CATALYST PROSPECTUS

A CATALYST PUBLICATION

CATALYST

Leading sustainable systems and business transformation

Fifth Edition
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CATALYST PROSPECTUS MAGAZINE
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LETTER FROM OUR EDITOR

Welcome to the Final Conference Issue of CATALYST Prospectus Magazine

Dear readers,
Welcome to this special final issue of the CATALYST Prospectus Magazine.

With the international conference “Catalyst for Change in Sustainable Systems and Business Transformation”, the official part of the CATALYST project comes to a close. After four years of learning, collaboration, experimentation, and co-creation, this issue offers both a reflection on what has been achieved and an invitation to carry the work forward.

Unlike previous editions, this final issue is not organised according to the usual PROSPECTUS categories. Instead, it follows the flow of the conference day itself, from the opening welcome and project introduction to the keynotes, panel discussions, posters, and closing reflections.

Together, these contributions show the richness of the project: the European CATALYST Centre and five national Centres of Vocational Excellence, 70 online courses, the CATALYST platform, business pilot projects, and a growing network of partners, learners, organisations, and stakeholders.

The conference highlighted many themes that have shaped CATALYST from the beginning: sustainable systems, business transformation, vocational excellence, future skills, green and circular economy pathways, lifelong learning, and cooperation between education, business, policy, and civil society.

Most of all, the day reminded us that transformation happens through people and relationships. Courses, platforms, technologies, and policies come alive when people use them, share them, adapt them, and continue building together.

To everyone who has followed the magazine, supported the project, joined our events, used the platform, taken part in courses, contributed to pilot projects, shared expertise, or encouraged the work over the past four years — thank you. Your support has helped make CATALYST more than a project: a community of practice and a foundation for future co-creation.

As the official project period ends, the work does not stop. The knowledge, resources, relationships, and structures created through CATALYST remain available for new partnerships, learning pathways, and transformation journeys.

We hope this final conference issue inspires you to look back with appreciation, look forward with courage, and continue transforming knowledge into action.

The CATALYST project may be closing one chapter, but the opportunities for co-creation are still opening.

Warm Regards

The CATALYST team

OPENING THE DAY
FROM KNOWLEDGE TO ACTION

Representatives from embassies, government institutions, the business community, and civil society gathered at the Museum of the Macedonian Struggle for Independence for an international conference dedicated to change in sustainable systems and business transformation.

The venue itself helped set the tone for the day. Established in 2011, the museum includes in its vision the ambition to be an example of sustainable cultural heritage. This made it a meaningful place to begin a conversation about sustainability, transformation, and the responsibility shared across sectors.

The opening remarks welcomed participants not only as distinguished guests, but as active contributors to a wider exchange. With simultaneous interpretation between Macedonian and English, the conference was designed to support participation across languages and cultures. This reflected one of the day's central messages: meaningful transformation depends on making knowledge accessible and creating the conditions for people to understand one another.

Facilitator Rhonda Bowen opened the programme by reminding participants that facilitation means "to make things easy." Her role throughout the day was to support the flow of conversation, helping ideas move between speakers, participants, and perspectives.

To frame the conference, she shared a quote from long-time consumer and environmental advocate Ralph Nader: "The flow from knowledge to action draws upon the complete person with his or her own catalyst and synergistic potential."

It was a fitting beginning. The room brought together people with different experiences, responsibilities, and hopes for the future. The day ahead invited them to explore how knowledge can become action - and how individual and collective potential can become a catalyst for sustainable change.

WESTERN BALKANS CIRCULAR ECONOMY HUB: CATALYZING REGIONAL TRANSFORMATION THROUGH INNOVATION & COLLABORATION

AUTHORS
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INTRODUCTION

The transition to a circular economy has become a critical imperative for the Western Balkans (WBs), driven by increasing environmental pressures, climate change, and the need to align with EU sustainability objectives. Although the concept remains relatively new in the region, the development of national Circular Economy Roadmaps and strategic documents demonstrates a growing political commitment. As candidate countries for EU membership, the WBs are tasked with adoption of the principles of the European Green Deal and the Green Agenda for the Western Balkans, where circular economy is one of the five key pillars. Shared historical, cultural, and economic challenges create strong foundations for regional collaboration, especially because 82% of the region's residents believe that regional cooperation is good for their economy[1].

The Western Balkans Circular Economy Hub (WBCEH) emerges as a catalyst, streamlining resources, building capacities, and connecting stakeholders to accelerate the transition, foster innovation, and unlock economic and environmental benefits for the region.

1. Balkan Barometer 2024, Regional Cooperation Council (RCC)

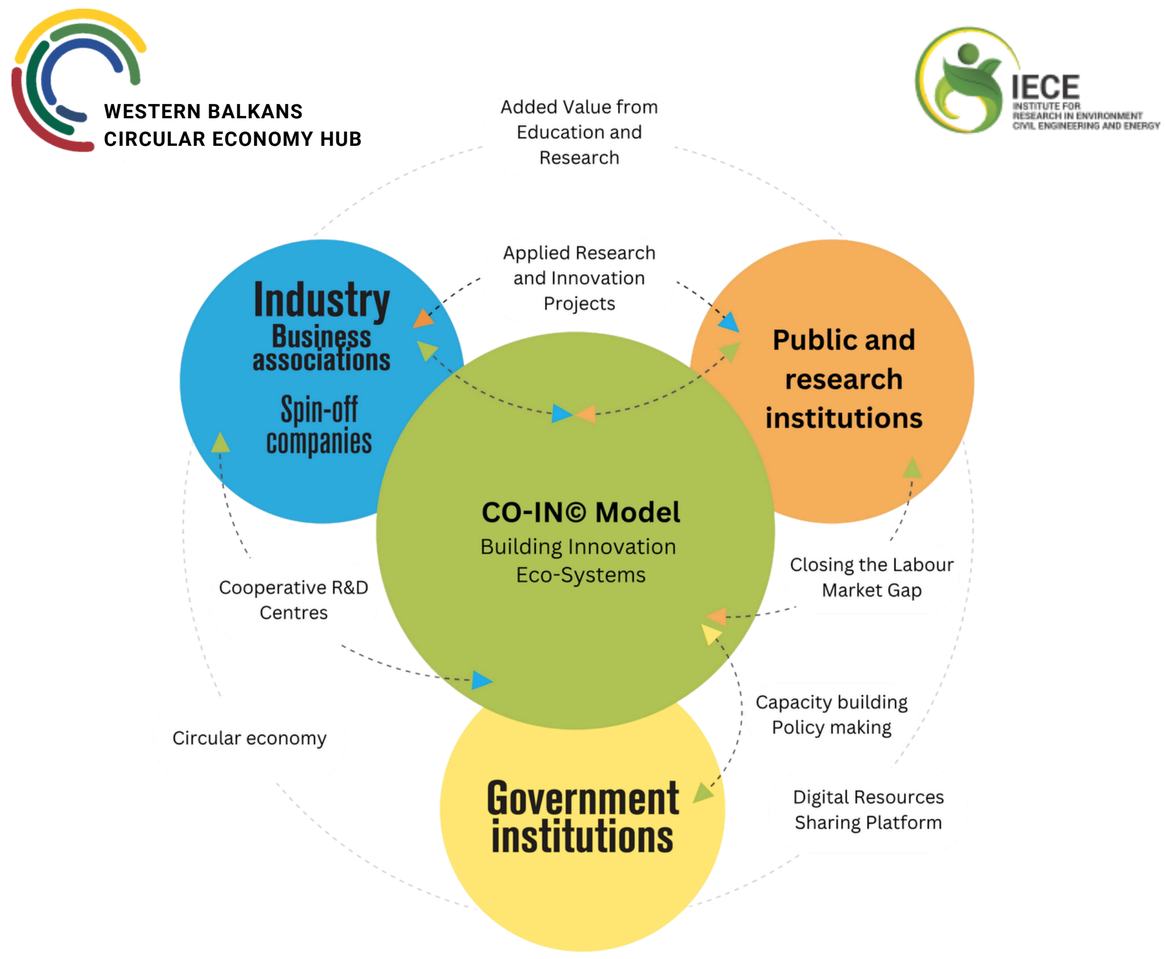
OBJECTIVE

WBCEH is envisioned as a focal point that connects different stakeholders across the Western Balkans, including Chambers of Commerce, companies, educational institutions, professionals, and students, in order to foster communication, collaboration, and networking between them with the goal of speeding up the transition to circular economy in the region.

Considering that national circular economy hubs already exist in some of the Western Balkan countries, WBCEH aims to address the problem from a broader perspective, consolidating existing circular Hubs' efforts at the national level and tailoring the activities and its offer to the regional context, so that stakeholders from each of the six countries can benefit.

METHODOLOGY

WBCEH is founded on the Collaborative-Innovative (CO-IN)© Model, developed by IECE and the Civil Engineering Institute of Macedonia. This model fosters partnerships between education, business, and government sectors, promoting knowledge sharing, innovation, and sustainable growth. It strengthens human capital, supports eco-innovation, and enhances competitiveness, contributing to building learning organizations, entrepreneurial universities, and a resilient, knowledge-based economy. At the heart of WBCEH is a commitment to fostering a supportive environment where stakeholders can connect, learn, and innovate. WBCEH is building partnerships with organizations active in the circular economy field across the region - Partners of the Hub, working collaboratively to design solutions adapted to each national context and to combine best practices into new, innovative approaches.



RESULTS

In its first year, the Western Balkans Circular Economy Hub has established itself as a regional platform connecting diverse stakeholders and supporting the transition toward circular practices. Through a combination of capacity-building, community engagement, and collaboration opportunities, the Hub has strengthened knowledge exchange and fostered partnerships across the region, while also promoting visibility of circular solutions and encouraging innovation among businesses and other target groups. Some of the achieved results are the following:

- **WBCEH digital platform** launched
- **132 registered** WBCEH members and **7 members meetings** held
- **700+ participants** attended **15 networking, capacity building and industry-specific events** organised in 2025
- **6 Roadshow events** co-organised in each of the WB countries with the national Chambers of Commerce
- **100+ individuals trained** on circular economy fundamentals
- almost **90,000 impressions** on WBCEH's LinkedIn profile in 2025
- **5 joint project applications** between IECE and WBCEH members
- **"100 Best Circular Practices"** initiative launched
- 55 applications received and 14 awarded for the first **Circular Economy Awards** initiative in the Western Balkans

Private sector enterprises with improved/new circular services into their operations & boosted competitiveness

Target groups increase their skills as well as access & use intermediation services & support systems to make informed decisions

Private sector enterprises have better policy support to do business & increase their efficiency

CONCLUSION

WBCEH fosters social and societal innovation by supporting businesses, communities, and individuals in adopting circular economy practices that enhance social well-being. Through waste reduction, resource efficiency, green job creation, and sustainable entrepreneurship, it addresses key societal needs such as improved living conditions, local employment, and better health outcomes linked to cleaner air, soil, and water.

At the same time, WBCEH acts as a driver of systemic change across the Western Balkans by supporting alignment with EU Green Agenda goals, enabling industry transformation, strengthening regional cooperation, and encouraging a shift in public values toward sustainability. These efforts contribute to long-term transformations in economic models, governance, education, and markets.

REFERENCES & ACKNOWLEDGEMENTS

This project and poster is developed as part of the RECONOMY programme which is an inclusive and green economic development program of the SwedishInternational Development Cooperation Agency (Sida), implemented by HELVETAS Swiss Intercooperation in the Eastern Partnership and the Western Balkan countries, together with IECE.

https://wbcirculareconomy.com

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WATERWISE: AN EXCELLENCE HUB ON WATER IN THE CIRCULAR ECONOMY

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INTRODUCTION

The WaterWise Excellence Hub is an EU-funded initiative advancing Smart Decentralized Water Solutions within the Circular Economy. The partnership spans across Greece, Romania and selected Western Balkans and Eastern Partnership countries and is supported by leading European water institutions from Netherlands and United Kingdom (21 partners in total from 9 European countries). The project capitalizes on the Quadruple Helix Innovation Model, working together with Universities, Research Institutions, SMEs and Start-ups, Public Sector and Civil Society to accelerate the adoption of close-looped water systems. The Hub activities revolve around Water Research & Innovation, Water Business Acceleration, and Knowledge Dissemination.

The Hub delivers a comprehensive set of actions to strengthen water circularity and innovation ecosystems. It develops a cross-border R&I strategy to address systemic gaps, supports market uptake through innovation acceleration programmes and funding opportunities, and provides decision-support toolboxes for planning and implementation of decentralized water systems. Additionally, it empowers water innovators through lifelong learning, mentoring, and enhanced matchmaking tools, while enabling new investment pathways to scale circular and decentralized water solutions.

OBJECTIVE

The WaterWise Excellence Hub aims to strengthen regional innovation ecosystems and accelerate the adoption of circular and decentralized water solutions. It seeks to bridge research, policy, and market gaps by fostering collaboration, enhancing capacities, and supporting the development and scaling of innovative water technologies. Ultimately, the project contributes to sustainable water management and resilience in participating regions.

METHODOLOGY

The Quadruple Helix model of innovation is central to the WaterWise Hub's approach, ensuring the integration of diverse perspectives and contributions from academia, business, government, and civil society. The model facilitates collaborative innovation and addresses the multifaceted nature of water management challenges.

PUBLIC AUTHORITIES: Collaborating with public authorities, local governments, and EU institutions to maximise the uptake of our research and innovation solutions.
ACADEMIA: Aggregating insights and contributions from academic institutions and water research and innovation centres, to steer innovation in circular water solutions.
CIVIL SOCIETY: Engaging societal actors in the decision-making process, providing training and tailored support to resolve local water challenges through innovative solutions.
BUSINESS: Creating opportunities for new talent to innovate and launch their own new businesses in the circular water market, while supporting SMEs, start-ups, and the industry sector, to accelerate solutions.

WaterWise Hub

CROSS-BORDER R&I STRATEGY

INNOVATION ACCELERATOR

DECISION-SUPPORT TOOLBOXES

EMPOWERING WATER INNOVATORS

NEW INVESTMENT PATHWAYS

RESULTS

Although still in its initial phase, the WaterWise Excellence Hub has successfully established the foundations for a strong and collaborative innovation ecosystem in circular and decentralized water management. Key achievements include the development of the project's visual identity and digital presence, as well as the initiation of cross-border cooperation among partners from Southeast Europe and beyond.

Early activities have focused on shaping the cross-border R&I strategy, including mapping policy frameworks and identifying innovation gaps and opportunities across participating countries. The Hub has also begun fostering stakeholder engagement through workshops, webinars, and participation in sectoral events, facilitating knowledge exchange and strengthening partnerships with key actors in the water sector.

In parallel, initial steps have been taken toward launching innovation support mechanisms, including the design of Open Calls, pilot actions, and accelerator programmes aimed at supporting startups, SMEs, and researchers. Capacity-building efforts have also commenced through knowledge-sharing activities and the development of training and mentoring frameworks.

These early results lay the groundwork for the upcoming implementation phase, where concrete pilot projects, funding schemes, and decision-support tools will be deployed to accelerate the transition toward circular water systems.

CONCLUSION

The WaterWise Excellence Hub lays the groundwork for a more resilient and sustainable water future by fostering collaboration, innovation, and knowledge exchange across regions. By connecting research, policy, and market actors, the Hub enables the transition toward circular and decentralized water systems.

As the project progresses, its integrated approach is expected to unlock scalable solutions, strengthen regional capacities, and contribute to long-term environmental and socio-economic benefits across participating countries.

REFERENCES & ACKNOWLEDGEMENTS

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https://waterwisehub.eu

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INTRODUCING CATALYST: A FOUR-YEAR JOURNEY TOWARD SUSTAINABLE TRANSFORMATION

The conference opened with an introduction to the CATALYST project, presented by Professor Dr. Angelina Taneva-Veshoska, who has coordinated the project from its beginning. She welcomed participants by thanking them for sharing what she described as their "most precious resource" — their time — and invited them to see the project as a four-year journey of collaboration, learning, and transformation.

CATALYST was created to support economic growth through sustainable systems and business transformation. At its heart is a holistic approach that brings together different stakeholders — from business, education, government, public institutions, and civil society — to build long-term partnerships and create practical change.

The project was built around two main components: Enable and Inspire. The Enable component focused on providing knowledge, training, courses, and resources to help people and organisations prepare for transformation. The Inspire component went further, offering networks, events, services, and business pilot projects to help turn that knowledge into action.

A major achievement of the project was the establishment of the European CATALYST Centre for Leading Sustainable Systems and Business Transformation, together with five national Centres of Vocational Excellence in North Macedonia, Greece, Austria, Germany, and Portugal. These centres were designed to support both local realities and European-level cooperation.

Over four years, CATALYST developed 70 online courses and specialisation programmes, along with tools, templates, guidelines, reports, a glossary, coaching, consultation services, webinars, expert sessions, and the CATALYST network. The programme addressed transformation at three connected levels: systemic, organisational, and personal. This included topics such as sustainable development, resilient transition, sustainable business management, circular economy, intellectual capital, and transformation readiness.

One of the project's most practical elements was the business pilot projects, where companies, students, and teachers worked together on real organisational challenges. These pilots helped bridge the gap between theory and practice, producing solutions that some organisations have already begun to implement.

The presentation also highlighted the CATALYST Prospectus Magazine as one of the project's lasting results: an open-access publication sharing perspectives, resources, opportunities, excellence, transformation, and partnership potential.

Looking back on the journey, the project team could say with confidence that CATALYST had achieved its original vision: to support high-quality vocational education, strengthen business transformation, encourage sustainable partnerships between education and industry, and contribute to green and circular economy pathways.

The opening message was clear: CATALYST is not only a project that has produced courses, resources, and networks. It is a living example of how education, business, and society can work together to turn knowledge into action.

5

METHODOLOGY OF INNOVATIVE USE OF INDUSTRIAL WASTE MATERIAL FOR CONSTRUCTION APPLICATION

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INTRODUCTION

The Republic of North Macedonia holds significant quantities of secondary raw materials in the form of industrial, construction and demolition, and municipal waste - a relatively unexplored potential that could serve as a meaningful source of secondary raw materials (SRM) for the construction sector after appropriate treatment and processing. The CINDERELA pilot project addresses this opportunity by assessing industrial waste streams, developing and testing new construction materials based on SRM, and exploring their application in construction. This paper presents the methodology for the innovative use of industrial waste in construction applications. The SRM source examined is non-hazardous industrial waste -- specifically black and white slag produced by electric arc furnaces during scrap iron smelting at the Makstil factory. Black slag was tested for use as a lower bearing layer aggregate (tampon subbase) and as an aggregate for asphalt mixtures, while white slag was tested as a cement substitute additive in concrete mixtures.

OBJECTIVE

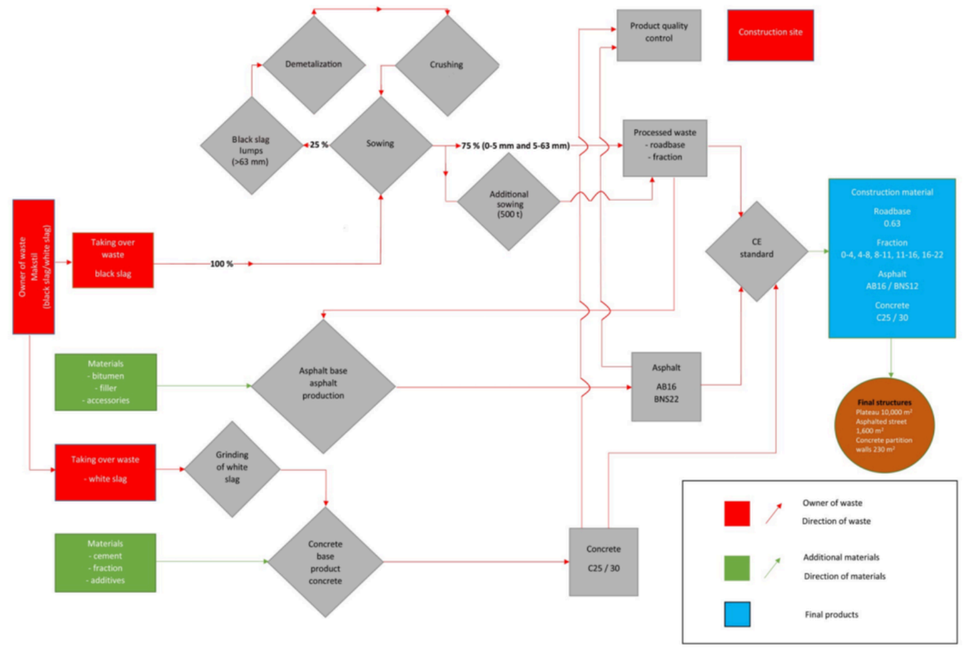
This study presents an innovative approach to the use of black and white slag, along with the results of analyses on the technical, technological, and administrative possibilities for their processing and reuse as construction materials based on secondary raw materials (SRM).

METHODOLOGY

Laboratory testing of black and white slag, as well as the design of concrete and asphalt mixtures, was carried out at the Civil Engineering Institute MACEDONIA AD Skopje. Final products (concrete and asphalt) were prepared and tested under laboratory conditions.

The obtained data were used to:

- Design and establish modular and mobile pilot production plants for recycled and manufactured aggregates, building composites, and recycled materials
- Demonstrate their application in large-scale construction projects.



RESULTS

Based on laboratory testing of black and white slag samples, in accordance with the standards applicable in the Republic of North Macedonia, it was determined that black slag meets all technical requirements for use as a lower bearing layer (aggregate for tampon–sub-base) and as an aggregate in asphalt mixtures.
White slag satisfies all technical requirements for use in concrete mixtures, except for the activity index, which is 32.9% (compared to the required 45%).

In the design process, three different concrete mixtures were tested, in which white slag was used as a substitute for 10 wt.%, 15 wt.%, and 20 wt.% of cement. The results showed that the concrete mixture containing 20% white slag meets the requirements for construction applications.
To ensure the technical usability of slag, it is necessary for free CaO and MgO to transform into stable hydroxides, i.e. for the slag to mature. It is therefore recommended that the slag be left to mature for 3 to 6 months or be sprayed with water to accelerate the process before mechanical treatment and use as aggregate, in order to prevent expansion in the final composite.

The slag also undergoes mechanical processing (screening, demetallization, crushing, and mixing of black slag, as well as grinding and mixing of white slag) to achieve the required granulometric composition. Black slag is subjected to a 100% screening process, producing 25% lumps (>63 mm) and 75% usable aggregate (0–5 mm and 5–63 mm). The lumps are then demetallized and crushed. After grinding, white slag can be used as a 20% substitute for cement in concrete mixtures for the production of C25/30 concrete.

Following treatment, three main products are obtained:

- Aggregate for tampon–sub-base applications
- Aggregate for asphalt mixtures (e.g. AB16/BNS12t)
- A 20% cement substitute in concrete mixtures (C25/30)

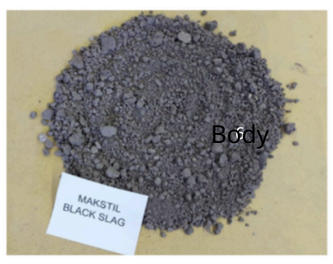
This process is illustrated in the scheme above.

CONCLUSION

Following the circular economy principles and using the secondary raw material as a building material is an excellent example of how to reduce the amount of landfilled waste, protect primary resources, and at the same time, provide a cheaper and faster solution for construction products.

The innovation and uniqueness of this project are that for the first time in our country, SRM-based products are produced and applied for the revitalization of degraded areas, rehabilitation of roads, and production of partition blocks for walls. The added value of it is the certification of the black slag product, aggregate for tampon - subbase, by the certification body CEIM.

The product is certified in accordance with tha standard MKC EN 13242 + A1: 2009, and the construction product is subject to a system for assessment and verification of consistency of properties.

REFERENCES & ACKNOWLEDGEMENTS

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Mastering Impact Pitching:
From Storytelling to Investment Readiness
A Practical Guide for Sustainable Ventures

AUTHOR: Katerina Chatzichristou, SPOROS Platform

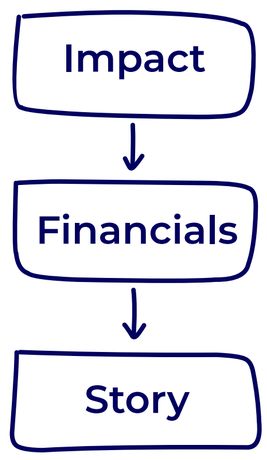
ABOUT

Impact investors increasingly seek ventures that combine financial returns with measurable environmental and social impact.

This poster outlines **key strategies** for designing and delivering an **effective sustainability pitch**.

It highlights the importance of **clear visuals**, **concise messaging**, **consistent design**, and **strong delivery techniques**. Additionally, it explores how entrepreneurs can **engage investors**, **handle objections**, and present **compelling** impact metrics.

By integrating storytelling, data, and structured communication, startups can **significantly enhance** their ability to **attract investment** and build long-term partnerships.



INTRODUCTION

A successful pitch is not only about presenting an idea, it is about **communicating value clearly and convincingly**.

In impact investing, this becomes even more critical, as investors evaluate both financial viability and measurable impact.

Entrepreneurs must demonstrate:

- **A clear value proposition**
- **Strong understanding of their market**
- **Credible impact metrics**

This section introduces the core elements that define an effective impact pitch.

RESULTS

Visual Strategy

- Charts → communicate data
- Infographics → simplify complexity
- Diagrams → explain models

Clarity & Design

- Minimal text
- Readable fonts
- Consistent layout

Engagement

- Ask questions
- Encourage feedback
- Create dialogue

Handling Questions

- Be prepared for financial & impact concerns
- Address risks clearly
- Practice active listening

Delivery Techniques

- Role-play scenarios
- Improve body language
- Simulate real pitch conditions

CONCLUSION

An effective impact pitch combines storytelling, data, and clarity to communicate both financial potential and measurable impact. By preparing thoroughly, using strong visuals, and refining delivery techniques, entrepreneurs can build credibility and establish meaningful connections with investors.

Successful pitching is not just about securing funding, it is about aligning vision, impact, and long-term value creation.

SPOROS PLATFORM

pitch to us

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THE AGE OF ALCHEMY: TEN TECHNOLOGIES, TEN YEARS, ONE PLANET TO SAVE

Keynote address by Profesor Dr. Wayne Visser

In the main keynote of the conference, Professor Dr. Wayne Visser invited participants to look ahead — not with vague optimism, but with a clear-eyed understanding of how rapidly transformation can happen when technology, science, policy, and human imagination begin to move together.

His keynote, titled ***"The Age of Alchemy: Ten Technologies, Ten Years, One Planet to Save,"*** began with an image from the past. Alchemy, he explained, was once a serious quest: the attempt to transform base metals into gold. The alchemists failed because they ignored the science. Today, he suggested, humanity faces a different kind of transformation. We are living through another industrial revolution, one with enormous potential — but it too will fail if it ignores science.

The science is clear: the planet is under pressure. Visser referred to the concept of planetary boundaries, noting that several have already been exceeded, including those linked to climate change, pollution, biodiversity loss, land-system change, and the overload of nitrogen and phosphorus in the environment. The challenge, then, is not simply to innovate. It is to innovate within the limits of the living systems that make human life possible.
For Visser, this is where a new kind of alchemy becomes necessary: not the fantasy of turning metal into gold, but the practical, urgent transformation of energy, food, materials, industry, data, and decision-making.

How Fast Change Can Happen

To show how quickly systems can shift, Visser used a striking historical comparison: New York City's Fifth Avenue in 1900, filled almost entirely with horse-drawn carriages, and the same street just 13 years later, filled almost entirely with motor vehicles. One system did not slowly and politely make room for the other. At a certain point, change accelerated.

This pattern, he explained, is typical of technological transformation. New technologies often seem slow at first. Then they reach a tipping point. Adoption accelerates. Costs fall. Performance improves. Public acceptance grows. Investment increases. Government support follows. At the same time, the old system begins to lose strength. Its costs rise, its social licence weakens, and it can enter a cycle of decline.

This "X-curve" of change — one system rising while another falls — framed the rest of the keynote. Visser argued that many of the technologies needed for a sustainable future are already on this curve. Some are still early. Others are accelerating quickly. Together, they offer a realistic possibility of deep transformation within the next decade.

1. Solar Energy

The first technology was solar energy. Visser highlighted the dramatic fall in the cost of solar power over the past decade, alongside continuing improvements in performance and efficiency. The result is exponential growth.

But the importance of solar is not only about large-scale infrastructure. Visser also shared the example of a “solar mama” in Borneo: an illiterate grandmother from a rural village who was trained as a solar engineer and returned home to install and maintain solar lighting for around 100 households. For him, this was transformation in its fullest sense — technological, social, economic, and human.

He also challenged the idea that solar must compete with agriculture. Through agrivoltaics, solar panels and farming can share the same land, creating benefits for both energy generation and agricultural production.

2. Wind Energy

Wind energy shows a similar pattern. Costs have fallen, especially in offshore wind, while turbine size and performance have increased. Visser pointed to the example of Ørsted, the Danish company that moved from fossil fuels to become a leader in offshore wind within roughly a decade.

This example mattered because it challenged a common assumption: that traditional energy companies cannot change. Visser’s message was that transformation is possible when organisations make strategic decisions and follow them through.

Wind energy can also support community resilience. When communities invest in their own wind turbines, they can reduce dependence on volatile fossil fuel prices and gain more control over their energy future.

3. Battery Storage

The third technology was battery storage. As renewable energy grows, storage becomes essential. Batteries help balance supply and demand, making solar and wind more reliable and allowing electricity systems to become more resilient.

Visser described the rapid fall in battery costs and the rise of large-scale battery storage systems that can now function almost like power plants. He also noted the role of major companies in the global battery market, particularly in China, where innovation and scale are moving quickly.

Battery storage, in his view, is not a separate story from renewable energy. It is one of the technologies that allows the whole system to shift.

4. Electric Vehicles

Electric vehicles were presented as another major transition already underway. Their growth is being accelerated by policy decisions, including bans or phase-outs of internal combustion engines in countries and regions around the world.

Visser pointed out that once a technology reaches around 5% adoption, it often begins to enter the steep part of the growth curve. Electric vehicles are already beyond that point in many markets.

He also used Kosovo as a regional example, noting the growth of electric taxis and the spread of different EV brands. His point was simple: if electric mobility can grow in smaller and developing economies, it can grow almost anywhere.

The question of battery recycling was also addressed. Batteries contain valuable materials, and companies are already developing circular systems to recover and reuse them. This connects electric mobility not only to decarbonisation, but also to the circular economy.

5. Green Hydrogen and Green Ammonia

While renewable electricity can transform power systems, some industries are harder to decarbonise. Steel, cement, chemicals, and other heavy industries need very high temperatures and currently produce a large share of global emissions.

For these sectors, Visser presented green hydrogen as a crucial technology. Hydrogen itself is not new, but when it is produced using renewable energy, it can become a clean fuel for industrial processes.

He also spoke about green ammonia, which can be produced from hydrogen and transported more easily as a liquid. Green ammonia has potential both in agriculture, especially for fertilisers, and in future fuel systems for shipping and aviation.

6. Cellular Agriculture

The keynote then moved into food and agriculture, where Visser drew attention to the environmental impact of livestock, particularly on biodiversity and climate. He described agriculture as one of the biggest drivers of biodiversity loss, and livestock as a major contributor.

Cellular agriculture offers one possible response. Sometimes called lab-grown meat, this technology grows real meat from cells without raising and slaughtering animals. Although still at an early stage, it has the potential to reduce the land, water, and emissions impacts associated with conventional livestock production.

For readers unfamiliar with the field, the key point is not that everyone will immediately change what they eat. It is that food production itself may be redesigned, using science to reduce pressure on the planet.

7. Precision Fermentation and Microbial Agriculture

Related to cellular agriculture is precision fermentation. Fermentation is ancient — used for thousands of years in foods and drinks — but new techniques allow microorganisms to produce specific ingredients.

Visser gave examples from food and healthcare, including the way precision fermentation has long been used to produce insulin. In food, it can help create ingredients that give plant-based products familiar taste, texture, and nutritional qualities.

He also discussed microbial agriculture. Companies are developing microbes that help plants access nitrogen from the air, reducing or even replacing the need for chemical fertilisers. This could have major implications for agriculture, water quality, soil health, and climate impact.

8. Biomaterials

The eighth technology area was biomaterials. Here, Visser focused on materials that are bio-based, biodegradable, compostable, or even created from carbon captured from the atmosphere.

He mentioned companies producing bioplastics, carbon-based materials for products such as shoes, and construction materials made at room temperature using microbes. The contrast was powerful: many traditional industrial materials require high heat and heavy emissions, while nature creates strong and useful materials under ordinary conditions.

Biomaterials therefore represent another kind of alchemy: learning from living systems to make materials that do not persist as pollution.

9. Earth Information Systems

The ninth transformation is happening through data. Satellites, drones, sensors, and environmental DNA are giving humanity new ways to understand what is happening across ecosystems.

Visser described satellite systems that can image the Earth daily, making it possible to detect deforestation, illegal logging, land-use change, fires, and other environmental threats much faster than before. He also spoke about drone planting for reforestation, including the Green Wings project in Kosovo.

At the micro level, environmental DNA can reveal what species are present in a river, forest, or ecosystem from tiny traces in water or air. This means biodiversity can be measured and monitored in ways that were previously impossible.

In short, we are becoming better able to see the planet — and therefore better able to respond.

10. Artificial Intelligence and Robotics

The final technology area was artificial intelligence and robotics. Visser did not present AI as an uncomplicated solution. He acknowledged its risks, including high water and electricity use, data-centre impacts, and job disruption.

But he also argued that AI has an important positive role to play. It can support material discovery, optimise wind energy, improve grid management, sort waste with high accuracy, and enable precision agriculture. In farming, for example, AI-powered machinery can identify individual plants and apply exactly the right amount of herbicide or fertiliser, reducing chemical use dramatically.

The message was not that AI will save the world on its own. It was that AI, used responsibly, can become an accelerator for many other sustainability solutions.

Convergence: When Technologies Strengthen One Another

A central insight of the keynote was that these technologies do not act alone. They converge.

Electric vehicles depend on better batteries. Solar and wind become more powerful when paired with storage. Green hydrogen becomes more viable when renewable electricity becomes cheaper. Alternative proteins can reduce pressure on land and biodiversity. AI can support better energy, waste, agriculture, and materials systems.

This creates cascading tipping points. A breakthrough in one field can trigger progress in another. A policy shift in transport can affect batteries, electricity grids, renewable energy, heating, and industrial systems. A shift in green ammonia can support agriculture, hydrogen, shipping, and aviation.

This is why Visser's keynote was ultimately hopeful. Not because the challenges are small, but because the solutions are beginning to connect.

Beyond Facts: Reaching the Whole Person

Visser closed with a reflection that connected directly to the spirit of the conference. After more than 30 years working in sustainability, he said he had learned that people cannot be shocked, shamed, guilted, scared, or even rationalised into change. Facts are essential, but they are not enough.

Real transformation also requires imagination, creativity, courage, and heart.

To underline this, he ended not with another graph or statistic, but with a poem — a call to redesign, reassess, redefine, and regenerate. It was a reminder that sustainable transformation is not only technical. It is also cultural, emotional, and deeply human.

The keynote offered a powerful frame for the conference as a whole. The future will not be shaped by one technology, one policy, one business model, or one sector acting alone. It will be shaped by convergence: between science and imagination, innovation and responsibility, knowledge and action.

And perhaps that is the new alchemy: learning how to transform systems before those systems transform the conditions of life beyond repair.

SUSTAINABLE LEADERSHIP VIA PERSONAL, TEAM, AND ORGANIZATIONAL EXCELLENCE

AUTHORS, AFFILIATIONS
Rhonda L. Bowen, Anke Jordaan, P5 bells

INTRODUCTION

The modern business landscape requires a transition toward sustainable, circular, and resilient systems, demanding excellence in leadership and professional development. This poster presents a comprehensive suite of three synchronous Vocational Education and Training (VET) courses hosted on the Catalyst platform, designed to support this green transition through "Catalyst for Change". These courses—"Personal and Organizational Values," "Sustainable Professional Growth," and "Beyond Boundaries: Navigating Team Dynamics and Development"—collectively address the core pillars of sustainable business transformation.

The framework begins at the individual level, utilizing self-assessment tools to align personal values with organizational missions. It extends into professional growth by cultivating essential abilities in creativity, expression, and productivity, ensuring learners remain adaptable in a dynamic workplace. Finally, it addresses the collective level through team dynamics, fostering synergy and responsible communication to minimize conflict and enhance collaborative problem-solving. By integrating individual coaching and group dynamics, these courses move beyond theoretical knowledge to facilitate lasting personal and professional transformation. This integrated approach serves as a best practice for VET excellence, empowering individuals and organizations to become agents of positive change within the wider community.

OBJECTIVE

The primary objective of this educational framework is to provide leaders and practitioners with the tools needed for long-term success and sustainable business transformation. In today's dynamic workplace, a lack of alignment between individual values and organizational goals often hinders productivity and innovation.
Key objectives include:

- Fostering Synergy: Enabling participants to recognize the significance of personal and organizational alignment.
- Developing Resilience: Building self-confidence and adaptable skill sets to navigate professional uncertainty.
- Enhancing Collaboration: Training teams to leverage diverse perspectives and practice responsible reactivity to improve outcomes.
- Driving Innovation: Applying critical thinking and creative problem-solving to address complex challenges in the circular economy.

METHODOLOGY

The courses employ a synchronous, multi-modal learning approach designed for maximum engagement and practical application.
Core Methodology Steps:

- Self-Assessment: Use of profile questionnaires and definitive tools to identify individual styles and values.
- Experiential Learning: Engaging in role plays and case studies to practice real-world scenarios.
- Reflective Practice: Implementing individual work and self-reflection techniques to uncover underlying behaviors.
- Coaching Cycles: Integrating one-on-one individual coaching for personalized guidance and group coaching for peer learning.
- Structured Content: Modular delivery ranging from 4 to 8 weeks, covering beliefs, abilities, and team synergy.

RESULTS

The implementation of these courses results in measurable growth across several professional domains.

- Improved Expression: Participants report enhanced verbal and written communication and the ability to use storytelling to inspire stakeholders.
- Increased Productivity: Learners master time management and performance optimization, ensuring they excel in modern professional environments.
- Lasting Transformation: Through coaching, participants translate insights into actionable strategies, creating new habits that bolster well-being and productivity.
- Enhanced Team Dynamics: Teams achieve higher synergy by understanding diverse member roles and embracing inclusion, leading to more effective conflict resolution.
- Organizational Alignment: Participants become advocates for shared values, leading to a more cohesive and mission-driven work environment.

CONCLUSION

This integrated VET framework serves as a powerful "Catalyst for Change" by bridging the gap between individual values and sustainable business practices. By focusing on VET excellence, the program supports the transition toward more resilient and circular systems. The results demonstrate that when individuals are empowered with self-awareness and teams are trained in synergy, the entire organization benefits from enhanced collaboration and innovation. These practices are not only relevant for immediate professional growth but also have a lasting impact on the wider community by fostering responsible decision-making and sustainable leadership. Ultimately, this tri-pillar approach equips the workforce to navigate the complexities of the green transition with confidence and excellence.

REFERENCES & ACKNOWLEDGEMENTS

- "Catalyst for Change: Excellence in Sustainable Leadership & Business" Conference Guidelines.
- Rhonda L. Bowen, P5 bells Course Syllabi: Personal and Organizational Values, Sustainable Professional Growth, and Beyond Boundaries: Navigating Team Dynamics and Development

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HACKATHON
THE GREEN IDEA

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INTRODUCTION

Small Business Chamber in cooperation with the Catalyst project organizes a Hackathon for sustainable economic, social, management and technical innovations - "The GREEN IDEA"; focused on developing innovative solutions through teamwork on a project and solving problems in the given 5 areas:

- Smart Green Skills
- Sustainable Energy in Agriculture
- Bio-economy production
- Green Energy Community
- Smart ESG Solutions

Teams will work on real problems set by real clients with the support of mentors in a time frame that is challenging for all involved participants of the hackathon.
The goal is to create solutions for specific challenges in a real environment, while being economically efficient in order to plan their financing and implementation. At the same time, the goal of building skills and competencies of team members adapted to the needs of the modern labor market for green skills and competencies will be achieved.

OBJECTIVE

The goal is to create solutions for specific challenges in a real environment, while being economically efficient in terms of planning their financing and implementation. At the same time, the goal of building skills and competencies of team members adapted to the needs of the modern labor market for green skills and competencies will be achieved.The project solution will be presented to clients and financial organizations who will assess the financing of the investment that will contribute to increased:- sustainability- application of green and socially responsible practices- cooperation with the community with measurable impact- productivity and profitof companies/organizations.

METHODOLOGY

The registered teams, companies/organizations will be invited to a matching event in Skopje where compatible supply and demand will be connected and the hackathon mentors will be introduced.A short training will be held at the event on:- Project task development to support the companies/organizations to prepare a detailed and specified project task for the problem the teams will work on- Presentation and public speaking skills to support the team members to present the solutions.
The clients (companies/organizations) that will manage to align with the teams' capacities to solve their problem at the matching event in the next 1 month will prepare a project task on which the team will work for the next 2 months. The hackathon mentors will advise the clients in preparing the project task. The clients will provide funding for the working hours of the team members and mentors for preparing the project task and the project solution. At the closing event, the project solutions will be presented to clients and financial organizations/investors.

RESULTS

With the GREEN Idea hackathon, several ideas were transformed into concepts for a smart bin for organic waste, a vertical green garden, a dashboard for an ESG survey of employees, digitization of samples taken for laboratory testing in the food industry.

- **Smart bin for organic waste concept is applied at EDIH INNOFEIT and developed in the CarbLog Bin prototype.**
- **The dashboard for the ESG survey of employees is part of the Erasmus + tool application for the promotion of green skills and construction workers.**
- **The vertical green garden is being piloted in a project supported by the German Foundation DBU.**

CONCLUSION

The GREEN Idea hackathon contributed to several ideas being turned into prototypes and included in project applications for co-financing their development and commercialization.The hackathon contributed to:

- **team members gaining new skills, team spirit and passion for engineering technology into products/services with economic, social and environmental impact for the client and the community.**
- **teams starting to think like a start-up company**
- **identifying local communities interested in participating and sharing specific challenges in local economic development they face**
- **recognizing and rewarding outstanding projects by providing support in refining the winning ideas, connecting with relevant resources, potential investors or financial assistance in project implementation**

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COMPETENCIES FOR A SUSTAINABLE FUTURE

Keynote address by Professor Dr. Phoebe Koundouri

In her keynote address, Professor Dr. Phoebe Koundouri focused on one of the central questions behind the CATALYST project: what kinds of knowledge, skills, and capacities are needed to create sustainable systems and sustainable business models?

Drawing on more than 30 years of work in innovative systems transformation, she spoke about the need to rethink the relationship between nature, the economy, and society. For sustainable development to become reality, she argued, stakeholders must move beyond narrow perspectives and work across disciplines, sectors, and systems.

This is especially important when looking at the Sustainable Development Goals and the European Green Deal. These frameworks are ambitious, but they are also technically complex. They require scientists, policymakers, financiers, businesses, civil society, and education providers to understand not only their own fields, but also how different systems connect.

A major challenge, according to Koundouri, is that the capacity to implement this transformation is still too low. She referred to research showing that the European labour market currently has only part of the skills and professional capacity needed to implement the laws and regulations connected to the European Green Deal. This creates an urgent need for major investment in training, upskilling, and reskilling.

This is where the work of CATALYST becomes especially relevant. The project's focus on sustainable systems, business transformation, vocational excellence, and continuous learning responds directly to the skills gap that Koundouri described. It is not enough to understand sustainability as an abstract goal. People and organisations need the practical competencies to design, implement, and lead change.

Her message was clear: the transition to a sustainable and flourishing future depends on capacity-building. Science matters. Stakeholder knowledge matters. Experience matters. But these must be brought together through continuous education, interdisciplinary cooperation, and a shared commitment to systems transformation.

In this sense, competencies for a sustainable future are not only technical skills. They include the ability to collaborate, connect knowledge across sectors, understand complexity, and turn ambition into practical action.

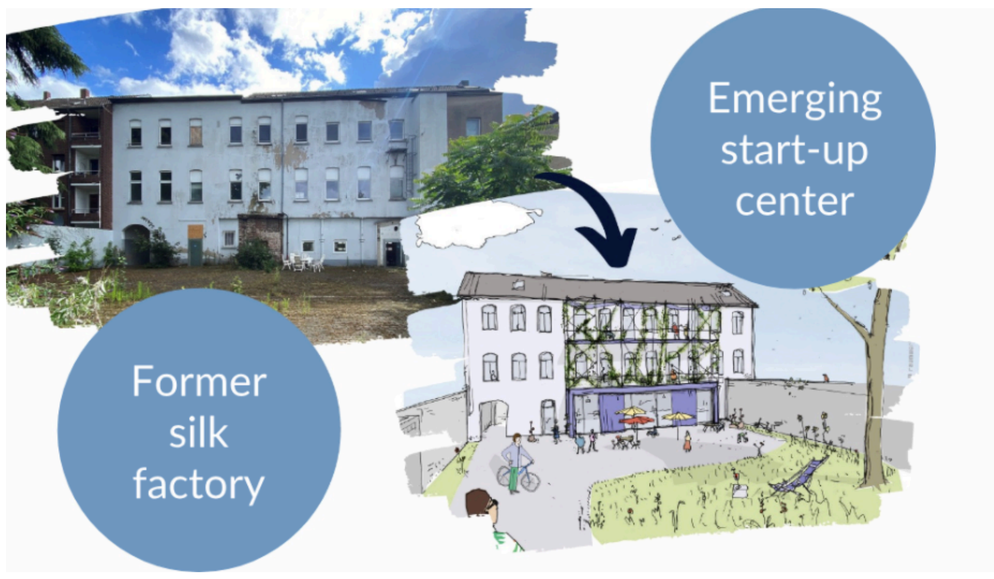
CIRCULAR RENTAL AGREEMENT START-UP CENTRE

AILEEN ESTRADA, CSCP
Marianne Magnus-Melgar, Carla Schmid, CSCP
Monika Zurnatzis, Krefeld Business

INTRODUCTION

This Business Pilot Project explores how circular economy principles can be integrated into a future start-up centre in Krefeld, located in a revitalised former silk factory.

A team of six international students, together with CSCP and Krefeld Business, developed a circular rental model and an implementation roadmap to embed circular practices into everyday operations.



OBJECTIVE

- Translate circular economy concepts into practical application
- Design a rental model that encourages tenant participation
- Create value for both the environment and the community

AI Generated

METHODOLOGY

The project followed a Double Diamond service design approach, structured in four main phases:

Discover & Define
- Research on circular spaces and start-up hubs
- Stakeholder mapping and expert interviews

Develop & Deliver
- Prototype Circular Rental Agreement
- Implementation Roadmap

The project resulted in two main outputs:

1. Prototype Circular Rental Agreement
- Shared use of space and infrastructure
- Integration of repair and reuse activities
- Knowledge exchange between tenants
- Commitment-and-benefit framework to encourage participation

2. Implementation Roadmap
- Improving space use efficiency
- Embedding circular practices into daily routines
- Creating incentives for participation
- Establishing feedback mechanisms for continuous learning

Internal Shared Room Use

Engagement in the Visibility Board

Shared Use of Community Space

Sharing more than just space

AI Generated

The project demonstrates how circular economy concepts can be translated into practical solutions through collaboration between education, business, and local actors.

The Prototype Circular Rental Agreement and Implementation Roadmap provide a foundation for future testing and refinement. Once the centre opens in 2027, the model can be further developed together with tenants.

The results highlight the importance of community-driven approaches, flexible structures, and practical incentives in making circularity actionable in real-world environments.

REFERENCES & ACKNOWLEDGEMENTS

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We also acknowledge the support of CSCP, as well as all interview partners and stakeholders who shared their insights and expertise during the process.

COLLABORATING CENTRE ON SUSTAINABLE CONSUMPTION AND PRODUCTION

KREFELD BUSINESS
Aus denkbar wird möglich.

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THE ROLE OF MARKETING MEDIA, EVENTS, AND PUBLIC RELATIONS IN BUSINESS TRANSFORMATION: FROM LINEAR TO SUSTAINABLE AND CIRCULAR ECONOMY

AUTHORS

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INTRODUCTION

The global shift toward sustainable development has placed increasing pressure on businesses to fundamentally rethink their operational models. The linear economy - built on a "take, make, dispose" logic - is no longer viable in the face of resource scarcity, climate change, and growing regulatory demands. The circular economy offers an alternative paradigm grounded in resource efficiency, waste elimination, and value regeneration across product life-cycles. Marketing media, events, and PR emerge as critical enablers - actively building the competencies, partnerships, and ecosystems that make circular transition possible.

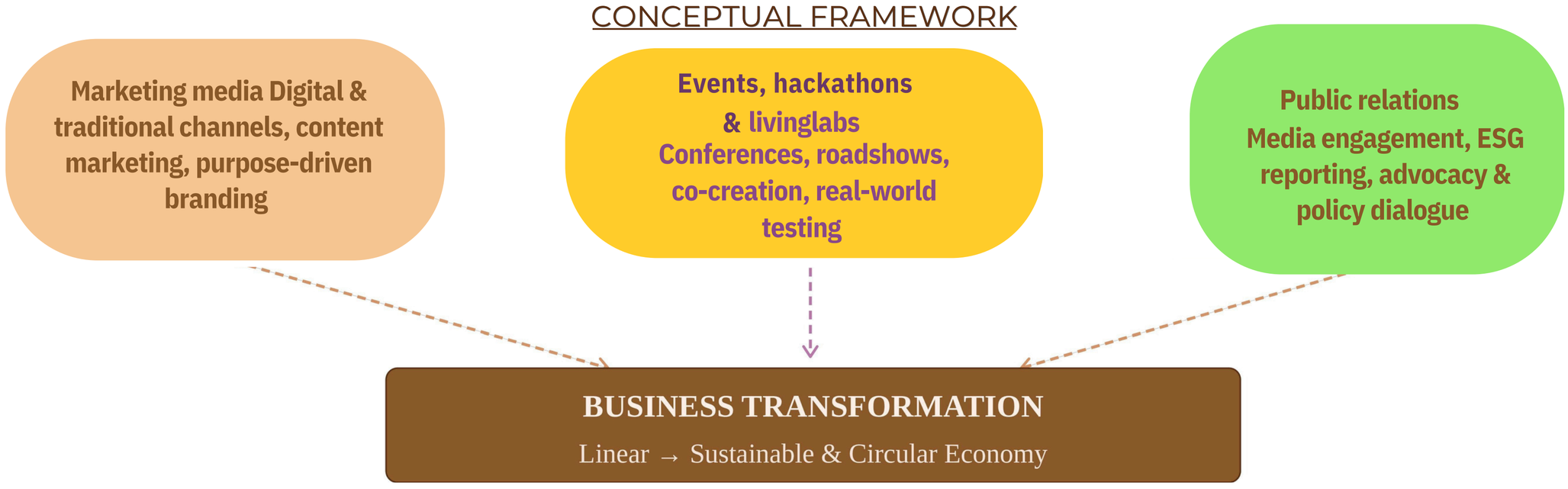
OBJECTIVE

This paper examines the role of strategic marketing communication - including digital and traditional media, industry events, hackathons, living labs, and PR - in facilitating the transformation of a company toward a sustainable and circular business model. These tools are argued to be primary drivers of organisational change and market repositioning.

METHODOLOGY

The research adopts a mixed conceptual and empirical approach, synthesising literature and examining practices of a company in transformation. The study maps strategies across four dimensions: media channels, event-based co-creation, living lab testing, and PR engagement. Findings are interpreted through the lens of ESG (Environmental, Social, and Governance) principles.

CONCEPTUAL FRAMEWORK



RESULTS

1.Marketing media as a strategic positioning tool

Strategic use of digital and traditional channels increases the visibility and credibility of circular practices. Consistent communication of the sustainability journey built stronger stakeholder trust and measurable market differentiation.

2. Events, hackathonsand living labs as innovation ecosystems

Events mobilise stakeholders. Hackathons generate concrete circular solutions. Living labs enable real-world co-development and validation. Together they form a continuum: awareness - co-creation - implementation and scaling.

3. PR as alegitimacy and policyengagement tool

Proactive media engagement and ESG reporting counter greenwashing perceptions and position the company as a credible agent of change, while facilitating dialogue with policymakers and civil society.

4. Integrated communication as a transformation driver

The most impactful results occur where media, events, hackathons, living labs, and PR are deployed as a coherent, integrated strategy aligned with the company's broader sustainability vision and business model transformation.

CONCLUSION

Marketing media, events, hackathons, living labs, and PR are strategic levers that define the pace and depth of a company's transformation toward a circular economy. When deployed with intentionality and aligned with genuine organisational change, they build compentencess and active collaboration

Businesses that invest in integrated communication strategies are better positioned to navigate circular transition - achieving operational improvements, stronger competitive positioning, and long-term resilience. Future research should explore measurement frameworks across different industries and contexts.

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FROM AMBITION TO ACTION: LEADERSHIP, PARTNERSHIP, AND SUSTAINABLE TRANSFORMATION

The first panel discussion explored how sustainable transformation can move from policy ambition and project results into practical action. The discussion highlighted three important themes: the role of government, the need for transformational leadership, and the value of collaboration between business and education.

The discussion opened with the recognition that the green transition is not only an environmental issue, but also a national development priority. It was described as an important field for the future of the country and as part of the reform agenda connected to the European Union. This placed the conversation within a wider policy context: sustainable systems and business transformation are not separate from economic development, public reform, or civil society engagement. They are increasingly central to all three.

A key question in the panel focused on transformational leadership in small and medium-sized enterprises. In response, Professor Dr. Wayne Visser introduced a practical framework for understanding change. He explained that resistance to change can only be overcome when three things are strong enough: dissatisfaction with the current situation, a compelling vision for the future, and clear first concrete steps.

To illustrate this, he shared the example of sustainability leadership work in Kosovo. In one project focused on deforestation, the first step was to gather credible satellite data showing that the problem was real. This helped challenge the assumption that the current situation was acceptable. The second step was to offer a positive vision, not only of reducing harm, but of regeneration — restoring nature and bringing ecosystems back to life. The third step was practical action: using drone technology for reforestation, including learning from partners with experience in this field.

The example showed that transformational leadership is not only about inspiring words. It requires evidence, imagination, practical tools, and persistence. When asked how long it takes to persuade people to change, the answer was simple: it is ongoing. Change is hard work, and leadership must continue beyond the first campaign, project, or presentation.

5

The panel also considered which collaborations between business and education have produced strong sustainable results. Several examples were shared, including work between the University of Cambridge, business leaders, and government on climate change; initiatives with companies around circular economy and well-being economy commitments; and newer work bringing together faculties, business schools, law schools, and companies to explore regenerative futures.

From these examples, three lessons emerged. First, educational institutions can create a neutral space where business, government, and other actors can meet without one party dominating the conversation. This kind of space makes it easier to co-create solutions.

Second, collaboration works better when it starts with a clear and specific proposal. Inviting people to solve a broad issue such as “circular economy” can be too vague. Partners are more likely to engage when research has already been done and a concrete opportunity for action is placed on the table.

Third, successful collaboration often begins with a small, diverse group. Rather than inviting everyone at once, it can be more effective to bring together five to fifteen organisations from different sectors, develop a strong solution, and then invite others to join. Once a practical idea has momentum, many more organisations may be willing to support it.
Together, the panel contributions reinforced one of the central messages of the conference: sustainable transformation requires more than good intentions. It needs policy direction, credible evidence, leadership, trusted partnerships, and practical first steps that help people believe change is possible.

Advancing Skills Development and Digital Transformation in Portugal

Florinda Matos[1] | Carolina Marques[1] | Nuno Matos[2] | Rui Soares[3]

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Quality of Education in Multinational Projects: The Catalyst Project Case Study

Florinda Matos[1] | Carolina Marques[1] | Nuno Matos[2] | Rui Soares[3]

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[2] ICLab – ICAA – Intellectual Capital Association, Portugal
[3] Centimfe – Technological Center for the Mouldmaking, Special Tooling and Plastic Industries, Portugal

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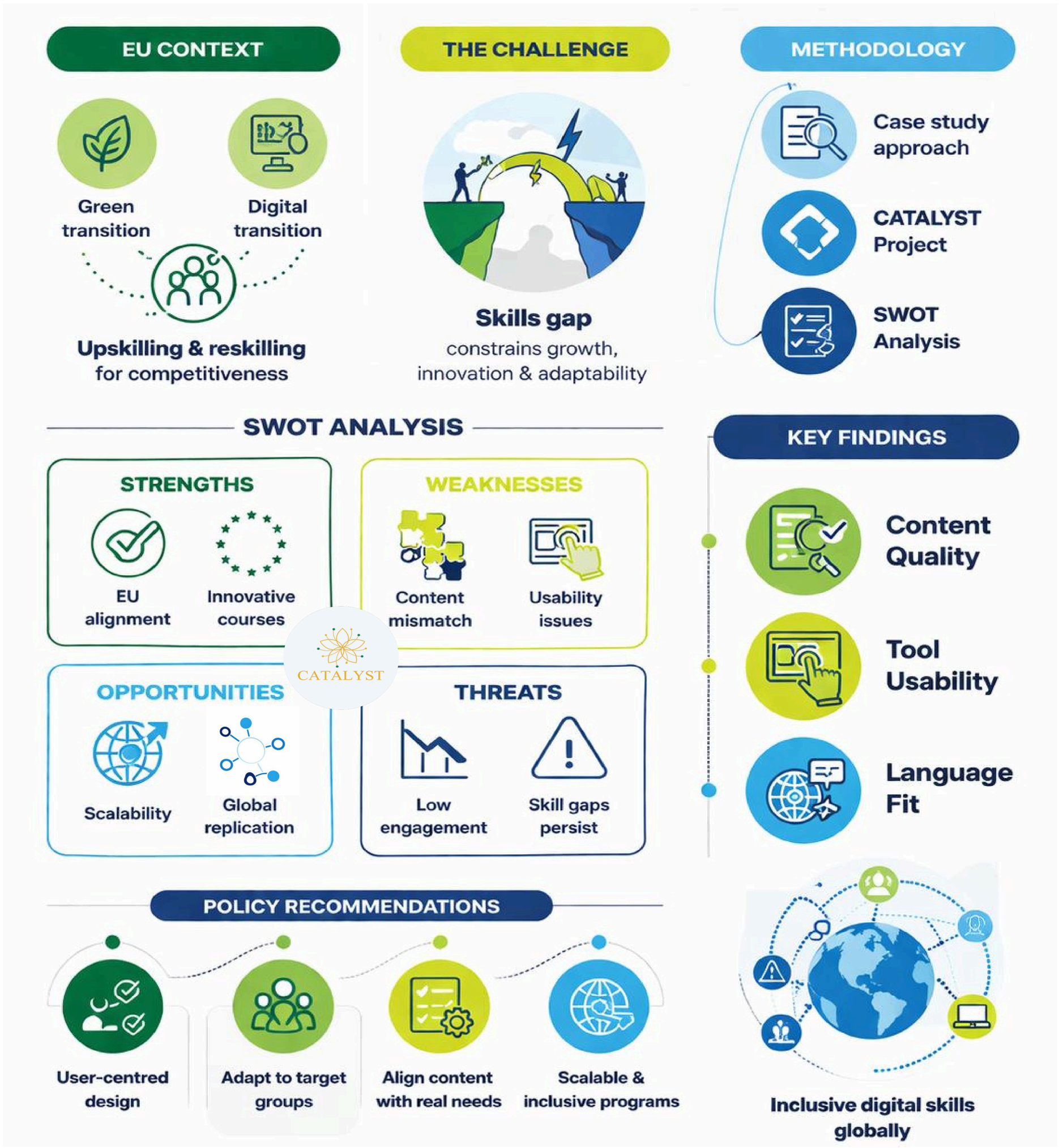

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CO-CREATING SKILLS FOR A CHANGING WORLD

PANEL DISCUSSION ON EDUCATION, BUSINESS, VET, AND SUSTAINABLE TRANSFORMATION

The second panel discussion brought together perspectives from higher education, vocational education and training, business cooperation, and the CATALYST project itself. The conversation focused on one of the most urgent questions facing education and industry today: how can people, organisations, and institutions prepare for a labour market that is changing faster than ever?

The panel included Professor ladimir Vitanov, Vice Dean for Education at the Faculty of Civil Engineering in Skopje; Professor Dr. Angelina Taneva-Veshoska, coordinator of the CATALYST project; and Dian Chuhovski from the German-Macedonian Chamber of Commerce, who works with the dual system of vocational training. Together, they explored how universities, VET providers, companies, and policy actors can work together to prepare learners not only for today's professions, but for a future in which many jobs will change or disappear.

A central theme was the need for lifelong learning. Professor Vitanov explained that civil engineering and construction may change more slowly than some other sectors, but digitalisation and innovation are still reshaping the profession. Universities therefore need to prepare students differently. A diploma can no longer be seen as the end of education. It is one stage in a much longer professional journey.

At the Faculty of Civil Engineering, this has already led to changes. Study programmes have been shortened, allowing students to enter the labour market sooner and continue learning while working. New subjects and courses are being introduced, and students are encouraged from the beginning to expect ongoing education, adaptation, and upskilling throughout their careers. This represents not only a curriculum change, but also a mindset change for students, teachers, and institutions.

The discussion then turned to dual vocational education and training. Dian Chuhovski explained that the German-Macedonian Chamber of Commerce has supported the development of dual VET in North Macedonia as a way to bridge the gap between theory and practice. The model is based on close cooperation between schools and companies, with a strong practical training component inside the workplace.

He emphasised that the German model cannot simply be copied and pasted into another country. Instead, key elements must be adapted to local needs. In North Macedonia, the process began by asking companies what skills and professions were missing in the labour market. This led to pilot programmes in mechatronics and industrial mechanics, developed with adapted curricula, company participation, trained workplace mentors, and quality assurance based on German standards.

The results show both progress and challenge. The programme began with 35 students and four companies. It has now grown to around 130 new students each year in cooperation with 16 companies. At the same time, the discussion made clear that quality standards matter. Not every student passes the additional examinations based on German standards, which shows that aligning national education systems with international expectations requires serious and ongoing work.

Professor Dr. Taneva-Veshoska connected this discussion to the COIN model and the CATALYST experience. She explained that the model has been developed and tested over many years in different settings, including cooperation between business organisations, universities, research and development alliances, and the CATALYST Centre itself. In CATALYST, the model shaped not only the centre structure, but also the educational programme and the business pilot projects.

The business pilot projects were presented as a practical example of co-creation. Real challenges from the business sector were brought into an educational setting, where students, teachers, and companies could work together on possible solutions. The value of this approach is that learning does not stay in the classroom. Insights from real organisations return to education, helping programmes become more relevant and applied.

The panel also addressed the different speeds of academia and industry. Companies often need fast answers, while universities tend to work more slowly and thoroughly. Prof. Vitanov acknowledged this tension and described how academic institutions can respond by offering quicker initial support while also continuing deeper research. Universities can also provide additional courses for professionals who are already working and need targeted upskilling for specific roles or challenges.

A recurring point was that cooperation must move in both directions. Companies benefit from better-prepared graduates, but they also need to contribute to the education process. This can include giving feedback on curricula, offering real-life case studies, providing guest lecturers, supporting workplace training, investing in school equipment, and helping teachers stay connected to current technologies.

The panel then opened into a wider conversation with the audience, and this became one of the most valuable parts of the session. Participants asked what would happen after the formal end of the CATALYST project. Professor Dr. Taneva-Veshoska responded that the work would not simply stop. The project's results will be documented in sustainability reports, the platform and learning resources will remain available for at least five years, and the work will continue through new activities such as the Western Balkans Circular Economy Hub. She also highlighted the need to involve public institutions more strongly, alongside businesses, teachers, students, and universities.

Several audience members added reflections from their own roles in the project. One partner from Greece emphasised that the CATALYST network itself is one of the project's most important results. The relationships built between partners across countries can support future collaboration, especially in the Balkans, where shared challenges and common opportunities create strong reasons to continue working together. She also invited participants to use the 70 online courses and to provide feedback so the platform can remain useful and up to date.

Another contribution came from the project's external evaluator, who praised the high level of commitment and motivation among partners throughout the project. Her comment opened a deeper question: what do the participating countries have in common as they face the challenge of transforming themselves and their societies?

Audience members responded from different perspectives. One participant noted that language barriers can affect how people use the courses and that this has implications for future policy and support. A student participant spoke personally about the value of the programme, saying it had provided new skills, European perspectives, networking opportunities, and a shift in mindset. At the same time, she reminded the room that knowledge has little value if it is not implemented. She also connected sustainability to lifestyle choices, overconsumption, and the need to balance speed with educational quality.

Another partner raised a challenging but important concern: how can the real impact of the project be assessed after the funding period ends? This question shifted the conversation from project completion to long-term responsibility. Creating courses, platforms, and networks is important, but the deeper question is whether they continue to influence organisations, learners, and society.

A further contribution underlined that the most important CATALYST outcome may not be the educational material alone, but the structures created around it: the centres, the network, the cooperation mechanisms, and the sustainability plans. In a rapidly changing VET environment, content will need to evolve. Sustainable structures make that evolution possible.

The final audience reflection brought the discussion back to intellectual and relational capital. One participant noted that the relationships created through CATALYST may produce results that are not immediately visible. Some impacts can only be seen years later, as people apply what they have learned, build on the networks formed, and plant "seeds" for future change.

The session closed with a question to the audience: if an organisation had €10,000 to invest in education, where should it go — training existing employees, partnering with a VET school, supporting dual education, or sponsoring student scholarships? The question captured the spirit of the panel. There is no single path to sustainable transformation. Different organisations may need different entry points. But all of them require investment in people.

The panel's message was clear: education, business, and society cannot prepare for the future separately. They must work together, learn together, and adapt together. Sustainable transformation depends not only on new technologies or policies, but on people who are ready to keep learning — and institutions that are willing to co-create the conditions for that learning to continue.

Catalysing Business Transformation:

Leading Sustainable Development via Research Collaboration and Course Development

Lydia Papadaki, Ebun Akinsete, Panagiota Koltsida, Angelina Taneva-Veshoska, Ana Tomikj, Eleni Toli, Slavica Trajkovska, Phoebe Koundouri

INTRODUCTION

Abstract. In order to achieve sustainable development, it is imperative to ensure that the competencies of the labour force are in accordance with the changing requirements of the business sector, all the while confronting the worldwide issues delineated in the Sustainable Development Goals (SDGs). This methodological paper proposes and demonstrates a structured framework for translating sustainability-related competency gaps into educational programme design. This paper aims to operationalise the identified missing competencies into actionable training design, linking empirical skill gaps with competency clusters and course categories while aligning them with the SDGs. By effectively incorporating educational programmes with industry demands, this approach fosters a combination of improved workforce preparedness and an environment that promotes sustainability and innovation.

OBJECTIVE

Despite the growing importance of **sustainability competencies** for the green and digital transitions, **a gap persists between conceptual frameworks**—such as GreenComp and EntreComp—**and their practical application**, as they are largely normative and not grounded in empirical labour market needs, while organisations continue to face skill shortages; this study addresses this gap by **developing a structured and replicable framework** that translates empirically identified competency gaps into educational programme design. Specifically, the objective is to:

(i) identify competency gaps across sectors,

(ii) align them with established competency frameworks and the Sustainable Development Goals (SDGs), and

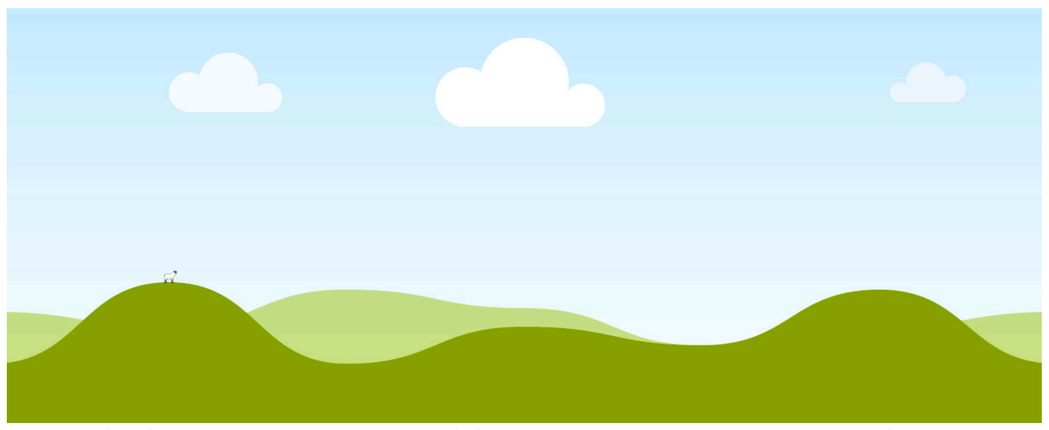
(iii) operationalise them into structured vocational education and training (VET) course portfolios.

METHODOLOGY

This study applies a structured five-step methodology to translate labour market needs into educational programme design.

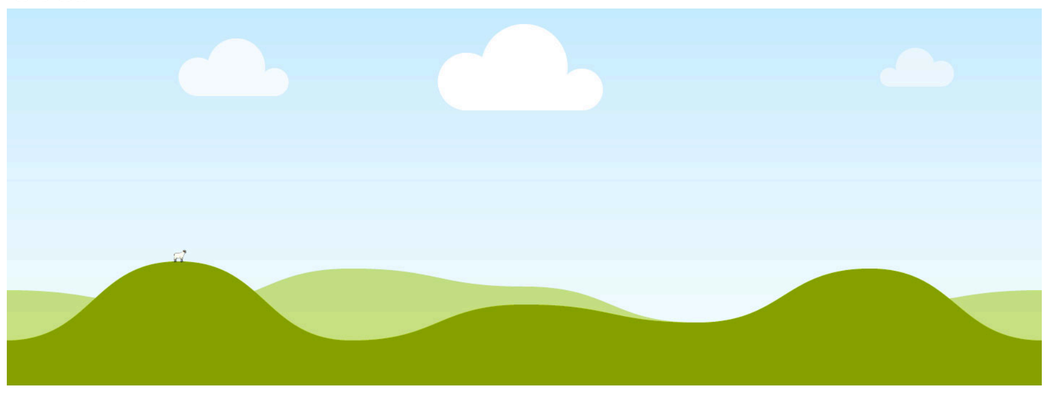
1. Data were collected through **surveys, interviews, and stakeholder roundtables** across multiple countries to identify sustainability-related skill gaps.
2. Competencies were extracted using **thematic coding** of qualitative and quantitative data.
3. Identified competencies were **clustered and prioritised** based on frequency, relevance, and cross-country consistency.
4. The resulting domains were **mapped onto established competency frameworks** (GreenComp, EntreComp, Wiek et al., 2011) and **aligned with the SDGs.**
5. These validated competency clusters were translated into **course architecture**, informing the design of thematic course categories, learning objectives, and curriculum structure.

Table 4 - Integrated Mapping of Thematic Domains to Sustainability Meta-Competencies



Legend: ●●● indicates high alignment, ●● indicates moderate alignment, and ● indicates low alignment between CATALYST course domains and the corresponding sustainability meta-competency dimensions.

Table 5 – Heatmap with the eight thematic domains mapping onto the SDGs



Legend: Colour coding represents the percentage of the SDG covered in each domain. Green denotes high coverage (>60%), yellow denotes moderate coverage (30–60%), light orange denotes low coverage (1–30%), and red denotes no coverage (0%))

RESULTS

Strong demand for sustainability skills:
Across all sectors, more than 60% of respondents reported a need for further education in sustainability-related competencies.

Highest priority competency gaps identified:

- Collaboration and partnerships
- Systems thinking
- Sustainability values
- Behaviour change

Organisational-level gaps (from interviews):

- Lack of sustainability knowledge and expertise
- Weak integration of sustainability into strategy
- Limited understanding of economic/business value
- Insufficient change management and transformation capacity
- Barriers related to funding, regulation, and reporting

Competency clustering outcome:
Identified gaps were grouped into eight thematic domains, including Sustainable Development, Business Transformation, Circular Economy, and Transformation Readiness.

Framework alignment:
The domains show strong alignment with GreenComp, EntreComp, and Wiek et al. (2011) competencies, particularly in strategic, implementation, and entrepreneurship dimensions.

SDG alignment:
High coverage observed for SDGs 3, 4, 8, and 17, while gaps remain in certain environmental and social SDGs.

Educational output:
Development of a structured programme comprising 70 courses across 8 thematic domains, aligned with identified competency gaps.

CONCLUSION

This study presents **a replicable methodological framework** that bridges labour market needs and educational programme design for sustainability transitions. By combining multi-source empirical data with established competency frameworks, the approach enables the systematic identification, prioritisation, and operationalisation of sustainability-related competency gaps into structured course portfolios. The findings highlight strong demand for **systems thinking, strategic integration, and transformation-related skills**, underscoring the need for **implementation-oriented education**. The resulting CATALYST programme illustrates the practical applicability of the framework. While promising, further research is required to evaluate its long-term impact and adaptability across different contexts, supporting more effective upskilling and reskilling for a sustainable and resilient future.

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IECE

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CARRYING THE CATALYST FORWARD

The conference closed with the same spirit that had shaped the day: conversation, connection, and shared possibility. As participants returned to the room after the final break, the atmosphere was still lively — “like a beehive,” full of voices, ideas, and energy. It was a fitting image for a day dedicated to collaboration and transformation.

The closing reflection returned to one of the themes introduced at the beginning of the conference: the movement from knowledge to action. Throughout the day, speakers and participants had explored sustainable systems, business transformation, vocational excellence, technological change, future skills, and the importance of cooperation across sectors. The final message invited everyone to see these discussions not as an ending, but as a starting point.

A quote from Khalil Gibran helped frame this forward-looking view: progress is not simply about improving what already exists, but about moving toward what will be. This captured the purpose of the conference well. The aim was not only to look back at what CATALYST has achieved, but to imagine what its ideas, partnerships, and resources can still become.

Several ideas from the day came together in the closing remarks. Participants had heard about self-sufficiency, such as the story of the “solar mama” bringing solar energy to her village. They had reflected on growth, tipping points, biodiversity, cultural diversity, and the need to recognise when older systems no longer serve the future. They had also explored the role of human ingenuity, relationships, and new technologies, including artificial intelligence, in shaping more sustainable ways of living and working.

Two ideas stood out strongly. The first was that people are the most important resource in sustainable development. The second was that transformation happens through relationships. New systems are not created only through policies, platforms, courses, or technologies. They emerge when people trust one another, learn together, and choose to keep building something beyond the moment of a single event.

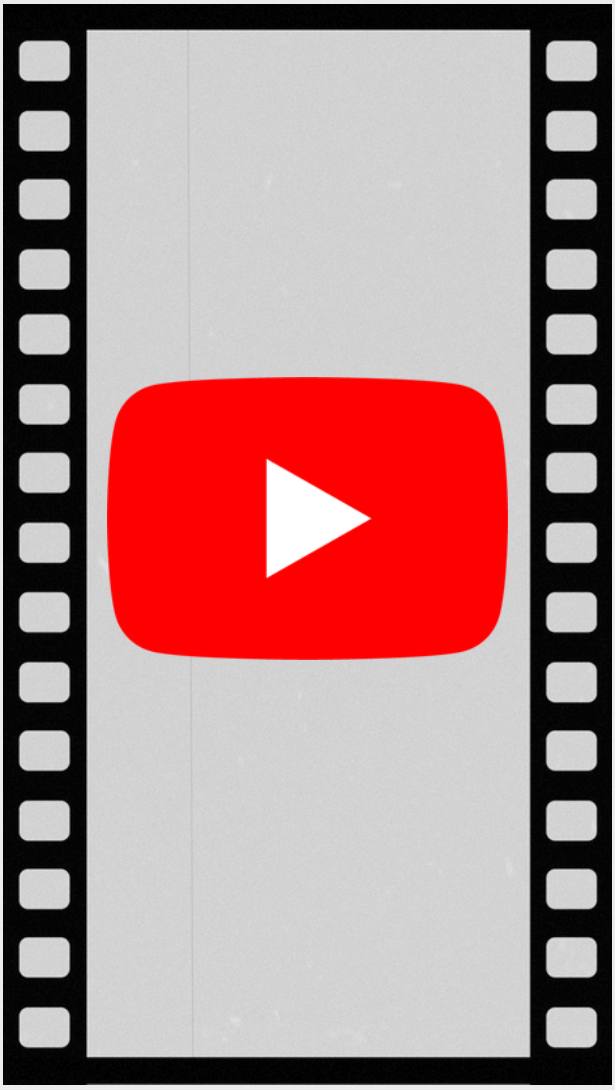
The closing also offered a reflective view of artificial intelligence, not as something that replaces human intelligence, but as something that may challenge humanity to elevate it. In this sense, the future is not only about smarter machines. It is about wiser choices, deeper cooperation, and the courage to act on what we know.

The conference ended with gratitude: for the knowledge shared, the questions asked, the relationships renewed, and the willingness to turn ideas into action. It was also an invitation. The CATALYST project may be reaching the end of one formal chapter, but the work of sustainable transformation continues.

The next opportunities will come through continued use of the CATALYST platform, further cooperation between education and business, new partnerships across countries and sectors, and future conversations that build on the trust created during the project. The day in Skopje showed what is possible when people gather not only to listen, but to co-create.

The catalyst now moves forward through everyone who carries the learning into their organisation, their community, and their next collaboration. The conference may have closed, but the possibilities it opened are still beginning.

WATCH THE VIDEO



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