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TÜRKİYE ULUSAL AJANSI
TURKISH NATIONAL AGENCY

Twin Transformation

"Increasing the Green and Digital Competencies of SME Owners and Employees in the Shoe Manufacturing and Leather Sector"

Project

WP4 AWARENESS MEETINGS/OERs

A.4.1 Sector analysis and determination of 5 sectors



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1. Introduction: The Strategic Imperative of the Twin Transformation

The European Union's future competitiveness, sustainability, and resilience are intrinsically linked to the successful navigation of the concurrent green and digital transitions. This "Twin Transformation," enshrined in landmark policy frameworks such as the **European Green Deal** and the **Digital Decade**, represents a fundamental and necessary shift in production and consumption patterns. The green transition is driven by the urgent need to achieve climate neutrality and environmental sustainability, while the digital transition is fueled by the vast opportunities for innovation and efficiency that new technologies create. Successfully managing these parallel transformations as a single, integrated objective is the cornerstone of a prosperous and fair future for Europe.

Small and Medium-sized Enterprises (SMEs) are the backbone of the European economy. Their ability to adapt and thrive within this new paradigm is essential for the EU to meet its ambitious goals. Indeed, the presence of innovative SMEs is a prerequisite for a competitive market of green-digital solutions. Therefore, their successful transition is critical to the overall success of the EU's strategic agenda.

This report provides a comparative analysis of SME-intensive sectors across four key partner countries: **Italy, Turkey, Portugal, and Spain**. The primary objective is to **identify which industrial sectors are most affected by the Twin Transformation and build the base for targeted support**. By systematically evaluating sectors against a common **set of criteria**, this analysis will inform the development of the Twin Transformation standard trainings on specific **International Standard of Developments (ISO) as part of Work Package 3.**

The analysis begins by outlining the comprehensive methodology used for sector selection and assessment. It then applies this framework to each partner. A final comparative synthesis indicate the 5 sectors where partners will focus.

2. Methodology: Sector Selection and Assessment Framework

A robust, evidence-based methodology is critical for systematically evaluating and comparing diverse industrial sectors across different national contexts. To achieve this, the analysis utilizes a comprehensive assessment matrix composed of eight key criteria designed to measure a sector's alignment with overarching EU policy objectives, its environmental and economic significance, and its structural readiness for digital and green innovation.

The assessment is guided by the eight criteria detailed in the matrix below. Each criterion provides a lens to evaluate a sector's strategic alignment with the Twin Transformation, combining policy relevance with

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operational and market realities, with a particular focus on the upcoming Ecodesign for Sustainable Products Regulation (ESPR) and the implementation of the Digital Product Passport (DPP).

In the assessment framework below each criterion is scored on a 1–5 scale, where 1 indicates a very low alignment or impact and 5 signifies a very high alignment or impact. This quantitative scoring, combined with qualitative analysis, allows for a clear and comparable assessment across different sectors and regions.

		Scale				
Criteria	**Description and guiding question**	**1 - Very Low**	**2 - Low**	**3 - Neutral**	**4 - High**	**5 - Very high**
Strategic Policy Relevance	This criterion assesses a sector's alignment with current and forthcoming EU policy priorities, such as the European Green Deal and Circular Economy Action Plan. It prioritizes sectors that are already regulated or are signaled for future attention. Guiding Question: *Is this sector an explicit priority under the ESPR or other key EU sustainability initiatives, or does it share characteristics with already regulated sectors?*	Not prioritized				Core focus of EU strategies
Environmental and Circular Economy Impact	This measures a sector's environmental footprint, including its greenhouse gas emissions, resource consumption, and waste generation. It also evaluates the sector's potential to benefit from circular economy models like reuse, repair, and recycling. Guiding Question: *Does the sector have a significant environmental impact, and*	Negligible impact				Major environmental footprint and strong circular economy potential

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	does it possess high potential for circularity and waste reduction?					
Degree of Digitalization	This evaluates the current level of digital maturity within the sector's SMEs. It considers the adoption of digital tools, ICT infrastructure, data management capabilities, and Industry 4.0 solutions, which are prerequisites for implementing systems like the DPP. Guiding Question: *What is the existing level of digital adoption and readiness among SMEs in this sector to support data-driven sustainability?*	Low digital adoption				Highly digitalized and technology-ready
Complexity and Opacity of Supply Chains	This criterion focuses on sectors with long, multi-tiered, and often non-transparent supply chains that span multiple countries. These sectors are prime candidates for the DPP, which is designed to enhance traceability and accountability. Guiding Question: *How complex and opaque is the sector's supply chain, making it a key target for DPP-driven transparency?*	Simple local supply chains				Complex, multi-tier international supply chains
Consumer and Market Pressure	This assesses the level of demand from consumers and B2B markets for greater transparency, sustainability, and ethical production. High consumer pressure often accelerates voluntary adoption of sustainable practices and technologies. Guiding Question: *Is the sector facing significant pressure from consumers and the market to demonstrate sustainability and provide product transparency?*	Minimal pressure				High consumer and market demand for sustainability

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Economic Importance and Material Criticality	This evaluates the sector's economic significance in terms of employment and contribution to GDP, as well as its reliance on critical raw materials. Prioritizing these sectors enhances resource security and economic resilience. Guiding Question: *How significant is the sector to the national/regional economy, and is it dependent on critical or scarce raw materials?*	Low economic /material importance				Very large economic contribution and critical materials
Regulatory and Data Readiness	This criterion assesses a sector's preparedness for upcoming regulations and the capacity of its SMEs to comply with digital data collection, management, and sharing requirements mandated by frameworks like the DPP. Guiding Question: *Is the sector already subject to related regulations, and what is its capacity to handle the data requirements of the DPP?*	Poor readiness and infrastructure				Well-prepared with advanced digital systems
Project Partner Reach and Operational Scope	This evaluates the ability of project partners to effectively engage with and support SMEs within a given sector. It considers the partners' existing networks, logistical capabilities, and operational presence in the industry. Guiding Question*: Do project partners have the necessary network and operational capacity to effectively support SMEs in this sector?*	Limited local scope				Broad regional and EU-wide coverage

Table 1 – Twin transformation sector assessment framework

The following sections explain how this framework was applied in partners country to identify its sectorial priorities for the Twin Transformation project.

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3. Italy

In Italy, the industrial fabric of the Marche region is characterized by a high concentration of manufacturing, which accounts for 27.6% of total employment—a figure significantly higher than the Italian national average of 20.1% (Report Annuale 2024, p. 15).

According to the 2024 CNA regional labor market report, Marche has experienced significant transitional pressures, evidenced by a notable decline in active enterprises between 2018 and 2023. This trend has been particularly acute in sectors such as agriculture (-16.0%), manufacturing (-11.2%), and construction (-10.5%), showing the urgency of supporting these industries as they navigate the twin transformation.

3.1 Identification of key sectors

Based on a comprehensive review of regional economic data and EU strategic priorities, four key SME-dominated sectors in the Marche region have been selected:

- **Footwear and Leather:** A cornerstone of the regional economy, particularly in the province of Fermo , in the southern part of the Marche region.
- **Textiles and Apparel (Fashion system):** A key component of the regional "Sistema moda," with a dense network of specialized SMEs.
- **Furniture Manufacturing:** A historically significant sector, especially in the Pesaro and Urbino province, known for its design and craftsmanship.
- **Construction:** A vital sector for regional employment, currently benefiting from post-earthquake reconstruction and energy efficiency incentives.
- **Agri-food:** An important sector for the regional economy, with a growing focus on sustainability and quality production.

The table below presents the quantitative scoring for each selected sector against the eight assessment criteria.

Assessment criterium	**Selected sectors - Italy**				
	Footwear & Leather	Textiles & Apparel	Furniture	Construction	Agri-food
Strategic Policy Relevance	5	5	4	4	3
Environmental and Circular Economy Impact	4	5	4	5	4

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Degree of Digitalization	3	3	3	2	3
Complexity and Opacity of Supply Chains	5	5	4	3	4
Consumer and Market Pressure	5	5	4	3	4
Economic Importance and Material Criticality	5	4	4	4	3
Regulatory and Data Readiness	4	4	3	3	2
Project Partner Reach and Operational Scope	5	5	3	3	3
Total score	36	36	29	27	26

In Italy, in the Marche Region, the **Footwear and Leather and Textiles and Apparel** sectors are the most strategic priorities for Twin Transformation project. Their high scores are driven by a confluence of imminent regulatory pressure (ESPR/DPP), intense market demands for sustainability, complex global supply chains necessitating transparency, and deep economic significance for the region. The **Furniture and Construction** sectors follow as important secondary priorities. The conclusion is that SMEs of mentioned sectors are the ones who need support to face the twin transition via training on ISO standards .

4. Turkiye

When we examined sectors in Turkiye based on the established criteria, the following information was obtained. The research focused particularly on sectors where small businesses affiliated with TESK are concentrated. While some of these sectors are not among the top five sectors in Turkiye, they are among the top 10. Brief information on the five sectors identified for tradespeople, artisans, and SMEs is provided below.

1. Footwear and Leather Sector

This sector is particularly important due to the high number of export-oriented SMEs, sustainability pressures from the EU, and environmental regulations, particularly those related to leather processing.

Criteria-Based Analysis

• Strategic Policy Relevance: Medium. Export support is available, but it is not as strategically focused as automotive/textiles.

• Environmental & Circular Economy Impact: High. Leather tanning is critical for water, chemical, and waste management; circular economy pressure is increasing.

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• Degree of Digitalization: Low-medium. Automation in production processes is low; however, this is expected to increase with the pressure for product passporting/traceability.

• Supply Chain Complexity: Medium. Raw material sourcing is complex (raw leather supply), but the production network is more localized.

• Consumer & Market Pressure: Medium-high. Demand for sustainable leather production is accelerating in the EU market.

• Economic Importance: Medium. Not as large as textiles, but employment is high.

• Regulatory Readiness: Medium. REACH compliance and chemical management issues are critical.

Not among the top 5 in Turkey, but among the top 3-4 sectors with high environmental regulatory pressure.

2. Textiles and Apparel

Criteria-Based Analysis

• Consumer and market pressure is very high: Fashion sustainability (ESG) pressures are most felt in this sector in Turkey.

• Circular economy: Recycled polyester and cotton recovery is developing.

• Demand for supply chain transparency is very high: EU regulations directly impact this sector (e.g., Eco-design, Digital Product Passport).

• Economic criticality: Always among the top 3-4 exporters in Turkiye.

3. Furniture Sector

The furniture sector in Turkiye is gaining importance due to its high export growth rate, design-focused transformation, and the relatively complex structure of the supply chain.

Criteria-Based Analysis

• Strategic Policy Relevance: Medium. Design-focused policies are in place to increase value.

• Environmental & Circular Economy Impact: Medium. Wood use, waste management, and sustainable forest products are critical.

• Degree of Digitalization: Medium. CNC and automation are widespread, but data-driven production is low.

• Supply Chain Complexity: Medium–high. Multiple supply chains, such as wood, metal, textiles, and chemicals, are merging.

• Consumer & Market Pressure: Medium. Demand for sustainable furniture is increasing in the EU; Turkish brands are feeling this pressure.

• Economic Importance: Medium–high. One of Turkey's strong design sectors; export growth is rapid.

• Regulatory Preparation: Medium. Digital product passports will also be introduced to this sector.

It ranks in the 6–8 range, with increasing strategic potential due to its role in consumer pressures and complex supply chains.

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4. Food and Agriculture Sector

Criteria-Based Analysis

• Expectations for supply chain transparency: Traceability solutions and blockchain-based tracking applications are rapidly spreading.

• Economic priorities: Food inflation and supply security are high political priorities.

• Consumer pressure: Demand for clean ingredients, sustainable production, and local products is increasing.

• Circular economy impact: Food waste, water efficiency, and packaging recycling are critical areas.

5. Transportation – Road Logistics & Transportation

Logistics is both the backbone of Turkiye's trade infrastructure and one of the areas experiencing the fastest-growing pressure for digitalization and transparency.

Criteria-Based Analysis

• Strategic Policy Relevance: High. Central Corridor, port and railway investments, logistics master plans.

• Environmental & Circular Economy Impact: Medium–high. Carbon emissions and fuel consumption are net pressures.

• Degree of Digitalization: High. E-freight, GPS, IoT tracking, and warehouse automation are growing rapidly.

• Supply Chain Complexity: Very high. All of Turkey's exports and imports depend on this sector.

• Consumer & Market Pressure: Medium. B2B pressure is more dominant (delivery performance, carbon footprint).

• Economic Importance: Very high. A strategic sector.

• Regulatory Readiness: Medium–high. The ETS framework and border carbon adjustment (CBAM) will directly impact logistics.

The logistics sector is a top-5 contender, scoring particularly highly in:

• Supply chain complexity

• Digitalization

• Strategic importance

Assement criterium	**Selected sectors - Turkey**				
	Footwear & Leather	Textiles & Apparel	Furniture	Agri-food Processing	Tranportation and Logistic
Strategic Policy Relevance	5	4	5	5	5
Environmental and Circular Economy Impact	5	5	4	4	5
Degree of Digitalization	4	4	3	3	4

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Complexity and Opacity of Supply Chains	3	5	4	4	5
Consumer and Market Pressure	5	5	5	5	5
Economic Importance and Material Criticality	4	5	4	5	5
Regulatory and Data Readiness	4	3	3	3	3
Project Partner Reach and Operational Scope	5	5	4	5	4
Total score	35	36	32	34	36

The footwear and leather sector, the sector chosen for our project, is experiencing the impact of the twin transformation intensely. The textile and transportation sectors, which received the highest scores, are the sectors with a high concentration of SMEs. Similarly, there are many SMEs in the furniture and food processing sectors. These businesses are not yet even aware of the twin transformation. They need to be informed about the legislation and practices they will soon be subject to.

5. Portugal

The Northern Region of Portugal represents one of the country's most industrialized territories, characterized by a diversified and export-oriented manufacturing base. Industry accounts for approximately 22 % of regional gross value added (GVA) and employs around 400,000 people, reflecting the strong presence of SMEs and traditional production clusters. The region is a key driver of national exports, particularly in footwear, textiles, furniture, metalworking, and agri-food products, and hosts a dense network of industrial districts combining craftsmanship, innovation, and international competitiveness.

However, as in other mature European regions, the North has experienced a gradual decline in the relative weight of manufacturing over recent decades, driven by structural shifts towards services and global supply chain pressures. Despite this trend, the region's cluster-based industrial ecosystem, vocational excellence, and export-oriented SMEs position it as a strategic testing ground for the Twin Transition, where digitalization and sustainability act as levers for industrial renewal and competitiveness.

5.1 Identification of Key Sectors

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The following five sectors have been identified based on their economic relevance, environmental footprint, and potential for digital innovation, in line with EU priorities on sustainability and resilience.

- **Footwear and Leather:**
  The footwear and leather sector is a flagship industry in Northern Portugal, concentrated in areas such as Felgueiras, Guimarães, S. João da Madeira and Santa Maria da Feira. It represents a significant share of national production and exports. The sector is actively embracing sustainable materials, eco-design, and digital tools for production and traceability. Industry associations such as APICCAPS and the Portuguese Footwear Technology Centre (CTCP) lead numerous EU-funded projects promoting circular economy models, digital product passports, and carbon footprint assessment.
- **Textiles and Apparel:**
  Centered in the Ave and Cávado Valleys, this sector is among the most dynamic in the region, accounting for a large share of Portugal's industrial employment and exports. Companies are increasingly investing in green fibres, recycling technologies, and digital process integration, including 3D design, virtual prototyping, and smart logistics. Cluster organizations like CITEVE and Cluster Têxtil play a key role in promoting innovation and regulatory adaptation to EU sustainability frameworks.
- **Furniture and Wood:**
  The furniture and wood industry, concentrated in municipalities such as Paços de Ferreira and Paredes, is undergoing a gradual transition toward sustainable production, modular design, and digital marketing. With its strong craft tradition and export focus, the sector holds considerable potential for eco-innovation, particularly in materials efficiency, product lifecycle management, and circular design.
- **Metalworking and Mechanical Engineering:**
  The metalworking and mechanical engineering sector is one of the most technologically advanced and export-oriented industries in the Northern Region, with strong concentrations in Vale do Ave, Braga, and Porto. The sector encompasses metal fabrication, moulds, machinery, automotive components, and precision engineering, employing tens of thousands of workers. It is a crucial enabler of other manufacturing activities, providing key inputs for industrial automation, renewable energy, and construction.
  Firms are progressively adopting Industry 4.0 technologies, including robotics, additive manufacturing, and advanced simulation tools, while investing in energy efficiency, waste reduction, and green metallurgy. Cluster organizations such as AIMMAP, CATIM, and Produtech play central roles in supporting the digital and green transition of SMEs through collaborative R&D, pilot lines, and upskilling programs.
- **Agri-food and Processing:**
  The agri-food sector represents a pillar of the Northern economy, with strengths in wine, dairy, meat, and processed food products. SMEs are adopting precision agriculture, digital traceability,

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and sustainable packaging solutions. Regional clusters such as Agrocluster do Norte and R&D institutions are facilitating collaboration across the value chain to enhance circularity and food system resilience.

The table below presents the quantitative scoring for each selected sector against the eight assessment criteria.

Assessment criterium	**Selected sectors - Portugal**				
	Footwear & Leather	Textiles & Apparel	Furniture & Wood	Metalworking & Mechanical Engineering	Agri-food Processing
Strategic Policy Relevance	5	5	4	4	4
Environmental and Circular Economy Impact	4	4	4	4	4
Degree of Digitalization	3	3	3	3	3
Complexity and Opacity of Supply Chains	5	5	3	3	3
Consumer and Market Pressure	5	5	3	3	3
Economic Importance and Material Criticality	5	5	3	4	3
Regulatory and Data Readiness	4	4	3	4	3
Project Partner Reach and Operational Scope	5	4	3	4	3
Total score	37	35	26	29	26

The analysis of the five selected sectors in Northern Portugal highlights a high concentration of industrial activity, strong SME representation, and substantial export capacity. The metalworking, footwear, and textiles sectors emerge as the most strategically aligned with the objectives of the Twin Transition, demonstrating leadership in digital manufacturing, circular design, and industrial innovation. The agri-food

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industry shows growing commitment to decarbonization and digital traceability, while the furniture and wood sector presents potential for further modernization through eco-design and smart manufacturing.

Overall, the results confirm the Northern Region's capacity to lead sectoral transformation efforts, leveraging its industrial clusters, R&D networks, and institutional frameworks to accelerate the green and digital transition. These findings will support the design of tailored training actions, innovation projects, and standardization measures in the forthcoming phases of the Twin Transition initiative.

6. Spain

The Valencian Region represents one of Spain's most industrialized territories: manufacturing still employs around 17 % of total workforce with approximately 370.600 people working in industrial enterprises in 2022. Goods exports are significant, with the active company base numbering 352.955 as of January 2023, including a strong SME fabric.

However, the region has experienced a marked decline in the relative weight of industry over recent decades: the industrial sector's share of regional gross value added (GVA) dropped from about 25 % in the mid- 1990s to below 17 % by 2013. This structural shift signals both a challenge and an opportunity: with its cluster- based industrial structure, export orientation and SME- led ecosystem, the Region is particularly relevant in the context of the Twin Transformation's focus on green and digital transformation of traditional sectors.

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3.1 Identification of key sectors

The following five sectors have been identified for their alignment with EU sustainability priorities, their environmental footprint, and their potential for digital innovation.

- **Footwear and Leather:** The footwear industry is a flagship sector in the Valencian Region, particularly around Elche and Elda. It represents over 40% of national production. The sector is actively integrating sustainable practices and digital tools, including traceability, eco-design, and smart manufacturing. AVECAL leads several European projects promoting ISO standards, circular economy models, and product passports.
- **Textile and Apparel:** Concentrated in areas such as Ontinyent and Alcoy, the textile sector is undergoing a green transition, with increasing focus on eco-fabrics and sustainable production. Many SMEs are beginning to adopt digital tools for design, production, and logistics.

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- **Furniture and Wood:** The furniture industry, notably in the area of La Sénia and nearby towns, is embracing circular design, modularity, and digital marketing. It shows strong potential in sustainable innovation, especially in materials and logistics.
- **Ceramics and Construction Materials:** Centered in Castellón, this sector includes world-leading ceramic tile production. The environmental impact is significant due to energy use, but the sector is innovating in emission reduction and digital design tools.
- **Agri-food and Processing**: The agri-food sector is a pillar of the Valencian economy, with strengths in citrus, wine, and canned products. SMEs are increasingly adopting digital monitoring, precision agriculture, and green packaging.

Assessment criterium	**Selected sectors - Spain**				
	Footwear & Leather	Textiles & Apparel	Furniture & Wood	Ceramics & Construction	Agri-food Processing
Strategic Policy Relevance	5	5	4	5	4
Environmental and Circular Economy Impact	5	4	4	5	4
Degree of Digitalization	4	3	3	4	3
Complexity and Opacity of Supply Chains	4	4	3	4	4
Consumer and Market Pressure	5	5	3	4	5
Economic Importance and Material Criticality	4	4	4	5	5
Regulatory and Data Readiness	4	3	3	4	3
Project Partner Reach and Operational Scope	5	4	4	3	4
Total score	36	32	28	34	32

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The analysis of the five selected sectors in the Valencian Region in Spain highlights a clear concentration of industrial activity with strong SME representation, substantial export capacity, and significant environmental and innovation potential. The footwear and leather sector emerges as the most strategically aligned with the objectives of the Twin Transformation, achieving the highest score (36/40) due to its strong policy relevance, high circularity potential, and active engagement in EU-funded innovation initiatives. Ceramics and agri-food also stand out for their environmental footprint and growing digital integration, despite existing challenges in supply chain transparency and data readiness. Meanwhile, the textile and furniture sectors reveal considerable opportunities for improvement, especially in digitalization and regulatory adaptation. Overall, the results confirm the region's readiness to lead sectoral transformation efforts, particularly through clusters with established institutional support such as AVECAL and active engagement in green and digital transition projects. These findings will support the development of tailored training actions and standards in the upcoming phases of the Twin Transformation project.

7. Conclusion

This report presents a comparative analysis designed to identify and evaluate the SME-dominated sectors in Italy), Turkey, Portugal, and Spain that are most profoundly affected by the twin transformation.

Finally, the identified gaps in data readiness and environmental management across key SME sectors directly align with the competencies provided by internationally recognized ISO standards. **This training is not merely a compliance exercise; it is an essential enabler for SMEs to navigate the twin transformation successfully.**

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