Interreg Danube Region

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Plan-C

Creation of scenarios of the future of the plastics value chain

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Responsible Partner: TUKE

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Introduction

Let's start with a definition of the circular economy according to Zero Waste Europe (https://zerowasteeurope.eu/about/about-zero-waste/):

"The circular economy is a model of production and consumption which involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products as long as possible; and tackling the presence of hazardous chemicals along the whole value chain. In this way, the lifecycle of products is extended in a toxic-free environment. In practice, it implies designing safe and sustainable products, and right systems, to reduce waste to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible. These can be productively used over and over again within non-toxic material cycles, thereby creating further value."

Short introduction to the PLAN-C project

Moving PLastics and mAchine iNdustry towards Circularity (Plan-C) is a European project focusing on the Danube Region. The project consortium consists of 14 project partners from 9 (AT, BiH, CZ, DE, HU, MD, RO, RS, SK) countries whose regions are part of the Danube Region.

As the project name suggests, the main objective of the project is to support the transformation of the plastics value chain in the Danube Region towards a circular economy through transnational cooperation. In addition to the core consortium of project partners, a number of other actors are involved, ranging from associated strategic partners to stakeholders representing plastics processors and manufacturers of plastics processing machinery.

The joint effort is to develop a vision of a transformed plastics value chain designed for the circular economy and to demonstrate the benefits of plastics reuse/recycling and maintenance, redistribution, refurbishment/remanufacturing and recycling of machinery. The final Transnational Action Plan for anchoring the circular economy in a holistic plastics value chain addresses SMEs, large enterprises, public sector organisations, sector agencies and public authorities.

Objective and scope of the creation of scenarios of the future of the plastics value chain

One main objective is reaching a transnational vision of where the plastics processing value chain of the Danube Region will be in 2030+ based on scenario analysis conducted by project partners together with external experts and all relevant stakeholders. Based on the results of the scenario analysis and a derived vision, a strategic transformation roadmap will be conducted – at a later stage - to lead the way for the plastic processing industry, including the material processor and machine manufacturers to achieve the goals set for reaching the vision of 2030+. Developed from this, a TRANSNATIONAL ACTION PLAN for the Danube Region will be developed jointly from the partnership, to set the actions and measures to be taken for the circular transformation of the entire plastics value chain. The transnational action plan will serve as an enabler for systematic changes in the industry toward a green and circular economy.

This report focuses on the creation of scenarios of the future of the plastics value chain by the project consortium. Project partners create scenarios of the future for a circular value chain following two views: the plastic processers as system enablers for the machine industry and the plastics processing machine manufacturer as enabler of circular plastics.

Methodology

Foresight is a systematic, participatory of catalysing future intelligence, and of creating medium or long-term vision, focused on present decisions; a process of coordinating joint actions. For creation of scenarios of the future of the value chain the consortium decided to lean on methods that are used for foresight exercises. The approach was to start with a SWOT analysis to be followed by below mentioned steps no. 1 and no. 2. These regional results were merged and prepared for the next activity, a workshop together with external experts for creating a joint picture.

The SWOT analysis is an analytical method, used to identify and catalogue significant internal factors (strengths and weaknesses) and external factors (opportunities and threats), occurring either in a particular environment, such as an organization or in a territory, as well as in a city, a region or a country.

Step 1: Establishing the area of analysis (Defining the central issue)

The process of developing a scenario once begun, it is recommended to start "from inside to outside". This means starting with a decision or a specific question, then broadening the analysis towards general issues. The scenarios do not have a finale, but are rather an aid to better strategic decision making.

Step 2: Identifying and analysing key factors and driving forces

This phase begins with the definition of the key factors that could play a role in influencing the central issues or in developing the answer following the central question (see step 1).

Step 3: Putting in order key factors, leaders, "wild card" events

After identifying the elements with influence (key factors, wild card events) at micro and macro level, it is important to put them in order. Thus, the elements must be ordered, according to their importance and their degree of safety. Usually, the participants distribute a limited number of points in two different colours to indicate those elements considered to be important and/or uncertain.

Step 4: Creating a scenario matrix

In order to establish a scenario matrix, the so-called critical uncertainties will be selected (usually 2, to limit the space of the scenario to a two-dimensional plane). Critical uncertainties are the elements with influence (key factors), while also being the most uncertain, as well as the most important

Step 5: Developing the scenarios

- Name of the scenario
- General description of the situation
- What is the situation in the rural and urban areas?
- How does the sector develop in connection with the recent problems?
- In what sense has the general infrastructure developed?
- In what sense has international cooperation developed?

Step 6: Analyzing the scenarios

The scenarios will be presented and discussed. The discussions will be related to specific problems, brought to light by various factors such as threats and opportunities, required skills and preliminary indicators, etc.

Afterwards, the scenarios can become the basis for the following discussions or the testing framework for planning activities.

Scenarios

SWOT of the circular plastics processors as system enablers for the machine industry and the machine industry as a system enabler for the plastics processor industry were identified by the project partners.

Based on the SWOT the **CENTRAL ISSUE** of each partner country was defined.

And the final step of this exercise was to specify the **KEY FACTORS** influencing the CENTRAL ISSUE. Project partners had to ask themselves "Which are the key factors we would like to know for the future, in order to improve the quality of our decisions?"

AT|Austria

Central issue:
In Austria the central issue is to develop innovative circular business models that capitalize on the region's strong research and innovation capabilities, industrial clusters, and excellent educational systems. By leveraging the growing demand for sustainable products and fostering cross-sector collaboration, this vision aims to reduce dependence on imported raw materials and mitigate the shortage of skilled labour. Additionally, it seeks to tackle the growing global competition driven by low-cost production and overcome consumer scepticism towards recycled plastics.

Key Factors
1. Market & Consumer Concerns - Consumers and industries scepticism towards recycled plastics - Recycled material cost development in comparison to raw materials - Demand trends for sustainable solutions - Development of the economic situation, are investment in this area economical sustainable
2. Research & Development / Technological Advancement - Security of funding (private and public) towards circular economy - Scalability (from small to large scale) of developed processes, key question: What is feasible? - What technology will be available and what will be the most efficient process (mix)? - Pace and direction of innovation in circular technologies, including the integration of digital tools for tracking, processing and optimizing circular value chains

3. Policy & Regulations - National & EU regulations forcing movement towards a circular economy, what will the companies have to do? - Reluctance to follow new policies from companies (cost, quality and properties of materials)
4. Know-how & Quality & Education - Knowledge increases the highest possible quality of recycled materials - Retained knowledge leads to market advantages due to sustained quality - Equipment of workforce with skills on circular economy and digital competencies
5. Logistic & Resource Dependance - Dwindling of natural resources and availability of critical raw materials - Supply chain security for recyclate (collection, sorting, and distribution)

BiH|Bosnia and Herzegovina

Central issue:
Despite strong mutual dependence and local technical capacity, the plastics and machine industries in Tuzla lack structured collaboration, shared innovation infrastructure, and a joint strategic approach to circular transition — risking stagnation, loss of competitiveness, and missed EU funding and policy alignment opportunities. However, by developing service-based business models rooted in existing industrial hubs and skilled labor, and by leveraging the market potential of bioplastics, both sectors can initiate proactive co-design processes, establish shared R&D facilities, and secure access to EU and donor support — paving the way for a more coherent and forward-looking national industrial policy.

Key Factors
1. Have training programs in mechanical engineering, materials science, and digital technologies that can make a significant impact on both sectors' capacities for co-developing circular solutions.
2. Provide access to competitive technology to understand ways of integrating innovation towards digital retrofitting, machine upgrades, and bioplastics processing considering the current state in local technology
3. Need for having governmental regulatory and policy frameworks regarding circular ecnomy that will incentivize joint pilots, shared infrastructure, and cross-sector investment, as well as increase pressure to reduce waste and carbon emmisions. Ensure the policies are also aligned with european policies e.g. European Green Deal.

4. Allocate resources for industrial hubs and R&D institutions to evolve into engines of circular transformation for both the plastic and machine industry. Have co-financing programmes for companies wanting to transition.
5. Strengthen the local innovation ecosystem, evolve around customer needs, track trends for identifiyng relevant opportunities and work on a joint development.

CZ|Czech Republic

Central issue:
To create an association which will represent as sustainable environment for joint projects based on the advanced R&D and modern plastics processing technologies in order to foster the industry-academia cooperation, to overcome the technical complexity of scalling up processes, raw material shortages and price volatility and to act towards strategic autonomy as an alternative of imports from Asia and other countries.

Key Factors
1. Waste recycling technology and its implementation in production practice (including chemical recycling). Technologies enabling practical application of the circular economy concept at the level of materials and components, including recycling of RES technological equipment, technologies ensuring the required quality of secondary raw materials and waste for their circular use. 2. Technologies focused on renewable sources and energy savings (using new sources of raw materials, searching for alternatives).
3. Research into mechanisms and methods of suppressing aging, photo-degradation of materials.
4. Development of materials from renewable raw materials, especially additives for plastics.
5. Development and effective use of plastic recyclates.

DE|Germany, Baden-Württemberg

Central issue:
To open new international markets based on the high technological expertise, skilled labour force and established supply chain embarking further on the digitalisaition process of SMEs and strengthening the industry-R&D cooperation leading to advances

in AI, IoT, and robotics in order to mitigate the dependence of raw materials imports and global economic fluctuations.

Key Factors
1. Strengthening International Market Access Through Technological Excellence - Leverage the region's advanced engineering know-how and reputation for precision to enter new global markets, positioning Horb am Neckar/black forest region as a high-tech export hub for plastics and machinery systems.
2. Accelerating Digitalisation of Regional SMEs for Increased Competitiveness and Flexibility - Drive the digital transformation of small and medium-sized enterprises in the south german region, enabling them to implement smart production, increase flexibility, and better respond to global supply chain disruptions.
3. Deepening Industry-Academia-R&D Collaboration to Foster Innovation in AI, IoT, and Robotics - Strengthen partnerships between regional companies, local universities, and applied research institutes (e.g., Hochschule Esslingen and Pforzheim, KIT, Fraunhofer Institut) to pioneer solutions in smart manufacturing technologies.
4. Developing Local and Circular Material Supply Chains to Reduce External Dependencies - Promote regional recycling initiatives and sustainable material sourcing to lower reliance on global raw material imports, building resilience in Baden-Württemberg's (South Germany)industrial ecosystem.
5. Upskilling and Retaining Talent for Future Industry Needs - Invest in continuous education and training programs to align the local workforce with future digital and technological demands, ensuring Baden-Württemberg /Horb region remains an attractive industrial location.

HU|Hungary

Central issue:
To fully unlock the market potential for new specialised machinery trigerred by the plastics industry's shift towards recycled and bio-based materials in order to overcome the high investments costs for ciruclar ready machinery and avoid the low confidence in recycled materials and the technological mismatch making use of the technology advances in terms of integration of diagnostics, energy tracking and modularity features of machinery.

Key Factors
1. Policy and Regulatory Incentives: high upfront investment costs and low confidence in recycled inputs. - EU-level support mechanisms (e.g., Horizon Europe, Innovation Fund) must prioritize co-financing for circular-ready machinery. - Clear standards and definitions must be achieved for recyclates and bio-based materials (e.g., through CEN/CENELEC) to enhance confidence in input materials. - Implement Extended Producer Responsibility (EPR) frameworks that reward recyclability and equipment enabling closed-loop processing. - Tax incentives or depreciation schemes for circular manufacturing investments at national levels must be created. - Hungarian innovation hubs or university-industry research programs also have no access to EU-funded cooperations at the moment due to policy/legislation issues; this must be remedied.
2. Demand Creation Through Green Procurement & Eco-labelling: market hesitancy due to low confidence in performance and ROI. - The public sector should mandate green procurement for packaging, construction, and automotive sectors using products made with recycled or bio-based plastics. - Broader eco-labeling schemes (EU Ecolabel, Blue Angel/Blauer Engel) to create pull for high-performance recycled plastics—encouraging investments in adaptable machinery.
3. Industrial Collaboration and Standardisation: technological mismatch between recyclates and legacy machinery. - Form industry cooperations or PPPs (e.g., within Hungary's automotive or packaging sector) to co-develop modular machinery adapted to regional feedstock types and create circular value chains. - European-wide collaborations (e.g., via Plastics Europe, Euromap, EREMA networks) need to define open standards for modular components, diagnostics and integration protocols.
4. Technological Integration and Innovation: new materials require flexible, smart systems; many entities lag behind. - It is necessary to invest in machinery with: a) integrated diagnostics (predictive maintenance for contamination & wear from recycled inputs); b) energy tracking systems to optimize footprint and align with ESG/CSRD demands. - Producers also require modular platforms allowing quick adaptation to different feedstocks (bio, post-consumer, post-industrial); as well as Industry 4.0-compatible retrofitting solutions for legacy systems to bridge the adoption gap. Additionally, inline equipment monitoring systems can help detect failures early, reduce unplanned downtime, and support predictive maintenance in recycling-intensive operations.

5. Financial Instruments and De-risking Models: high capex for uncertain long-term returns.
    - The industry needs EU-backed de-risking instruments (e.g., EIB circular economy financing, InvestEU) tailored for SMEs adopting advanced recycling machinery. Another solution is pay-per-use or leasing business models offered by equipment manufacturers for modular, upgradeable machines—spreading investment risk over time.
6. Workforce Upskilling and Ecosystem Support: operators unprepared for smart or modular machinery.
    - Perhaps an EU Social Fund and national programs to upskill workers? Technical universities and dual education programs play a key role in preparing the future workforce to operate and maintain circular-ready machinery. Dedicated modules on smart systems, diagnostics and recycled material handling should be integrated into vocational curricula.
7. Transparent Data and Material Traceability Systems: low trust in input materials', or spare/refurbished machinery's quality and performance.
    - Mandate digital product passports (DPPs) for plastics and equipment—recording origin, performance, and carbon footprint.
    - Incentivise integration of blockchain or QR-based material traceability systems compatible with machinery sensors and analytics.

MD | Moldova

Central issue:

To establish relevant business partnerships with international companies leading to technology upgrade, acces to expertise and financing, making use of the growing network of recycling facilities and the increasing demand for sustainable products through enhanced cooperation with the University of Technical Sciences leding to a resilent development of the plastics sector, overcoming the dependence of imports and facing the competition from traditional materials, resistance to change from the consumers and global economic disruptions.

Key Factors

1. Technological Advancements
    - Adoption of advanced technologies to enhance efficiency and scalability in circular plastics processing.
    - Access to and integration of international expertise and innovations.
2. International Partnerships and Funding
    - Collaboration with international companies and organizations for technology transfer, expertise, and financial support.

- Leveraging EU integration goals to secure funding and align with circular economy standards.
3. Regulatory and Policy Framework - Clarity and consistency in regulations related to recycling, waste management, and circular economy practices. - Government incentives (e.g., tax breaks, subsidies) to promote sustainable manufacturing and recycling.
4. Economic Stability and Market Demand - Mitigating economic challenges (inflation, currency fluctuations) to ensure financial viability of circular projects. - Capitalizing on growing global demand for sustainable products to expand market opportunities.
5. Education and Public Awareness - Enhancing public and business awareness about the benefits of circular economy practices. - Strengthening vocational training and academic collaboration to build local expertise and innovation capacity.

RO|Romania

Central issue:
To become a plastics industry hub in SEE & Black Sea Region by integrating the existing R&D institutes and industrial actors into regional clusters. by scalling up the Deposit Return System in a cross-sectoral way, leading to technology innovation, upskilling of workforce and use of eco-design to face the increased energy costs and other economic disruptions on global markets.

Key Factors
1. Increased cooperation in the Black Sea Region based on the Transnational Programme Black Sea
2. Creation of plastics clusters in the SEE Region
3. Coherent policy towards circularity (incentives, standardisation, awareness campaigns, etc.)
4. Targeted educational offer for green jobs
5. Functionality and cross-sectoral expansion of DRS

RS|Republic of Serbia

Central issue:
Development of new business models (PaaS, remanufacturing, sharing economy) triggered by digital innovation based on the existing industrial base, skilled workforce and geographical position in order to increase the industry-R&D cooperation and to overcome the dependence on the import of raw materials and low demand for recycled poducts contributing to the updgrade of technical equipment and implementation of EU regulations.

Key Factors
1. Regulatory Stability and Enforcement - The success of circular business models in Serbia depends heavily on the enforcement and consistency of environmental and circular economy regulations. Frequent changes or weak implementation undermine business confidence and long-term investments. This factor includes: consistency of environmental laws, enforcement of Extended Producer Responsibility (EPR), implementation of EU directives, and reduction of administrative inefficiencies.
2. Industry-R&D Collaboration and Technology Transfer - Bridging the gap between research institutions and industry is critical to developing and applying circular innovations (like PaaS and remanufacturing). Serbia's strong academic base needs to be better connected to industrial needs. This factor includes: academica-industry partnerships, co-funded R&D programs, incentives for joint innovation, and commercialization of research outcomes.
3. Digital and Technological Readiness - The development of new circular business models heavily relies on digital innovation, smart manufacturing (Industry 4.0), and data systems for material tracking and reuse. Serbia's digital infrastructure and technical equipment must evolve to support this shift. This factor includes: availability and affordability of new technologies, digital skills in the workforce, investment in AI, IoT, and automation for CE.
4. Market Demand and Consumer Behavior - Low demand for recycled products is a major barrier. Raising awareness and trust in recycled goods, and creating favorable market conditions, are essential to scaling circular models. This factor includes: trust in quality, public awareness campaigns, green public procurement, and incentives for choosing circular products.

5. Access to Financial and Human Capital - High upfront costs and a lack of highly skilled professionals slow the transition. Ensuring access to financing mechanisms and CE-focused education/training will improve Serbia's capacity to implement circular solutions. This factor includes: green financing tools, EU and national funding schemes, vocational and university training on CE, and talent retention.

SK|Slovak Republic

Central issue:
Strengthening the role of Slovak Plastics Cluster as a driver of SK plastics industry leading to the better integration of multinational companies into the national innovation ecosystem, increased cooperation between industry and R&D, including the establishing of a network of accredited laboratories and testing facilities, upskilling of labour force, better absorbtion of EU Funds and higher degree of poduct diversification.

Key Factors
1. Connecting Slovak and international industry with research and universities.
2. Joint research and development projects (e.g. through EU grants, National projects, Horizon Europe).
3. Investments in digitalization and automation of production in the Slovak companies .
4. Active role of the cluster as a coordinator between small, medium-sized enterprises and multinational companies.
5. Creating a platform for technology transfer between Slovak and foreign companies.

Summary of Key Factors likely to be known for the future

After identifying the elements of influence, the key factors per project partner region/country they were summarized and sorted as preparation for the development of a joint picture as next step (D.3.1.2).

	Key Factors Summary
1	**Workforce & Education** - Technical Universities and Dual Education Programmes play a key role in preparing the future workforce to operate and maintain circular-ready machinery (HU) - Targeted educational offer for green jobs (RO) - Invest in continuous education and training programs to align the local workforce with future digital and technological demands (DE) - Have training programs in mechanical engineering, materials science, and digital technologies making a significant impact on both sectors' capacities for co-developing circular solutions (BH)
2	**RDI & Technology** - Adoption of advanced technologies to enhance efficiency and scalability in circular plastics processing (MD) - Access to and integration of international expertise and innovations (MD) - Leverage the region's advanced engineering know-how and reputation for precision to enter new global markets (DE) - Scalability (from small to large scale) of developed processes (AT)
3	**Supply Chain Security** - Developing local and circular material supply chains to reduce external dependencies (DE) - Dwindling of natural resources and availability of critical raw materials (AT) - Supply chain security for recycle (collection, sorting, and distribution) (AT)
4	**Funding** - Ensuring access to financing mechanisms (RS) - Leveraging EU integration goals to secure funding and align with circular economy standards (MD) - Security of funding (private and public) towards circular economy (AT) - EU-backed de-risking instruments (e.g., EIB circular economy financing, InvestEU) tailored for SMEs adopting advanced recycling machinery (HU)

5	**Digitalisation** - Transparent data and material traceability systems (HU) - Mandate digital product passports (DPPs) for plastics and equipment (HU) - Development of new circular business models heavily rely on digital innovation, smart manufacturing (Industry 4.0) etc (RS) - Investments in digitalisation and automation of production (SK) - Drive the digital transformation of small and medium-sized enterprises (DE)
6	**Policy & Regulations** -Coherent policy towards circularity (incentives, standardisation, awareness campaigns etc) (RO) - Clarity and consistency in regulations related to recycling, waste management, and circular economy practices (MD) - Government incentives (e.g., tax breaks, subsidies) to promote sustainable manufacturing and recycling (MD) - Harmonisation of national and EU-level regulations (AT)
7	**Market** **-** Mitigating economic challenges (inflation, currency fluctuations) to ensure financial viability of circular projects (MD) - Capitalizing on growing global demand for sustainable products to expand market opportunities (MD) - Consumers and industries skepticism towards recycled plastics (AT) - Low demand for recycled products is a major barrier; Raising awareness and trust in recycled goods (RS) - Demand creation through green procurement & eco-labelling (HU) - Functionality and cross-sectoral expansion of DRS (RO)
8	**Innovation Ecosystems** - Creation of plastics clusters in the SEE Region (RO) - Strengthen partnerships between regional companies, local universities, and applied research institutes (bridging the gap between research institutions and industry is critical to developing and applying circular innovations) (DE) - Increased cooperation in the Black Sea Region based on the Transnational Programme Black Sea (RO)

Conclusion

The future of the circular plastics value chain is crucial for sustainability, especially in the context of European and global environmental goals. Plastic processors see their future role as catalysts of industrial transformation, where their activities will not only consist of the technical recovery of plastic waste, but mainly in the provision of high-quality secondary material for high-value applications - including mechanical engineering, the automotive industry, and electrical engineering. Looking at it from two different perspectives – plastics processors and machinery manufacturers – it becomes clear that each of these players plays a key but different role in enabling the entire system.

Annex

SWOT Analysis of the circular plastics processors as system enablers for the machine industry and the machine industry as a system enabler for the plastics processor by each country.

AT|Austria

	Strengths	Weaknesses
1	Leading plastics machinery industry: Austria is home to global leaders such as ENGEL, Wittmann Battenfeld, and EREMA, which drive innovations in plastics processing and recycling technologies.	High energy and labor costs: Austria's strong industry faces competition from lower-cost manufacturing countries, impacting production and recycling costs.
2	High R&D and innovation capabilities: Austria has a strong research landscape with institutions like e.g. Montanuniversität Leoben and RECENDT, supporting advancements in circular plastics solutions.	Dependence on raw material imports: Austria imports an significant share of its virgin plastics, making it vulnerable to price fluctuations and supply chain disruptions.
3	Well -developed recycling infrastructure: Companies like ALPLA and EREMA contribute to Austria's leadership in plastics recycling, including mechanical and chemical recycling technologies. Further, Austria encompasses the entire value chain from raw materials to finished products in both plastic and machinery industry. Understanding each other is key, to a circular value chain.	Challenges in closing material loops: Despite high recycling rates, downcycling remains an issue, and the use of high-quality recycled plastics in manufacturing is still limited.

4	Strict environmental regulations: Austria's policies, such as the national Circular Economy Strategy and complemented by the EU Green Deal, promote sustainable materials and industrial transformation.	Limited scaling of innovative recycling solutions: While Austria is a leader in plastics recycling technology, widespread industrial adoption of advanced recycling methods is still in progress. Since Austria has predominantly small and medium-sized enterprises, scalability is limited and makes a circular value chain more challenging.
5	Strong industry clusters and collaboration: Initiatives like the Plastics Cluster and the Mechatronics Cluster foster cooperation between the plastics industry, machinery manufacturers and research institutions. This collaboration fosters innovation and efficiency improvements. Top Educational Programs: Austria offers comprehensive educational programs in the field of plastics and circular economy, from apprenticeships to postdoctoral studies. Notable programs include the Master's in Sustainability and Plastics Management at Johannes Kepler University Linz and the Master's in Circular Engineering at Montanuniversität Leoben	Regulatory complexity: Companies often struggle with compliance due to evolving EU and national regulations related to packaging, waste management, and circular economy goals. Due to advancing technologies more essential health and safety regulations are continuously being introduced as well (e.g. machinery regulation (EU) 2023/1230.
6	Various funding programs / financial support: Well-established public funding measures and instruments are provided to R&D organisations, enterprises and SMEs to support their transformation towards circular economy. (e.g. FFG - Austrian Research Funding Association)	Lack of skilled workforce: As new technologies (AI, automation, digitalisation,...) and regulations are evolving, companies have to invest in training and educating their employees.

	Opportunities	Threats
1	Consumer awareness and behavioral change: End-user requires sustainable products	Global competition from lower-cost regions: Austrian plastic processors and machine manufacturers face price competition from Asia and Eastern European markets.
2	Advancing digitalization and automation: Austrian companies can benefit from Industry 4.0 solutions & smart manufacturing, such as AI-driven sorting, inline quality control, and process optimization.	Regulatory uncertainty and compliance costs: Frequent updates to EU and national legislation (e.g. Packaging and Packaging Waste Regulation) create challenges for long-term business planning.
3	Increasing demand for sustainable products: Major Austrian and European companies are committing to higher recycled content in packaging and production, creating market opportunities.	Raw material shortages and price volatility: Dependence on virgin plastics and fluctuating oil prices pose risks for plastic processors and recyclers.
4	Expanding chemical recycling and alternative feedstocks: Austria has the potential to pioneer chemical recycling technologies and bio-based plastics production, reducing dependency on fossil-based raw materials.	Consumer skepticism towards recycled plastics: Despite regulatory pushes, some industries and consumers still hesitate to adopt high-recycled-content plastics due to perceived quality concerns.
5	Cross-industry collaboration: Stronger partnerships between Austria's plastics processors, machinery industry, and environmental technology sector can create synergies for circular business models.	Economic downturns affecting investment: Economic slowdowns may delay necessary investments in recycling infrastructure, advanced processing technologies, and digitalization

6	New markets / business models: Companies can attract new customers through new business models such as offering remanufacturing & refurbishment services, providing circular business models such as renting (product as a service), buy-back-programs and encouraging their customers to return their old machines for upgrades or recycling. Reducing the dependency on raw material imports and generate revenue, with prices/services which are competitive against the international competition.	

BiH|Bosnia and Herzegovina

	Strengths	Weaknesses
1	Active demand-side influence: Plastics processors drive machine industry adaptation by requesting customized tools, and machines suited for recyclates or bioplastics.	Lack of structured collaboration frameworks: Despite interdependence, there is no systematic platform where plastics and machine sectors co-develop solutions or innovation strategies.
2	Strong local capacity for refurbishing and adapting machines: The machine industry in Tuzla frequently adapts second-hand machines from the EU — enabling their production at lower costs.	Reactive adaptation instead of proactive co-design: Most refurbished machines are adapted on-demand, not as part of a forward-looking, circular transition strategy shared between sectors.
3	Mutual reliance encourages co-evolution: As plastics processors modernize, machine builders also upgrade their competencies, creating a reinforcing development loop.	Technological lag in plastics–machine interface: Many plastics processors still operate on legacy systems, limiting the machine industry's incentive to offer advanced, circular-ready technologies.
4	Skills & knowledge transfer: Both sectors benefit from a shared skilled workforce, educated in mechanical and materials engineering, with crossover know-how (e.g., toolmaking, mechatronics).	No shared R&D infrastructure: There are no joint labs or pilot facilities focused on circular material–machine compatibility, which limits the pace of innovation.
5	Skill-sharing ecosystem: Existing industrial hubs and university-industry linkages support cross-sector collaboration and training.	Low visibility of circular potential: Many companies are unaware of the enabling role they play for each other, reducing motivation for joint transformation.

	Opportunities	Threats
1	EU Green Deal alignment: Growing pressure and support from EU policies (EPR, packaging directive, digital product passports) to transition toward circularity.	Joint development: If local machine builders do not evolve, plastics processors will bypass them and import advanced, circular-ready equipment from abroad.
2	Transition to bioplastics and recyclates opens a co-development market: Plastics processors need machines that can handle new materials; machine builders can gain competitive advantage by specializing in such equipment.	Silos in national policy: Without integrated circular economy policy for both sectors, the enabling loop weakens — investments may support one side only (e.g. recyclers but not machine adaptation).
3	Circular economy funding can support joint pilots: EU and donor programs encourage cross-sector collaboration, ideal for co-designed solutions.	Mismatch between refurbished equipment and new materials: Machines designed for virgin plastics may underperform or fail with recycled or bio-based materials, unless re-engineered.
4	Digital upgrades of used machines: Machine industry in Tuzla can offer "second life" services — refurbishing and digitizing older machines to make them circular-ready for plastics processors.	Perception barrier: Many traditional manufacturers still view circularity as a cost burden, not a value-generating opportunity.
5	Development of service-based business models: Instead of one-time sales, machine builders can offer ongoing support, retrofitting, and optimization services, enabling long-term circular performance.	Risk of external competition: EU-based integrated manufacturers offering "all-in-one" solutions may enter the market, undermining local cooperation.

CZ|Czech Republic

	Strengths	Weaknesses
1	**Waste recycling technologies and their implementation in production practice (including chemical recycling).** Technologies enabling the practical application of the circular economy concept at the level of materials and components, including the recycling of renewable energy technological equipment, technologies ensuring the required quality of secondary raw materials and waste for their circular use.	**Energy sources, including energy saving measures.** General targets for reducing emissions from industry and energy in the EU, a general definition of nano and microparticles or the treatment of substances that can be added to products
2	**Development of modern plastics processing technologies,** including compounding and utilization of recycled materials from waste plastics. Proposal for the use of new products in the current conditions of the chemical and plastics industry in the Czech Republic.	**Technical complexity of scale up processes**
3	**Development of polymers** with special properties (magnetic, conductive, etc.), research into the use of nano-silicon compounds based on polyhedral silsesquioxanes (POSS) as carriers of catalytic components in the polymerization of styrene and olefins. Development of modern, non-toxic inorganic UV absorbers for paints, cosmetics and plastics. Woven and non-woven polymer textiles.	**Only limited discussion and cooperation between universities and academic institutions with industrial companies** – the lack of interest of academic institutions in applied industrial research and, conversely, the unwillingness of industrial company owners to finance basic research without the prospect of benefits in the short term limits the selection of joint projects

4	Research focused on understanding the effects of nano-fillers with a large specific surface area on the mechanical properties, degradation and flammability behavior of polymers. Research into the conditions for the preparation of new, non-traditional types of nanocomposite materials based on montmorillonite clays and other types of inorganic nanoparticles. Development of methods for dispersing nanoparticles and evaluating their properties.	No shared R&D infrastructure: There are no joint labs or pilot facilities focused on circular material–machine compatibility, which limits the pace of innovation.
5	Skill-sharing ecosystem: Existing industrial hubs and university-industry linkages support cross-sector collaboration and training.	**It is necessary to take into account** in particular the technical standards that apply to specific plastics and specific products made from them - these are changing practically constantly. It is also necessary to perceive the requirements for BAT and BREF technology limits, which will have to change in accordance with the above objectives.

	Opportunities	**Threats**
1	**Information area** – an association will be established that maintains an up-to-date summary of information on the state of technology and legislation in the Czech Republic and a comparison with the state in the EU in relation to the sustainability of chemistry as a field, information and documents	**Non-transparent** trading of energy and emission allowances in the EU.

	on commercially usable technologies, and project ideas for research subjects.	
2	**Financial (material) area** – creating a suitable environment for the implementation of joint projects between individual members of the platform and creating consortia that can apply for research grants and the implementation of their innovation plans in various public support programs. Plastics processors will thus expand their experience in solving joint projects with public support.	**Regulatory uncertainty and compliance costs:** Frequent updates to EU and national legislation (e.g. Packaging and Packaging Waste Regulation) create challenges for long-term business planning.
3	**Human resources area** – mapping the intentions of individual companies in the area of using new technologies, sources of raw materials and new materials and will cooperate with educational institutions in formulating new fields of study.	**Raw material shortages and price volatility**: Dependence on virgin plastics and fluctuating oil prices pose risks for plastic processors and recyclers.
4	**Informal communication channels** – the emergence of informal working groups based on personal contacts, encompassing various specializations, these ties are key in the formulation and solution of complex projects.	**Imports mainly from Asia and other countries.** In the vast majority of cases, products and technologies cannot compete with these imports, mainly because importers and manufacturers fundamentally do not comply with the requirements for products, their safety, their composition, etc. - and they do not comply with production technological procedures and requirements at all.

DE|Germany, Baden-Württemberg

	Strengths	Weaknesses
1	**Strong Industry Synergy** – Plastics processors and the machine industry act as mutual system enablers, fostering innovation and efficiency.	**High Energy Costs –** The energy-intensive nature of both industries makes them vulnerable to rising energy prices.
2	**High Technological Expertise** – Companies in the region have advanced technical knowledge and expertise in both plastics processing and machinery development.	**Dependence on Global Supply Chains –** Reliance on raw material imports and global market fluctuations can lead to supply disruptions.
3	**Established Supply Chain –** Well-developed logistics and supplier networks support stable and efficient production.	**Regulatory Challenges** – Stricter environmental laws and compliance requirements can increase operational costs.
4	**Sustainability and Circular Economy Initiatives –** Increasing focus on recycling and sustainable production methods strengthens long-term industry viability.	**Investment-Intensive Industry** – High capital expenditure is required for maintaining and upgrading machinery and production processes.
5	**Skilled Workforce** – The region benefits from highly trained professionals, with strong vocational training and university collaborations.	**Limited Digitalization in SMEs** – Smaller companies may struggle with digital transformation and automation adoption.

	Opportunities	Threats
1	**Growing Demand for Sustainable Solutions** – Rising environmental awareness increases demand for recycled plastics and energy-efficient machinery.	**Economic Fluctuations –** Market downturns and financial instability could reduce investments and slow down growth.
2	**Industry 4.0 and Automation** – Advances in AI, IoT, and robotics can enhance productivity and efficiency.	**Shortage of Raw Materials** – Limited availability and rising costs of raw materials could impact production.
3	**Expanding International Markets –** Opportunities to enter new global markets due to high-quality standards and innovation.	**International Competition** – Increasing competition from low-cost manufacturers in Asia and Eastern Europe.
4	**Collaboration with Research Institutions** – Partnering with universities and research centers for technological advancements and workforce development.	**Stricter Environmental Regulations** – Rising regulatory pressure could lead to increased costs and operational limitations.
5	**Government Incentives for Green Technologies** – Subsidies and funding for sustainable production processes support industry growth.	**Technological Disruptions** – Rapid technological advancements could make existing production methods and machinery obsolete.

HU|Hungary

	Strengths	Weaknesses
1	Clear synergies between plastics and machinery sectors: circularity goals create shared innovation needs.	High investment cost for circular-ready machinery limits accessibility for plastics processors.
2	EU-level regulatory pressure drives investment in both recycling and circular machinery development.	Machinery producers often lack feedback from recyclers on real-world circularity needs.
3	Plastics processors create demand for high-performance recycling, sorting, and reprocessing equipment.	Fragmented waste collection and low-quality recyclate limit what machines can process effectively
4	Machine industry increasingly integrates diagnostics, energy tracking, and modularity features.	Lack of systemic collaboration between the two sectors slows down co-development of solutions.

	Opportunities	Threats
1	Plastics industry's shift towards recycled and bio-based materials opens new markets for specialised machinery.	Market centralisation (e.g. monopolies in waste collection) may reduce access to recyclate and limit innovation.
2	Demand for local, in-factory reprocessing (e.g. waste from injection molding) creates machinery innovation potential.	Technological mismatch: new materials may not be processable with existing machines.

3	Digitalisation (e.g. equipment platforms, predictive maintenance) enables transparency and efficiency in both sectors.	Low confidence in recycled materials reduces demand and weakens feedback to machinery developers.
4	Academic and industrial partnerships can accelerate joint development and knowledge transfer.	Manual processes in plastics sorting persist, delaying automation-based machine development.

MD | Moldova

	Strengths	Weaknesses
1	Access to Recycled Materials: Moldova has a growing network of recycling facilities and partnerships with suppliers of post-consumer recycled (PCR) plastics, which can be used as raw materials for circular plastics processing.	Limited Infrastructure: The lack of advanced recycling and manufacturing infrastructure in Moldova may hinder the efficient processing of recycled plastics and the production of high-quality circular products.
2	Modular and Reusable Designs: The development of modular automotive parts and other components using recycled plastics demonstrates innovation in design, promoting reusability and upgradeability.	Dependence on Imports: Moldova relies heavily on imported machinery and technologies for plastics processing, which can increase costs and limit the scalability of circular initiatives.
3	Energy-Efficient Manufacturing: The adoption of advanced manufacturing techniques that reduce energy and water consumption aligns with sustainability goals and reduces operational costs.	Low Public Awareness: There is limited awareness among consumers and businesses about the benefits of circular economy practices, which may slow the adoption of sustainable solutions.
4	Collaboration with Academia: Partnerships with local universities and research institutions, such as the Academy of Economic Sciences and Technical University of Moldova, support innovation and the development of sustainable practices in the plastics and machine industries.	Inconsistent Quality of Recycled Materials: The quality of locally sourced recycled plastics can vary, affecting the performance and reliability of circular products.

5	Alignment with EU Standards: Moldova's efforts to align with EU legislation on circularity and sustainability provide a strong foundation for developing a circular plastics value chain.	Limited Financial Resources: The high initial investment required for transitioning to circular practices may be a barrier for small and medium-sized enterprises (SMEs) in the plastics and machine industries.

	Opportunities	Threats
1	EU Integration: Moldova's goal of EU integration by 2030 presents an opportunity to adopt advanced circular economy practices and access EU funding for sustainable development projects.	Economic Instability: Moldova's economic challenges, including inflation and currency fluctuations, may impact the financial viability of circular economy projects.
2	Growing Demand for Sustainable Products: Increasing global demand for eco-friendly and sustainable products creates a market opportunity for circular plastics and machinery in Moldova.	Competition from Traditional Materials: The widespread use of traditional, non-recyclable plastics and materials may hinder the adoption of circular solutions in the market.
3	Technological Advancements: The adoption of new technologies, such as 3D printing and AI-driven design tools, can enhance the efficiency and scalability of circular plastics processing.	Regulatory Challenges: Inconsistent or unclear regulations related to recycling, waste management, and circular economy practices may create barriers to implementation.
4	Partnerships with International Companies: Collaborating with international companies and organizations can provide access to advanced technologies, expertise, and funding for circular economy initiatives.	Global Supply Chain Disruptions: Dependence on global supply chains for machinery and raw materials makes the industry vulnerable to disruptions, such as those caused by geopolitical conflicts or pandemics.

5	Government Support: The introduction of policies and incentives to promote circular economy practices, such as tax breaks or subsidies for recycling and sustainable manufacturing, can drive growth in the sector.	Resistance to Change: Resistance from traditional industries and stakeholders who are accustomed to linear economy models may slow the transition to circular practices.

RO|Romania

	Strengths	Weaknesses
1	Existence of prestigious RDI Institutes in plastic industry	Weak colaboration between industry, research and authorities
2	Romania is rolling out a centralized deposit return system (DRS) – with almost 80,000 collection points – and seeks to increase collection and recycling rates for single-use beverage containers	Limited digitalisation of SMEs to use smart manufacturing and IoT, to enhance energy management and process optimization;
3	Existence of big enterprises with integrated business models (TERAPLAST, ROMCARBON etc)	Low Capacity for Eco-design – Many companies do not have technical capacity to design products with eco-design principles, limiting circularity in production.
4	Existence of a high number of SMEs in plastic industry, members of National Employers' Association of Plastic Mass Processors.	There is not an adequate collection and sorting infrastructure for efficient recycling, and the investments in this field are insufficient.
5		Insufficient high skilled labour force
6		High initial costs for upgrading to energy-saving machinery and processes
7		Dependence on imported raw materials
8		Existence of obsolete plastic processing machinery

9		Limited adoption and integration of circular technologies

	Opportunities	Threats
1	Setting up of cluster in plastic industry	High energy costs- The energy intensive nature of plastic industry makes it vulnerable to rising energy prices;
2	Implementation of Circular Economy Strategy and the Circular Economy Action Plan.	Economic instability: inflation, currency fluctuations affect SMEs to innovate and to adopt new business models (e.g. reuse, repair, recycling)
3	Investments of companies in Romania and abroad (i.e, TERAPLAST in Austria)	Global competition from lower costs regions (i.e. Asia)
4	Eco-design implementation – Focus on modular and recyclable products in the machine industry	Technological disruptions- rapid technological advancements could make existing production methods and machinery obsolete
5	Increasing separate collection, increasing use secondary materials in production, eco-design, increasing the consumption of more sustainable products, support for research and development.	

6	Expansion of the Deposit-Return System (DRS) for plastics(packaging for detergents, diary products, canned goods etc) to reduce the high amount of plastic waste	
7	Investments in technologies that allow the integration of recycled materials in production processes.	
8	Simplified procedures for accessing funds of Circular Economy projects	
9	Black Sea access for export of recycled plastic products	
10	Increased inter-regional cooperation	

RS | Republic of Serbia

	Strengths	Weaknesses
1	Existing industrial base – Serbia has a strong manufacturing and engineering sector, particularly in the machine industry	Lack of regulatory enforcement – Insufficient implementation of CE-related laws and policies
2	Growing interest in circular economy – Increasing awareness of CE principles among policymakers and businesses	Limited infrastructure for waste management – Inadequate collection, sorting, and recycling facilities
3	Skilled workforce – A solid base of engineers and technical professionals	Dominance of linear economy practices – Many businesses still rely on traditional, unsustainable production models
4	Geographical position – Strategic location in Europe allows access to EU markets and partnerships	High initial investment costs – Circular models require significant funding for new technologies and processes
5	Academic and research potential – Universities and research institutes working on sustainability and materials innovation	Insufficient financial incentives – Limited access to subsidies, tax breaks, or green financing
6	Government incentives – Some funding programs support CE-related projects and green technologies	Weak collaboration between industry and research institutions – Gaps between scientific innovation and industrial application
7	Recycling industry presence – A developing recycling sector, especially in plastics	Dependence on imports – Many raw materials and components are imported, reducing circularity potential

8	Participation in international initiatives – Serbia is part of regional and EU-backed programs for sustainability	Low consumer demand for recycled products – Market preference for traditional materials due to perceived quality issues
9	Potential for industrial symbiosis – Possibility of cooperation between companies for material reuse and waste valorization	Limited industrial waste tracking and data availability – Lack of comprehensive systems for monitoring material flows
10	Increasing public awareness – Consumers and businesses are becoming more conscious of sustainability	Skills gap in circular business management – Lack of education and training for companies transitioning to CE

	Opportunities	**Threats**
1	EU integration and funding programs – Serbia can access EU funds for circular economy projects	Regulatory uncertainty – Frequent policy changes or lack of long-term governmental commitment
2	Growing global sustainability trends – International market demand for circular and sustainable products	Economic instability – Inflation, currency fluctuations, and economic downturns affecting investment in CE
3	Development of secondary raw materials market – Potential for domestic production of recycled plastics and machine components	Competition from low-cost linear businesses – Traditional models often remain cheaper in the short term
4	Public-private partnerships (PPPs) – Possibility to collaborate with the government and international investors	Lack of market incentives – Circular products often face difficulties in competing with cheaper, non-sustainable alternatives

5	New business models – Emerging opportunities like product-as-a-service (PaaS), remanufacturing, and sharing economy	Technological barriers – Some necessary technologies for CE are still underdeveloped in Serbia
6	Eco-design implementation – Focus on modular and recyclable products in the machine industry	Limited consumer behavior change – Resistance to adopting new consumption patterns and circular principles
7	Technology innovation – Adoption of Industry 4.0, digitalization, and AI in material tracking and production efficiency	Short-term mindset in business decision-making – Many companies prioritize immediate profits over long-term sustainability
8	Extended Producer Responsibility (EPR) adoption – Stronger regulations can drive circular practices	Lack of standardization and certification – No unified guidelines for circular product quality and performance
9	Waste-to-energy potential – Utilizing plastic and industrial waste for energy generation	Administrative inefficiencies – Slower implementation of reforms and funding disbursement
10	Cross-sector synergies – Linking the plastics industry with construction, automotive, and textile industries for waste repurposing	Global supply chain disruptions – Fluctuations in raw material prices and availability

SK|Slovak Republic

	Strengths	Weaknesses
1	Almost 60% of the GDP of the chemical industry in the SR is created in the area of the Production of rubber and plastic products (59.2%).	Large companies producing plastic products for the automotive sector are companies exclusively with foreign capital, with their own development departments and divisions, the results of which serve entire concerns but do not support cooperation with SMEs. They act as essentially closed entities.
2	According to the achieved turnover, the sector of production of rubber and plastic products is in 5th place in the SR, but according to the achieved economic result before taxation, it is the second most profitable sector.	Lack of companies focusing on new innovative projects, waste recovery or waste reuse in Slovakia
3	The plastics processing industry is predominantly a sector of small and medium-sized companies. More than 60% of the total sector is made up of SMEs.	Limited cooperation between science, research and innovation at the top state level. Cooperation is transferred to a lower level, namely between R&D institutions and SMEs.
4	The largest companies that produce plastic products (they make up more than 30%) are currently included in SK NACE in the motor vehicle production sector. They are in the first and second line (TIER 1 and TIER 2) suppliers for the automotive industry and have exclusively foreign or multinational capital.	Low flexibility of R&D, which is paid from public funds, the lack of habit of SMEs to turn to R&D institutions paid from public funds (universities) in the field of innovation. SPK is trying to influence this long-lasting state of disinterest, or mistrust between universities and companies.

5	More than 398 companies with more than 25 employees are registered by SPK in its database. They include polymer producers, plastic processors, recycling companies, and associated industries such as fiber production, and 3D printing, but also companies for finishing operations in the plastics industry – such as painting, plating, etc.	In the SR, there are long-term difficulties in obtaining state subsidies or grants for innovations, therefore the costs of innovations are mainly paid from private and not public sources. At a certain point, this slows down the implementation of innovations.
6	Since 2022, start system of deposit of PET bottles and aluminum cans in Slovakia. The target was to collect 80% of sold bottles back for recyclation. The results are even better with 92% of bottles collected back.	Creation of a low number of jobs in the field of plastic processing industry with a higher added value. That is one of the reasons why qualified graduates leave for work abroad.
7	The plastic processing sector is one of the key sectors in which automation and robotization already play a dominant role. Most of the companies were based from the beginning on top technologies and modern forms of work organization.	Lack of qualified employees in the plastic processing industry – in production, but also maintenance - who would be able to ensure new or innovated production programs.
8	Slovakia has a sufficient number of universities, several of which (mainly in technical and natural sciences) form a very good foundation for basic research as well as they are able to educate and train qualified graduates.	Qualified and available workforce is needed for the operation of R&D centres – such as high-quality graduates of technical universities, able to think critically and innovatively. Many young people go to study abroad, where they have better job opportunities after graduation.
9	Universities, esp. TUKE educating experts in the plastics processing industry, also being interested in cooperation with	Low promotion of innovative products from the plastic industry, recycled products or products from new materials. There is no tool for joint promotion of innovative or recycled products.

	SMEs, are also very well technically equipped. In numbers, 5 key faculties from 3 universities in Slovakia are members of SPK.	
10	The Slovak Academy of Sciences is the concentration of research and development of the Slovak Republic and is starting to get closer to the problems of practice through its institute – The Institute of Polymers with a large share in patents and other outputs protected by the intellectual property). The Institute of Polymers is also a member of the SPK.	Very low real support for applied research in the SR. It is rather non-systemic, and information for SMEs is scarcely available.
11	SPK was created "from the bottom" (based on companies´ needs and interests), 16 years ago, in order to solve the problem of training professional staff at the secondary school level. In 16 years, SPK became a partner representing primarily SMEs at the level of central state administration bodies.	Low willingness to use existing public resources for research (corruption, lengthy and biased program management from organizations providing EU funds).
12	In 2024, the SPK has been accredited as educational organisation for all life education in scope of plastic processing process which also includes the area of circular economy and is set to be cross-sectoral (cross-sectoral study fields: chemistry, mechanical engineering, electrical engineering, and environment)	
13	The biodegradable and fully compostable material "NONOILEN", which is protected by a patent, has been developed in the Slovak Republic. SPK has been helping since 2012 in applied research and testing of this material using various technologies. SPK	

	members who tested NONOILEN have skills and experience beyond other companies.	

	Opportunities	Threats
1	Among medium and large companies, approximately 11% of companies have exclusively Slovak capital. Medium-sized companies with Slovak capital are set to develop innovations, both in the plastic processing industry and in recycling and reuse of already consumed products in a different form. SPK regularly monitors these companies.	Manufacturers of plastic products are primarily suppliers to the automotive industry (4 car factories in a 250 km radius, the fifth is starting production in 2027). The production of packaging, which is predominant in Europe from the point of view of EU statistics, accounts for less than 30% of the production of plastic products in the SR – low diversification of production.
2	A very strong network of accredited laboratories and testing facilities that also provide services to neighboring countries. In most cases, they are a good basis for applied research.	Low support for innovation in plastic companies - public resources for applied research are decreasing every year; SMEs are not in good shape in the area of innovation compared to other EU countries. There is a threat that the ideas of Slovak companies will be supported by foreign capital and Slovak companies may lose autonomy (in some cases they might "sell intellectual property outputs to someone who will help these outputs get into practice").
3	A strategic document has been adopted in the SR – "Waste Management Program of the Slovak Republic" for the years 2021 to 2025. This means a shift from material recovery to waste prevention. In this context, the Waste program focuses primarily	Innovation management from the state's point of view is "three-track" - which is very dangerous. Science and research is supported by the Ministry of Education, Science, Research of the Slovak Republic; innovations are under the auspices of the

	on reuse, support for waste sorting at the source and recycling, better use of bioplastics, and also the introduction of the obligation to sort textile waste.	Ministry of Economy of the SR and R&D management at the regional level is under the auspices of the Ministry of Investments, Regional Development and Informatization of the SR. Science, research and innovation are still coordinated by the Office of the Government of the SR. In addition, the first two ministries created their own budget and contribution organizations to provide direct aid for science and research. The system created in this way is unclear and non-cooperative and results in not drawing public resources and not supporting good ideas.
4	At the beginning of June 2022, a document was adopted - "Overview of policy recommendations to stimulate circularity in production - Preparation of a circular economy roadmap and concept". Therefore, the circular economy is firmly embedded in strategic documents for the years 2023-2030 at the state level but also in all regions (document supported by OECD experts).	The Slovak economy has a dual character. The main economical part is formed by branches of multinational companies (MNCs), especially the 4 major car companies and consumer electronics manufacturers, which also brought dozens of their own suppliers (large and medium-sized companies) with them. There is still a risk that MNCs branches may leave Slovakia with their suppliers and move to cheaper countries. (What happened with SONY, SAMSUNG)
5	Waste Act from 2015 - sorting of waste, biodegradable waste from 2019, an amendment to the law is being prepared from January 2024 - sorting of textile waste.	Low related variety of key branches of the Slovak economy, such as engineering, consumer electronics, production of metals and metal products, production of plastic products, as well as the development of information and communication technologies.

6	SPK is part of the working group at the level of the Ministry and relevant institutions involved in the collection, separation, and recycling of textile waste. In this role, SPK provides support for intersectoral cooperation.	Low and delayed withdrawal of financial resources from EU funds for the support of innovations. At the end of 2018, more than 50% of the allocated budget for challenges until 2020 had not been contracted. This creates assumptions that the budget for the Slovak Republic will continue to decrease.
7	A document is in place favoring Green public procurement at the level of the public and state sectors.	Missing state strategy in the area of R&D and cluster policy.
8	Solving the situation from weaknesses: lack of qualified employees in the plastic processing industry - SPK is involved in process of preparing a tool for sharing experts.	Fragmentation and duplication of R&D support institutions.
9	Solving the situation from weaknesses: Low promotion of innovative products from the plastic industry - SPK publishes an Innovation brochure, updated every year, and the number of companies being presented within it is growing with every new edition. This brochure is brought with SPK representatives to every mission or meeting realized abroad.	Unnecessarily high administrative burden of obtaining R&D support and bureaucracy of public and state administration.
10		State propaganda negatively focuses on all plastic products (mainly led by environmental organizations that do not give another alternative) instead of educational solutions for handling waste plastics or leading the population to reduce the use of plastics, extend the life of plastics, etc.