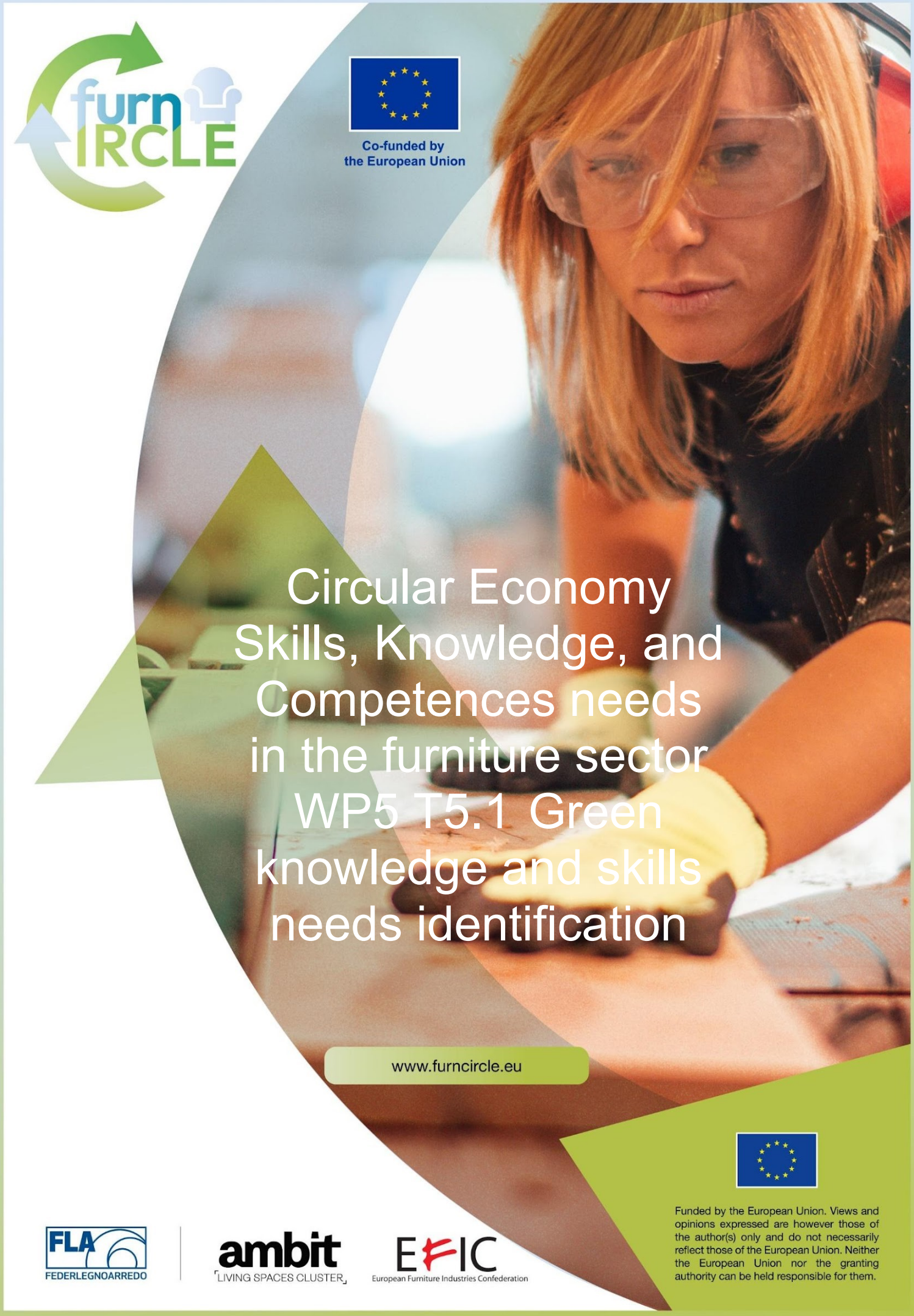

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Circular Economy Skills, Knowledge, and Competences needs in the furniture sector WP5 T5.1 Green knowledge and skills needs identification

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FLA FEDERLEGNOARREDO

ambit LIVING SPACES CLUSTER

EFIC European Furniture Industries Confederation

SUMMARY TABLE

Grant agreement	Project 101102389 — FurnCIRCLE
Programme	Support for Social Dialogue
Project acronym	FurnCircle
Project title	**FurnCIRCLE - Circular Economy Guidelines and Tools for Application in the EU Furniture Sector**
Project starting date	01/09/2023
Project end date	31/08/2025
Project duration	24 months
Project work package	WP5 Green SKCs needs and recommendations for CE deployment
Deliverable title	Circular Economy Skills, Knowledge, and Competences needs in the furniture sector
Nature of deliverable	Report
Dissemination level	Public
Due date of deliverable	November 2024
Actual date of deliverable	30/01/2025
Produced	FLA
Reviewed	AMBIT
Validated	AMBIT

1. INTRODUCTION

The shift towards a circular economy (CE) is crucial for the furniture industry to minimise waste, extend product lifespans, and enhance resource efficiency. By adopting circular strategies, businesses can move away from the traditional linear production model and embrace more sustainable practices.

This FurnCIRCLE survey was designed to identify the skills, knowledge, and competences (SKCs) required by workers in the furniture and woodworking industry to facilitate the transition to circular economy practices. It highlights current approaches, barriers, and skill gaps that hinder the adoption of circular methods. The insights gathered provide a strong foundation for aligning training and development efforts with industry needs for sustainability and the successful implementation of CE.

Key areas for improvement have been identified, including existing challenges in CE adoption, essential workforce skills, and potential training opportunities to support this transition. Recognising key workforce capabilities is vital for effectively embedding circular economy principles such as eco-design, life cycle thinking, and waste reduction.

2. METHODOLOGY

The survey was designed to capture the perspectives of professionals actively involved in circular economy projects within the furniture industry. A total of 46 responses were gathered, representing a diverse group of stakeholders, representing diverse roles such as production, research and development, and business development.

The survey sought to explore key areas, including the extent to which CE principles are being applied, the barriers to their implementation, the necessary skills, knowledge and competences required for success, including transversal skills, and the specific training needs of the workforce. The survey was structured with both quantitative ratings as well as qualitative insights.

By analysing the responses, this provides a comprehensive view of industry's readiness and highlights areas for improvement.

3. SURVEY KEY FINDINGS

3.1 Adoption of Circular Economy Principles

The first part of the survey focused on the Circular Economy practices in use. The results reveal that a significant portion of respondents have already begun integrating Circular Economy principles into their operations:

- a total of 78% reported applying the **9 / 10 Rs Framework**, which includes Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle and Recover.
- additionally, 80% of participants indicated that they have implemented **eco-design principles**, ensuring that products are designed for longevity, modularity and disassembly, with their entire lifecycle in mind.

Respondents stressed the importance of integrating these principles at all stages of product and process development.

Companies are also beginning to implement **product life cycle management strategies**, allowing them to track products from production to end-of-life and explore remanufacturing and material recovery options. The transition to **sustainable materials** is another trend observed among respondents, with businesses increasingly shifting to biodegradable and recyclable raw materials.

For the managers that are working in a furniture or woodworking company, 83% has themes related to the transition towards Circular Economy explicitly in their job description. For 80% of them, this is about Eco-Design principles. For the other 17% where CE is not explicitly mentioned, the domains addressed are the 9 / 10 Rs Framework.

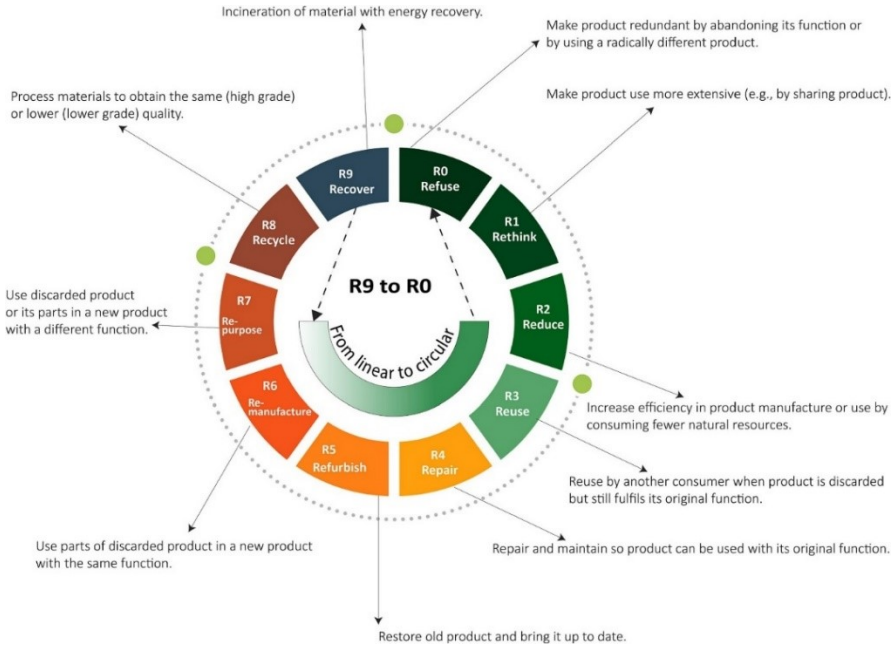
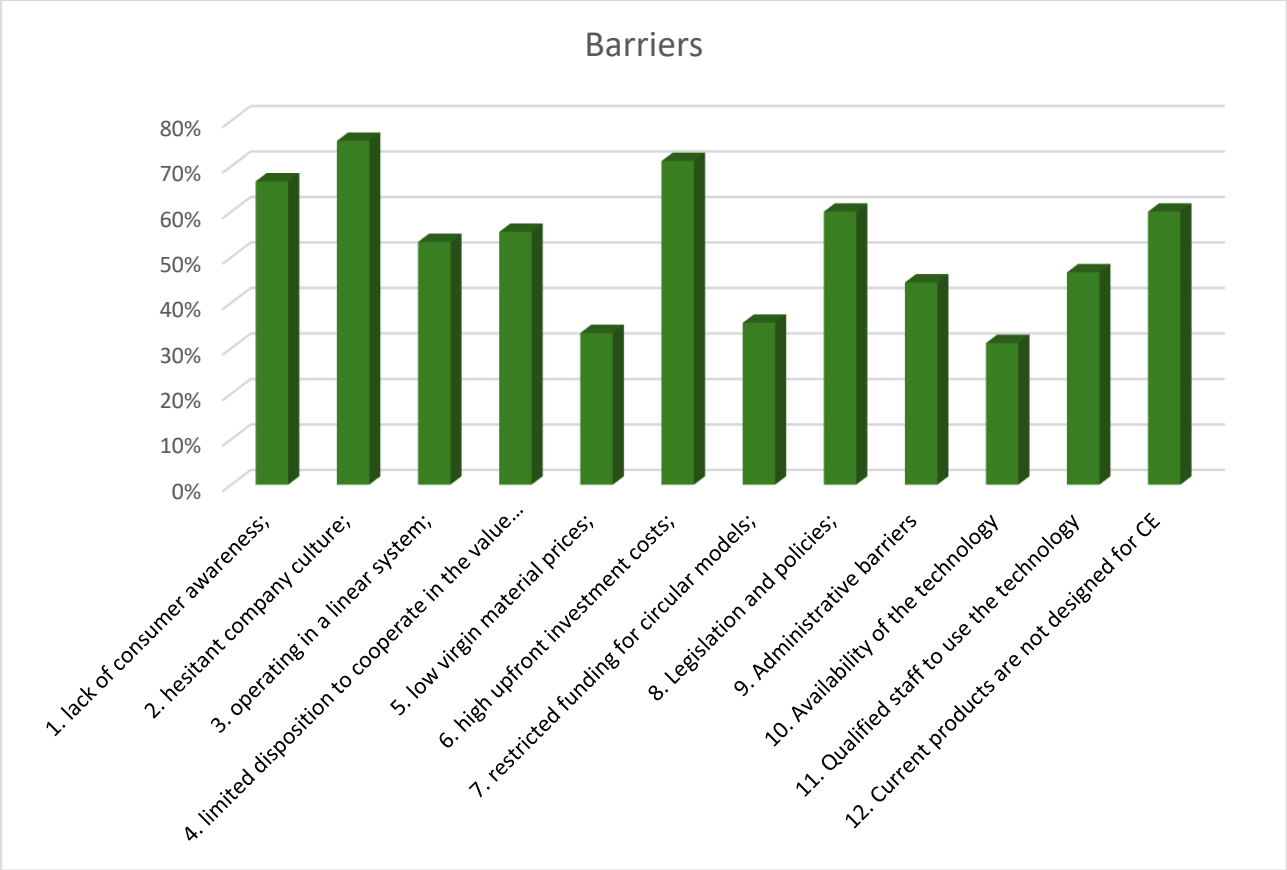


Fig. 1. The 10R framework (adapted by ScienceDirect from Kirchherr et al. (2017)).

3.2 Barriers to Circular Economy Implementation



Despite progress, several significant barriers are hindering the widespread adoption of CE practices. One of the most commonly cited obstacles is a **hesitant company culture**, where businesses are resistant to change due to a lack of awareness, fear of disrupting existing (efficient linear) processes, or uncertainty about the return on investment. This suggests a need for **cultural shifts / mindset** within organizations, with leaders championing circular economy goals to foster acceptance across all levels of the company. The need for a cultural shift or mindset can also be defined as a kind of cultural barrier.

Limited consumer awareness also emerged as a significant challenge, indicating a gap in understanding, acceptance and adoption of circular economy practices and products. Raising awareness of circular benefits among both employees and consumers could help address this barrier.

Financial constraints were another major barrier. Over 60% of respondents highlighted the **high initial investment costs** for CE tools and processes. This financial burden can be a deterrent, especially for smaller businesses (SMEs) within the furniture industry. The respondents also mentioned the **lack of financial incentives** for adoption circular principles.
Technical limitations, such as the **availability of technology** and **qualified staff** with the necessary digital competences, were also prevalent barriers. These constraints highlight a need for **increased**

access to specialized technology and **technical training** to build a workforce skilled in circular economy applications. **Insufficient infrastructure** for managing reverse logistics and material recovery is also a technical barrier to adopt CE practices.

Additionally, businesses face **regulatory challenges**, as compliance with CE-related policies and legislation varies across regions and can be complex to navigate. The lack of harmonised rules and lots of different rules in EU countries, increase the complexity to implement CE practices.
Some suggestions to counter these barriers can be found in networking, in developing eco-systems, in co-creation with all stakeholders involved, including universities conducting relevant research.

3.3 Skills and Competences for Circular Economy Transition Managers

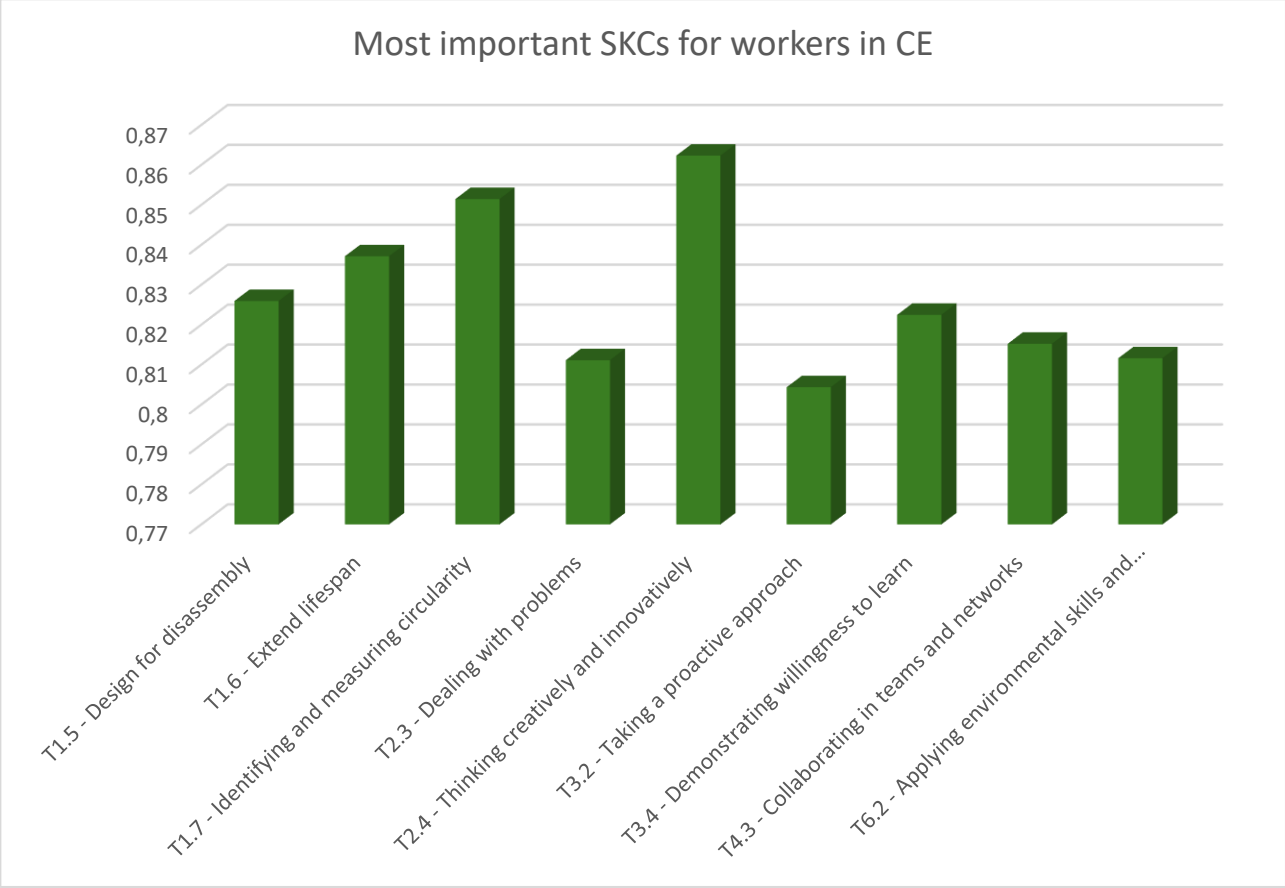
For businesses to successfully transition to a circular economy, employees must develop a **broad range of essential skills, knowledge, and competences** (SKCs).

Respondents highlighted the significance of strategic skills such as **systems thinking**, which enables an understanding of the wider impact of circular economy practices across different stages of the furniture lifecycle. This skill is particularly valuable for recognising the interconnected elements of production and the complexities of supply chain interactions. Additionally, they emphasised the importance of **future-oriented thinking** and **values-based thinking** in fostering sustainable and

ethical business approaches. These capabilities support **strategic decision-making** and help ensure that sustainability efforts align with long-term business objectives.

The survey also identified several additional skills and competences suggested by respondents as critical to the successful implementation of a circular economy. **Innovation and creativity** were deemed fundamental for the design of circular products and services. Specifically, skills related to creative problem-solving, innovation, and circular design strategies were noted as essential for developing new circular solutions.
Skills rated as having medium to high relevance included the ability to apply general knowledge effectively. Cross-disciplinary skills and collaboration were also identified as crucial for bridging gaps between departments and enabling the organisation-wide adoption of circular economy practices. Furthermore, respondents stressed the importance of environmental knowledge, supply chain management expertise, and digital literacy, particularly concerning CE-specific software tools, such as digital twins, Life Cycle Assessment (LCA) software, but also competences needed for correct data interpretation, new data standards, new data flows (eco-systems in stead of individual streams), etc..., concerning the Digital Product Passports (DPP) and other new instruments.

Some other skills were mentioned by the experts panel, such as strategic and environmental communication, on how transition to CE works, on purpose development, future trends and the understanding of the new role that businesses need to assume.



"Mastering languages" and "Use online conventions of netiquette" are the two skills sets that following most of the respondents are not essential for workers in the furniture industry.

Awareness of environmental issues, stakeholder connection, future thinking and systems thinking, reverse logistics and material knowledge are some of the suggestions made by the respondents to include in the needed SKCs for workers in the furniture industry, facing the transition toward circular economy.

3.4 Training Needs

For 65% of the respondents, Circular Economy transition is an extra role that has to be taken up, rather than a full profession or a separate function (35%). And most of the respondents think this could be taken up by the general manager (59%), the innovation department (52%) and/or production manager (48%). 4 out of 10 think this should be taken up by all departments.

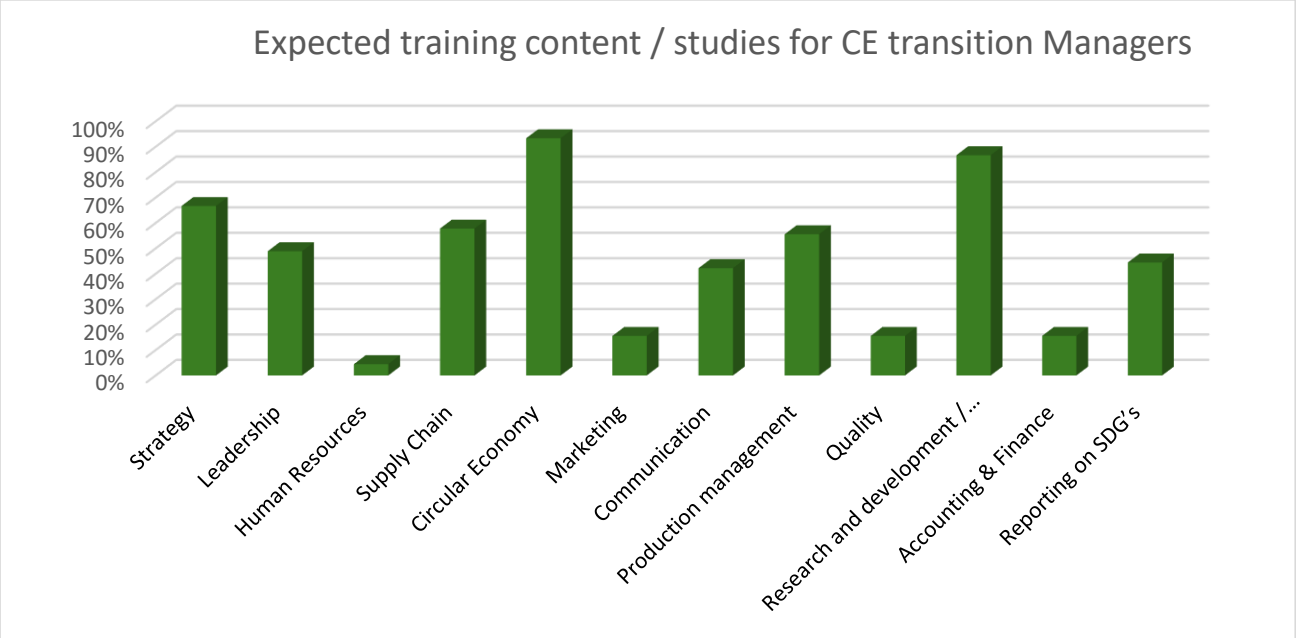
Circular Economy transition is for most respondents a role where minimum a bachelor degree is necessary. 78% recommends a university degree for this role.

A key takeaway from the survey is the overwhelming need for training programs to upskill employees in CE-related fields.

98% of respondents expressed the need for additional studies or training, with the most critical areas including:

- **circular economy fundamentals** (95%),
- **research and development, eco-design, innovation** (86%),
- **strategy** (68%),
- **supply chain management** (61%),
- **leadership** (55%),
- **production management** (55%).

Respondents also recognized the importance of training on **reporting on the sustainable development goals SDGs (48%)** to help organizations measure their progress.



Summarising there is a great need for introductory training, building awareness of CE principles among workers and leadership. Fundamentals of CE on conceptual level versus implementational level is not the same. Training offer must be specific, 'group' specific, adapted to ones needs, adapted to different sizes and organisation of companies.

The training offer could be broadened according to the roles a team takes on. Some examples: for design teams, eco-design and modular product development should be integrated in the courses; for logistics teams, there should be an important part on reverse logistics and lifecycle management. The specific tools for LCA, blockchain for supply chain transparency, 3D-printing and/or and material marketplaces also have their importance in the suggested training needs.

Although everybody agrees that 80% of Circular Economy principles are determined during the design phase, CE is more than that. The new Eco-design for Sustainable Products Regulation goes further than just the design phase but talks also of unsold consumer products and how to deal with it. CE is more than just the (EU) regulations.

3.5 Format and target groups for the suggested training

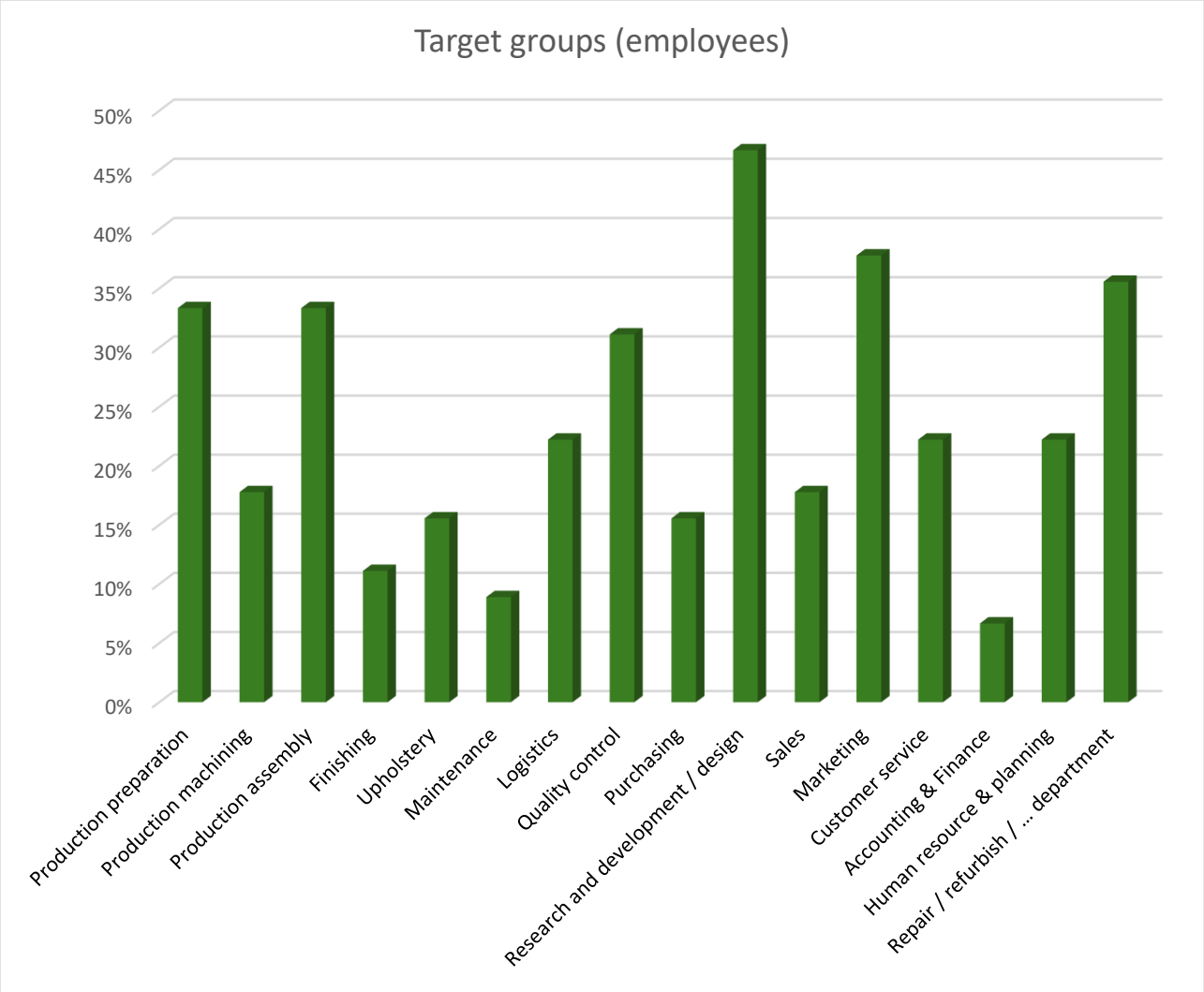
Actually, in 40% of the cases, these kinds of trainings are not yet organised or planned.

The **target groups** mentioned play critical roles in the implementation of circular practices across product design, manufacturing, and promotion. We target employees and workers in the **R&D / design department** (78%) for innovation in circular product and process design. In a lesser extend (+/- 50%) were mentioned the departments:

- Production (preparation and assembly): for minimizing waste and adopting circular practices;
- Quality control;

- Marketing: to communicate effectively CE benefits to consumers, and
- Repair/refurbish and resource recovery department (often within logistics).

Another important target group concerns the future employees and employers: the students that are now in secondary schools, in higher education or in universities. There is a growing need for schools, universities and training organisations to be able to use the tools to implement CE. So they can guide students that could set up virtual CE companies, to test new CE strategies, etc...



Core areas identified for training for the workers include circular economy concepts. The survey results indicate that training in following areas would better equip workers to manage sustainable transitions in production processes.

- 9 / 10 Rs framework: essential concepts in reuse, recycling, and rethinking waste (92%);
- Eco-design principles, Life Cycle Design: these skills help in designing products that can be easily disassembled, reused, or recycled, reducing environmental impact throughout the product's lifecycle (77%);

- Systemic design: Emphasizes designing with the entire system in mind, integrating multiple processes, stakeholders, and sustainable goals.

Whether this should be organised within the company or externally, the answers differ (52% vs 48%). Respondents expressed a preference for in-company training tailored to specific job roles. This suggests that role-specific training programs are seen as more effective for developing practical skills. External training was still valued for providing general knowledge and updates on industry-wide circular economy practices.

The preferred training has durations ranging between **24 and 80 hours.**

4. CONCLUSION

The results of this survey reveal that although the furniture industry has made notable progress in adopting circular economy practices, a number of significant challenges still hinder widespread implementation. Persistent issues such as cultural resistance to change, limited financial resources and other financial constraints, regulatory complexity, and technological limitations continue to slow the sector's transition toward circularity. However, these barriers are not insurmountable. With well-designed training initiatives, strong leadership commitment, and better access to both financial and technical support, meaningful progress is achievable.

A strategic emphasis on workforce development and skills enhancement will be instrumental in accelerating the shift to a fully circular economy. By equipping workers with the right competencies and fostering a culture of continuous learning, businesses can enhance their sustainability performance and reinforce their long-term competitiveness. This report serves as a comprehensive roadmap to support organizations in building the necessary knowledge, capabilities, and operational structures for integrating circular economy principles into their core strategies and daily operations.

Annex: Questionnaire

In the projects regarding the transition towards Circular Economy in which you are working, which principles are used?

- 9 or 10 Rs (Refuse, reduce, renew, re-use, repair, refurbish, remanufacture, re-purpose, recycle, recover)
- Eco-design
- Other (please specify)

Which kind of barriers do you encounter in their deployment / implementation? *Source: The Circular Economy transition: Barriers faced and enablers used by managers of Dutch manufacturing SMEs. Master Thesis – Business Administration – Innovation & Entrepreneurship Public version. Author: Jelle Kerstjens S4624084 Thesis supervisor: Dr. Alexandra Holz Second Examiner: Dr. Robert Kok. Date: 9-08-2021*

Cultural/organisational barriers:

1. lack of consumer awareness;
2. hesitant company culture;
3. operating in a linear system;
4. limited disposition to cooperate in the value chain;

Market barriers:

5. low virgin material prices;
6. high upfront investment costs;
7. restricted funding for circular models;

Regulatory barriers

8. Legislation and policies;
9. Administrative barriers

Technological Barriers

10. Availability of the technology
11. Qualified staff to use the technology
12. Current products are not designed for CE

This area of the survey will focus on skills, knowledge and competences of Managers

Do you work in a furniture or woodworking company?*

YES / NO

Is there anyone in your company, that has themes related to the transition towards Circular Economy explicitly in his/her job description?

YES / NO

Which are the domains of Circular Economy that are addressed by this person?

- 9 or 10 Rs
- Eco-design
- Other, please specify.

The next part is focusing on skills / competences and knowledge **for managers in furniture companies.**

What do you think managers, dealing with Circular Economy transition in a furniture company, should have as skills, competences, and knowledge?

On a scale between 0 and 6, where 0 is not relevant at all, and 6 is extremely relevant.

- Global environmental challenges
- General framework of sustainability
- Circular logistics & value chains
- Forest resource management and sustainable supply chain -> could be in circular logistics and value chains or separately to be more sector specific
- Circular design & design strategies
- Circular procurement
- Circular economy (What, why, how)
- Circular initiatives (sales channels, companies, regions, platforms, knowledge platforms and institutions)
- Circular business models (What, measuring impact, steward-ownership)
- Product maintenance and service -> could be in 'business models or not
- Waste management and dealing with residuals flows
- Circular policies (EU, national, challenges)
- Circular financing (what, how, which form, risks, where to find)
- Equity in the Circular Economy
- Social Leadership
- Life Cycle Analysis
- Global environmental challenges
- General framework of sustainability
- Circular logistics & value chains
- Forest resource management and sustainable supply chain -> could be in circular logistics and value chains or separately to be more sector specific
- Circular design & design strategies
- Circular procurement
- Circular economy (What, why, how)
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- Product maintenance and service -> could be in 'business models or not
- Waste management and dealing with residuals flows
- Circular policies (EU, national, challenges)
- Circular financing (what, how, which form, risks, where to find)
- Equity in the Circular Economy
- Social Leadership
- Life Cycle Analysis

5.a) Would you suggest any other skills, competences, and knowledge as key for furniture sector managers?

6) Do you think Circular Economy transition can be seen as an additional task or role for other managers having already other responsibilities within the company?
Here we want to understand if it is better that the Circular Economy Transition is led by someone having a full dedication to this profession or it can be integrated with other tasks/responsibility.
YES / NO

7. Do you think Circular Economy transition should be taken up by the manager of which department?

- Financial dept.
- Production dept.
- Human resources dept.
- Purchasing / Supply Chain dept.
- Marketing dept.
- General management
- Innovation dept.
- All departments
- Other:

8. What do you think the profile for a manager taken up the tasks for Circular Economy transition should be? Please indicate which studies he or she should have as a basis?

- University Degree
- Bachelor (academic / professional)
- VET studies
- Other:

8.a) If you have chosen the University Degree, please indicate which faculties? If you have chosen Bachelor or VET studies, please, specify further.

9. Do you think the manager, that is taking care of Circular Economy transition, should have taken or needs extra studies or training?
YES / NO

Studies / training required

10) Please specify which kind of studies / training?

- Strategy
- Leadership
- Human Resources
- Supply Chain
- Circular Economy
- Marketing
- Communication
- Production management
- Quality
- Research and development / eco-design / innovation
- Accounting & Finance

- Reporting on SDG's
- Other:

Extra support need

11) Does he or she needed or needs extra support or coaching?

YES / NO

Kind of support he / she needs

12.a) Please indicate

- support – coaching
- extra training

12.b) Please indicate

- internally in the company (by another manager)
- by an external partner

Interested in training focusing on Circular Economy?

13. If you were a furniture sector manager, would you be interested in such a training?

YES / NO

Suggested training duration

14. Which should be the duration of such a training? Please indicate an approximative duration (in hours)

- 8
- 16
- 24
- 40
- 60
- 80
- Other:

The next part is focusing on skills / competences and knowledge **for workers / employees in furniture companies.**

15. Which transversal skills do you consider relevant for workers concerning the implementation of Circular Economy transition in the Furniture Company? - You can choose as many as you want (list of transversal skills and competences (ESCO) + some other proposals)

- T1.1 - Mastering languages
- T1.2 - Working with numbers and measures
- T1.3 - Working with digital devices and applications
- T1-4 - Working digitally
- T1.5 - Design for disassembly
- T1.6 - Extend lifespan
- T1.7 - Identifying and measuring circularity
- T1.8 - Multiple value creation
- T2.1 - Processing information, ideas and concepts
- T2.2 - Planning and organising
- T2.3 - Dealing with problems

- T2.4 - thinking creatively and innovatively
- T3.1 - working efficiently
- T3.2 - taking a proactive approach
- T3.3 - maintaining a positive attitude
- T3.4 - demonstrating willingness to learn
- T4.1 - communicating
- T4.2 - supporting others
- T4.3 - collaborating in teams and networks
- T4.4 - leading others
- T4.5 - following ethical code of conduct
- T4.6 - Collaboration in chains/networks
- T5.1 - Manipulating and controlling objects and equipment
- T5.2 - Responding to physical circumstances
- T5.3 - High-quality reuse
- T6.1 - applying health-related skills and competences
- T6.2 - applying environmental skills and competences
- T6.3 - applying civic skills and competences
- T6.4 - applying cultural skills and competences
- T6.5 - applying entrepreneurial and financial skills and competences
- T6.6 - applying general knowledge
- T6.7 - use online conventions of netiquette
- T1.1 - Mastering languages
- T1.2 - Working with numbers and measures
- T1.3 - Working with digital devices and applications
- T1-4 - Working digitally
- T1.5 - Design for disassembly
- T1.6 - Extend lifespan
- T1.7 - Identifying and measuring circularity
- T1.8 - Multiple value creation
- T2.1 - Processing information, ideas and concepts
- T2.2 - Planning and organising
- T2.3 - Dealing with problems
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- T6.4 - applying cultural skills and competences
- T6.5 - applying entrepreneurial and financial skills and competences
- T6.6 - applying general knowledge
- T6.7 - use online conventions of netiquette

15.a) Would you suggest any other skills, competences, and knowledge as key for workers?

16. Do you think there are specific training needs concerning Circular Economy transition for workers/employees in a furniture company?

Yes / No

Areas

17. In your opinion, what should be the area(s) targeted?

- 9 or 10 Rs
- Eco-design
- Other:

About Training

18. Did your company organise similar trainings or are there any plans on doing this?

Yes / No

Targeted workers / employees

19. What are the target groups of workers/employees?

- Production preparation
- Production machining
- Production assembly
- Finishing
- Upholstery
- Maintenance
- Logistics
- Quality control
- Purchasing
- Research and development / design
- Sales
- Marketing
- Customer service
- Accounting & Finance
- Human resource & planning
- Repair / refurbish / … department

- Other:

20. What are the areas targeted?

- 9 or 10 Rs
- Eco-design
- Other:

21. Was this training organized in-company or externally?

- Within the company (adapted to the specific situation of the company)
- Externally (more general)

Final question

22. Do you have any other suggestions / comments concerning the need of new skills, competences, and knowledge for workers / employees in a furniture company?

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