in which women entrepreneurs would like to be educated is digital marketing. Subsequently, women respondents would like to be educated in the use of digital technologies and Internet for business needs. They consider training in setting up and operating online shops and resource optimization to be equally important.

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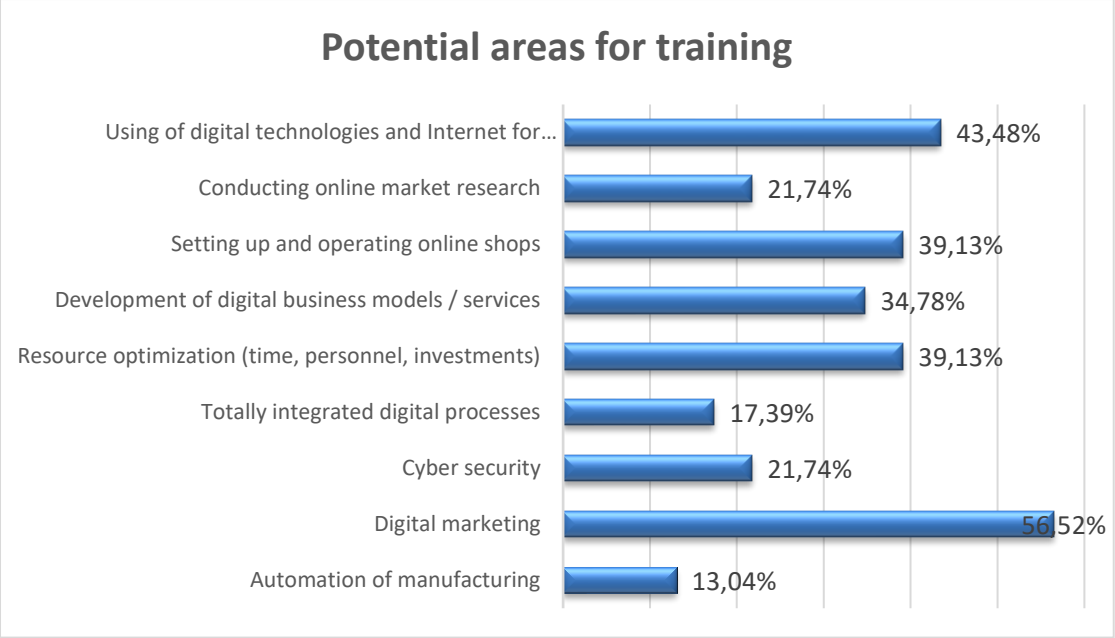
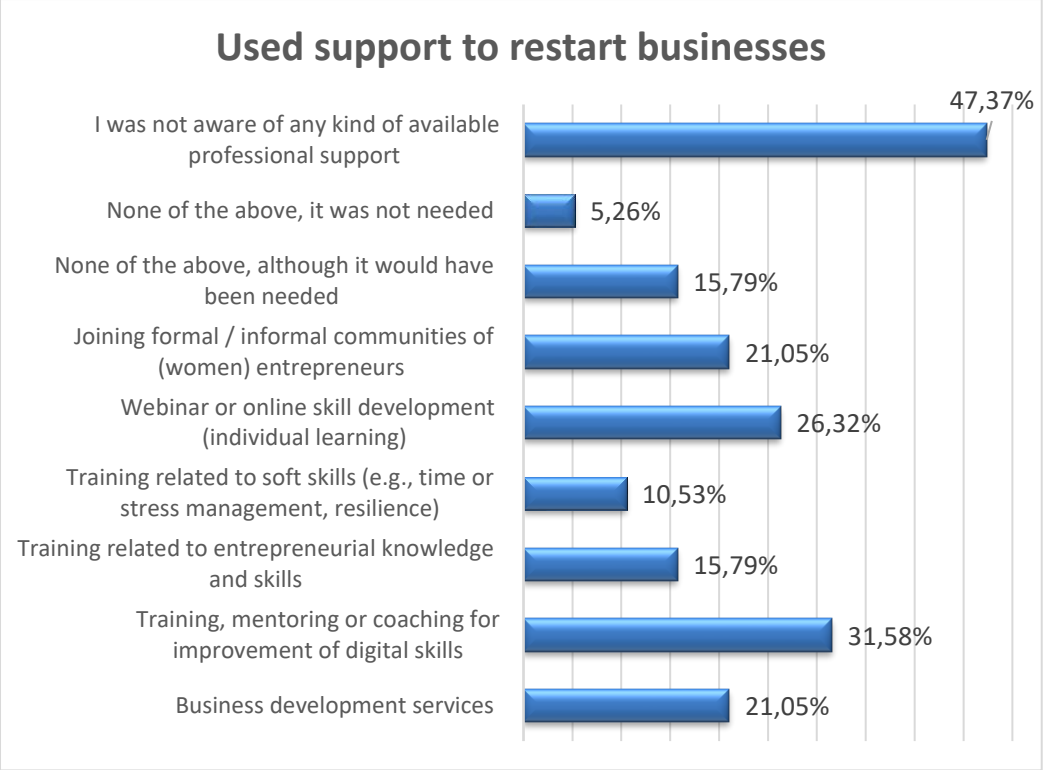


Source: authors elaboration

When it comes to Industry 4.0, we can conclude that businesses are still skeptical about digital transformations. However, on the positive side, those enterprises that do embark on digital transformation are motivated by internal factors of the organization, such as cost reduction or increased efficiency and quality, rather than external pressures. On the other hand, we observe a lack of confidence in women entrepreneurs in their digital skills. Women entrepreneurs themselves perceive that they would need to improve their digital skills. Respondents consider the area of digital marketing and the use of the internet and technology during business activities as the most important to develop.

5.3 Smart Specialization (S3) and external impacts

Regarding smart specialization, only 3% of respondents are familiar with this strategy. Awareness of this topic is very low in Slovakia. However, those who are involved in this specialization said that they also cooperate with local clusters, they also cooperate with universities on innovation, and they are also active in the region, where they are informed about the progress of the smart specialization strategy. They are also trying to align business practices with the sustainability objectives set out in the strategy. We can therefore conclude that, in the Slovak environment in particular, work should be done to raise awareness of this strategy in general.



Source: authors elaboration

External influences include crises such as the COVID-19 pandemic and the war in Ukraine. Over 65% of respondents said that their business was affected by these crises.

Up to almost 48% of respondents were not aware of any support aimed at helping them cope with the consequences of the pandemic and the war in Ukraine. Almost 16% of businesswomen admit that they did not receive any non-financial support although it would have been necessary. Training, mentoring, and coaching in digital technology improvement are among the most commonly used assistance. Next, webinars or online courses focused on individual learning, already in the area that the female entrepreneurs themselves considered necessary.

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6 Successful women entrepreneurs

The interviews focused on SmartHead, a company operating in the sustainability and

ESG consulting sector. Founded by Vera Osvald in 2016, SmartHead provides digital tools to help companies navigate sustainability processes, including materiality analysis and ESG reporting. Their business model involves a comprehensive digital platform for managing and reporting ESG metrics.

The primary motivator for adopting circular economy practices at SmartHead is to drive sustainable transformation in companies. This commitment stems from the need for long-term competitiveness, financial stability, and compliance with evolving legislation.

Several aspects (tools) of the implementation process of green and digital transformation have been successful so far. Positive initiatives such as events, workshops, and round tables have facilitated progress. Additionally, mutual support among women entrepreneurs is increasing, and government subsidies, like those for electric cars, have successfully promoted related themes. However, some challenges remain. There is a lack of support in regions outside the Bratislava (BA) area, where traditional thinking still prevails. Moreover, companies often underestimated the inefficiency of managing data in Excel, highlighting the need for specialized software.

Worked Well:

- various initiatives, events mainly in Bratislava,
- mutual support among women entrepreneurs is increasing,
- government subsidies.

Did Not Work Well:

- lack of support in regions outside Bratislava,
- missing tools for green and digital transformation.

To effectively manage sustainability, companies need to streamline their sustainable practices and educate all employees, teams, and departments on its importance. It is essential to maintain continuity in data collection and analysis to track progress and address discrepancies in meeting sustainability goals. As green and digital transformation

is in many ways a business topic, women entrepreneurs should develop their management skills first.

Skills needed:

- management skills,
- be able to explain and educate employees about the importance of these topics,
- analytical skills.

To better support women entrepreneurs in circular and digital transition, it is recommended to increase public support, particularly financial assistance for initial costs associated with consulting and ESG software. More events, workshops, and international exchanges should be encouraged to bridge regional gaps. Engaging male entrepreneurs in sustainability discussions is crucial, as they are often the decision-makers, while also empowering women to take on decision-making roles. It is important to promote sustainability as a vital business topic to ensure broader acceptance and support, and to emphasize the necessity of specialized software solutions for managing sustainability data effectively and efficiently.

7 Stakeholder Perspectives

Slovak Business Agency provided 4 interviews with respondents representing business support organizations for women entrepreneurs, industry experts within the circular economy field, policy-makers, and NGOs operating in the sustainable tourism sector.

Interviewees see the **digital transformation and Industry 4.0** as follows:

Technology is radically changing the environment, particularly impacting service industries where online sales are prevalent. The rapid technological advancements require faster responses, quicker assortment changes, and prompt communication. Digitalization, including Industry 4.0, optimizes processes and production, enhancing data management within and beyond enterprises. Typically led by foreign entities, these innovations bring transparency and reshape work structures.

Nationally, there's a shift toward innovation and digital integration, reflected in the National Action Plan for Women's Employment 2022-2030: improvement of digital, business, and language skills, flexible working conditions, and education in STEM fields. Women entrepreneurs, demonstrate remarkable innovation in their businesses, often implementing effective practices inadvertently. These methods typically result in improved time management and enhanced integration across business functions.

Perceived barriers:

- fear and insecurity in joining support initiatives,
- lack of time and financial resources to learn and adopt new digital tools,
- insufficient digital skills.

Perceived recommendations:

- promoting examples of successful women entrepreneurs,
- increase openness, flexibility, and growth mindset skills,
- assistance in access to training, advisory services, funding, and adoption of digital technologies (including AI, data management, elimination of administrative burden, and non-financial reporting) in a real business process,
- boost motivation e.g. through women entrepreneur's award.

Interviewees see the **smart specialization** as follows:

Two out of four respondents were unaware of the term "smart specialization" and thus did not engage in related activities. The other came across the concept of smart specialization strategy when their organization applied for a national certificate of cluster performance through the Slovak Innovation and Energy Agency (SIEA). However, it was a very challenging process as the document discusses the promotion of science and research specializing in highly technical and strategically important areas of the economy.

The fourth respondent is knowledgeable about smart specialization, because of the involvement of the Ministry of Labor, Social Affairs, and Family of the Slovak Republic under the calls Slovakia 2021-2027 Programs to bolster social innovation. It is the first time Slovakia has a separate priority in the 2021-2027 program dealing with social innovation focused on education, employment, and social inclusion.

Policymakers hold a pivotal role in executing the smart specialization strategy, with the Ministry emphasizing the significance of supporting social innovation for societal progress and enhancement.

Perceived barriers:

- lack of awareness, information, unclear benefits and understanding,
- time constraints,
- lack of readiness for practical application,
- financing.

Perceived recommendations:

- spreading awareness, providing information, and offering education in an understandable language by policymakers,
- provide financial support, networking, and best practices by policymakers,
- highlighting their potential cost reduction benefits by applying innovation strategies,
- enable effective communication channels to reach SMEs,
- increased private sector involvement in legislation drafting and voluntary commitments to promote policy awareness and implementation.

Interviewees see the **circular economy** as follows:

Women entrepreneurs promote innovation and sustainability equally with men, as sustainability is inherent to them. In Slovakia, women tend to have a strong inclination towards a circular economy. They often aim to make their businesses green and rational from the start. Women, recognized for their innovative ideas, are integral to societal progress. They are considered to be "transition brokers" leading change in the country. Especially, women in the circular economy are often driven by environmental responsibility rather than profit, primarily in the non-profit and micro/small enterprise sectors. Generally, in terms of funding conditions, discrimination is not observed in Slovak legislation.

Perceived barriers:

- lack of agility,
- demand for flexible workplaces to balance work and family responsibilities,
- struggle to translate education into their business models.

Perceived recommendations:

- requirement of flexibility, openness, cooperation, critical thinking, intrinsic motivation, sales skills,
- financial benefits and support rather than the ecological penalization,
- address information on how to access time and financial capacity by streamlining administrative processes, providing readily available guidance on transitioning to circular business models,
- access to flexible jobs to enhance their marketability, education, and information is crucial,
- highlighting the benefits,
- supporting women's entrepreneurship right from the start,
- supporting women's entrepreneurship from the outset.

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8 Conclusion

Circular economy among women entrepreneurs in Slovakia

The circular economy focuses on extending the life of products through repairing, refurbishing, reusing, and recycling, among all sectors this is the most used circular model. Sectors like construction and real estates and waste and water management lead in familiarity with the circular economy concept according to our analysis. Over half of businesses use circular models, driven by management mindset, consumer expectations, and cost reduction. Interestingly, those currently not using these models also do not plan to continue in the future.

Women entrepreneurs in Slovakia face challenges in adopting circular practices due to a lack of knowledge and practical guidance. They seek training in applying circular principles, financing transitions, and using digital technologies. Their motivations range from personal conviction to meeting customer demands, often prioritizing sustainability.

Barriers include a need for flexibility, balancing work and family, and applying education to business. Recommendations include promoting critical thinking, sales skills, financial support, streamlined processes, flexible jobs, and early support for women entrepreneurs. Highlighting the benefits of circular practices is also essential.

In summary, while Slovak women lead in innovation and sustainability, they need more support and practical training to integrate circular models fully, enhancing their impact on societal progress and environmental responsibility.

Digital transformation among women entrepreneurs in Slovakia

In Slovakia, 48% of women entrepreneurs embrace **digital technology** in their businesses. Mobile technologies and e-commerce platforms lead the charge. The Technology, Electronics, and IT sectors boast the highest digital adoption, with significant use of the Internet of Things and cybersecurity technologies. Micro-enterprises are the most familiar with digital tools, followed by small and medium-sized businesses.

The primary drivers of digital transformation are improving operational efficiency and reducing costs, while policy support plays a minor role. However, women entrepreneurs face major obstacles: lack of public support, high investment costs, and insufficient digital

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skills. Alarmingly, only 13% feel confident in their digital abilities, especially in software design, simulation, and cybersecurity.

Education in digital marketing and leveraging digital technologies for business is highly sought after. Training in online shop setup and resource optimization is also crucial. Despite skepticism towards Industry 4.0, internal motivations such as cost reduction and efficiency fuelled the push for digital transformation.

Barriers include fear of joining support initiatives, lack of time and financial resources, and inadequate digital skills. To overcome these challenges, showcasing successful women entrepreneurs, fostering openness and a growth mindset, providing access to training and funding, and offering motivational awards are recommended.

External factors and smart specialization among women entrepreneurs in Slovakia

Awareness of **smart specialization** is alarmingly low in Slovakia, with only 3% of respondents familiar with the strategy. Those engaged in it collaborate with local clusters and universities, align with sustainability goals, and stay informed on regional progress. This highlights a critical need to raise awareness of smart specialization.

Crises like the **COVID-19 pandemic** and the **war in Ukraine** have impacted over 65% of businesses. Surprisingly, nearly 48% of women entrepreneurs were unaware of support programs, and 16% didn't utilize available assistance. Popular support includes training, mentoring, and digital technology coaching, along with webinars and online courses.

Barriers to adopting smart specialization and digital strategies include lack of awareness, time constraints, readiness for practical application, and financing. To tackle these issues, policymakers should provide clear information, financial support, and networking opportunities. Highlighting the cost benefits of innovation, improving communication channels for SMEs, and involving the private sector in policy-making is essential.

In summary, Slovak women entrepreneurs face significant external challenges, but with better awareness and support for smart specialization and digital transformation, they can effectively navigate these hurdles.

Annexes

Survey Questionnaire:

Survey_Final ENG

Interview Guides:

Interview Guide_draft.docx

List of Interviewees:

Industry expert - Circular Slovakia,

NGO - Civic Association FooTour,

Business support - Top Centre of Women Entrepreneurs,

Policymaker - Ministry of Labour, Social Affairs and Family of the Slovak Republic.

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