twin revolution

Twin digital and green transition for furniture and textile industries

Joint Curriculum Endorsement

Co-funded by the European Union

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TWIN REVOLUTION PROJECT

The TwinRevolution project supports Vocational Education and Training (VET) learners from the textile and furniture industries on their twin transition journey. By improving their digital and green skills, the project wishes to prepare professionals from both industries to meet the requirements of a sustainable, circular, and digitally enabled industry.

Due to the necessity to update and align Vocational Education Training (VET) offer to the industry needs to facilitate a twin digital and green transition of manufacturing and traditional sectors, the main aim of the TwinRevolution projects is to develop an innovative and interactive tool & a training course that will up- and re-skill VET learners (from upper secondary and current workers) providing them with the necessary digital and green skills and competences.

In the framework of Twin revolution project partners defined the Joint Curriculum of the future training on circular economy for the textile and furniture sectors based on previous research on the industry needs.

This report shows the result of the Joint Curriculum validation performed through a serie of questionnaires with stakeholders of the industry sector and the provided feedback from their point of view. The main objective of this report is to know the feedback from the final target group of the future training course. It will permit to know consortium partners if the proposed Joint Curriculum addresses the expectations of the industry and how it could be improved.

This report was developed in the framework of TWINREVOLUTION (https://twinrevolution.eu), an Erasmus+ EU founded project aiming at developing a novel curriculum supporting companies from the furniture and textile industry to implement circular practices.

1. Methodology

One of the tools more used at the hour to carry on a sociological study about the opinion or knowledge of a group of people in a particular subject is the survey. The survey is one of the most used methods in market research because it allows obtaining extensive information from primary sources. Naresh K. Malhotra [1] defined surveys as interviews with a high number of people using a designed questionnaire. The survey method includes a structure questionnaire that is has been designed to obtain specific information.

Thus, for the TWINREVOLUTION Joint Curriculum validation it was decided to develop a questionnaire with 10 questions (see annex II), most of them in the form of multiple-choice questions. The developed questionnaire was available online, through Google form tool[1]. At the same time partners try to reach different stakeholders (companies, professional associations of the sector, experts on circular economy, etc) by email, phone or face to face interviews to get as many answers as possible to the developed questionnaire. In addition, as participants should have a general idea on the proposed Joint Curriculum, they were invited to check a general overview of the Joint Curriculum drafted for this task. This document is still available online[2] and also is annexed in this report (see annex I).

Finally, consortium partners collect 43 respondents. The profile of respondents ensures that all different defined organizations as stakeholders (professional associations, universities, chambers of commerce, companies of the habitat sector, etc...) have been involved in the validation process. In addition, answers have been received from the different consortium partners countries, and other EU countries, such as Czech Republic, Belgium, Poland, Portugal, The Netherlands, Slovenija, and Ukraine. Therefore, a wide perspective and a European approach has been reached.

[1] https://www.google.es/intl/es/forms/about/

[2] https://twinrevolution.eu/twinrevolution-provides-a-complete-joint-curriculum-to-foster-the-twin-green-and-digital-transition/

2. Results of the survey

Questions were classified in four different sections: data of the participant, TWINREVOLUTION Joint Curriculum, training modules, and TWINREVOLUTION training course. All data is going to be analysed in this section considering the structure of the questionnaire.

Data of the Participants

The consortium partners carefully selected a diverse range of organizations and countries in order to engage a wide range of stakeholders. This ensures the successful analysis of achievements across a broad spectrum of participants, including professionals from diverse backgrounds and expertise. The following list reflects this diversity and offers an opportunity to comprehensively evaluate progress towards project goals.

Name of your organisation	Position	Country
KIT	academic staff	Germany
CEIPES	Videdirector	Italy
Universidad Politécnica de Cartagena	Associate Professor and Researcher	Spain
Wood Industry Cluster	Assietent	Slovenija
HMC	Teacher	the Netherlands
FORZA NGO	Coordinator	Ukraine
InnovaWood	Communication Officer	Belgium
RDA for Podravje - Maribor	Senior Project Manager	Slovenia
AMBIT (formerly CENFIM)	Inovation & Sustainability Manager	Spain
University of Ljubljana	assistant	Slovenia
Sint-Paulusschool campus VTI Waregem	Erasmus+ coordinator	België
Universidad de Murcia	Head of International Projects	Spain
VTI Wargem	IT-coördinator	Belgium
SOTEX GINETEX CZ	marketing and training manager	CZ
ATOK - association for textile clothing and leather industry	general manager	cz
AMUEBLA	Cluster Manager	SPAIN
UPHOLSTERY AND DECORATORS AND CARPENTER GUILD, Z.S	project manager	CZ
CLUSTER EMPRESAS INNOVADORAS VALLE DEL JUGUETE	CLUSTER MANAGER	SPAIN
INOTEX spol. s r.o.	Envi-affairs Specialist	Czech Republic
Střední průmyslová škola textilní, Liberec	directer	Czech Republic
Ecovala	project manager	Finland
Ecores	circular economy manager	belgium
Academia Formação do Norte	Trainer	Portugal
Simona Knavs	senior expert for VET	Slovenia
SERVIMA	Programs Director	Spain
I.E.S. Los Alabares	Teacher	Spain
HKA - University of Applied Sciences	Researche Assistant	Germany
Escuela de Madera-CRN Producción, Carpintería y Mueble	HEAD OF PROJECT DEPARTMENT	España
wurm + wurm architekten ingenieure gmbh	Architect	Germany
Globalnet	Manager	Poland
Warsaw University of Live Sciences	Researcher	Poland
CPI	Senior advisor	Slovenia
Cluster - Klastr technické textile	Cluster manager	CZ
CTPT	Executive director	Czech Republic
Profutura	Project Manger	Poland
Sportisimo	Material Spcialist	Czech Republic
Federico. Universidad de Murcia	Profesor	España
La Croix Architekten	Architect	Germany
Institute for Development and International Relations	Adviser	Croatia
IRMO	Director	Croatia
AREMA	GENERAL SECRETARY	SPAIN
AIJU	Future Business Manager	SPAIN
Institut Technologique FCBA	Industrial Designer, consutant on product design and materials	France

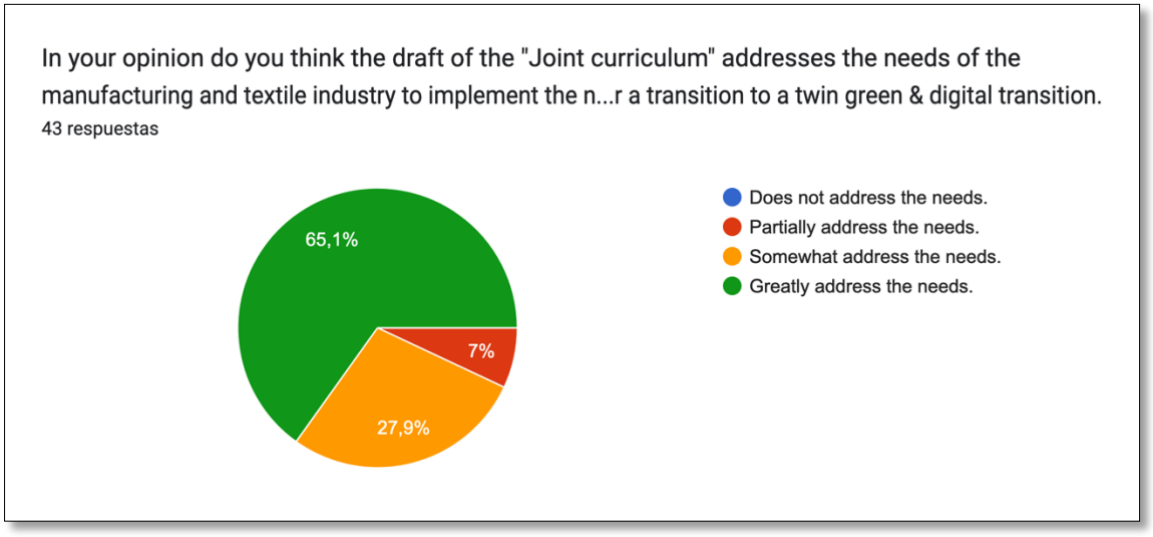
Table 1: Organisations and position of the participants

TwinRevolution Joint Curriculum

In the second part of the questionnaire, participants were directly asked about the Joint Curriculum. Prior to this section, they were invited to review a brief overview of the proposed Joint Curriculum to gain a general understanding (see Annex I).

Needs addressed by the Joint Curriculum

The first question of the survey directly inquired whether respondents felt that the proposed Joint Curriculum adequately addresses the needs of the manufacturing and textile industry to implement the necessary changes for a twin green and digital transition. Of those surveyed, 65.1% declared that the proposed Joint Curriculum greatly addressed the industry's needs, while 27.9% reported that it somewhat addressed their needs. Notably, no respondents indicated that the curriculum failed to address industry needs.

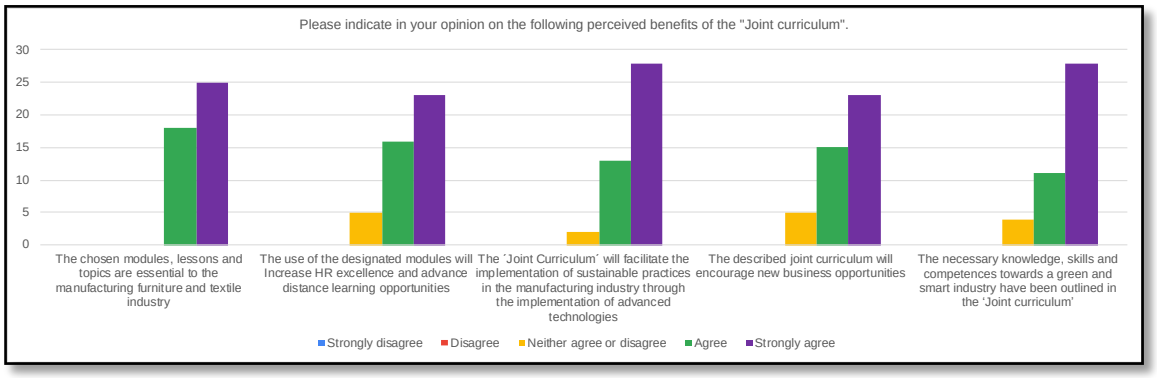


Graphic 1: Needs addressed in the JC.

Benefits of the Joint Curriculum

Secondly, all participants were requested to express their opinion on a list of perceived benefits of the Joint Curriculum in order to analyse the feedback of the stakeholders and the expected impact by the consortium partners.

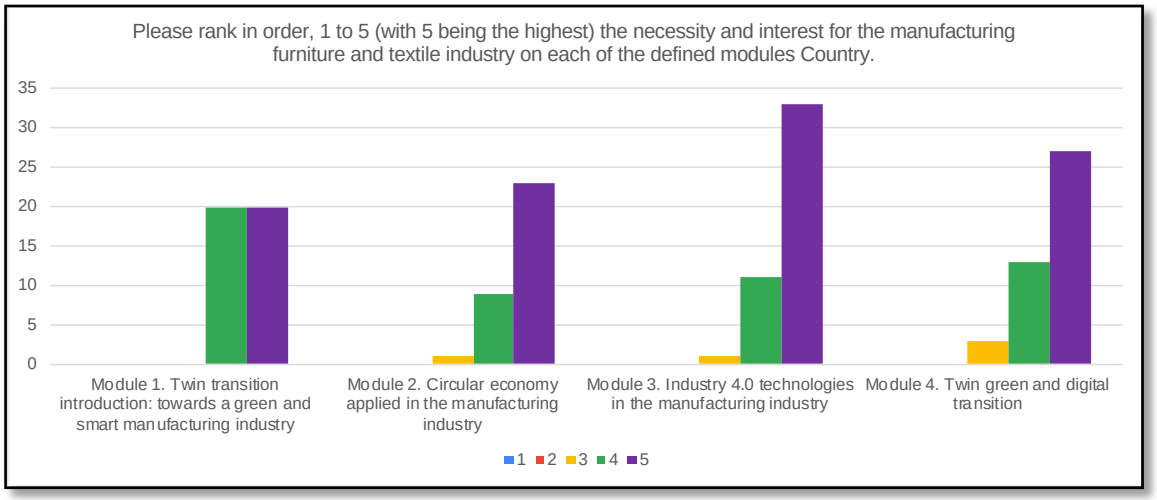
More than 88% of the surveyed strongly agree or agree with them, a small percentage remain neutral, and no one disagrees.



Graphic 2: Benefits of the Joint Curriculum.

Training modules

In the third section, participants were requested to rank the four proposed modules according to their perceived necessity and interest for the manufacturing furniture and textile industry, with a score of 1 representing the lowest and 5 the highest. Analysis of the responses revealed that 93% of participants rated all four modules with a score of 4 or 5, indicating a high level of perceived relevance and interest across all proposed modules.



Graphic 3: Necessity and interest of the modules.

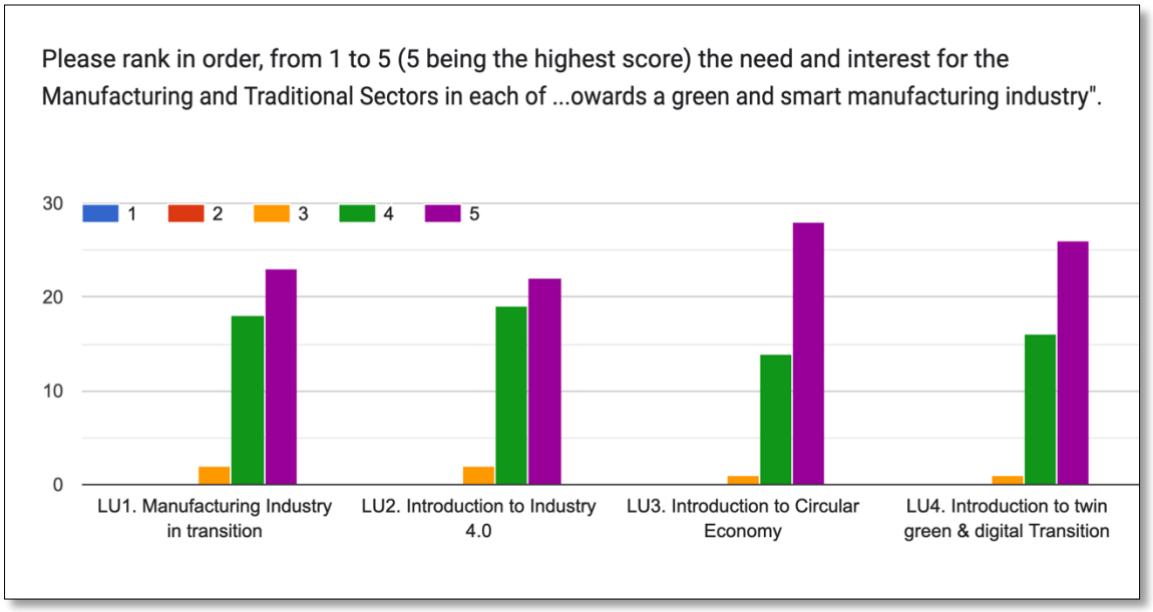
Learning units

To evaluate the different units within the four modules, participants were asked to rank the level of need and interest of the Manufacturing and Traditional

Sectors for each specific unit. This section of the questionnaire delved deeper into the specific training topics that will be addressed in the future training course. Although participants were asked to rank all the units within a single question, the results are analyzed by module below.

Module 1, which covers the introduction to twin transitions towards a green and smart manufacturing industry, received a high score for all its units, with over 90% of participants rating them between 4 and 5.

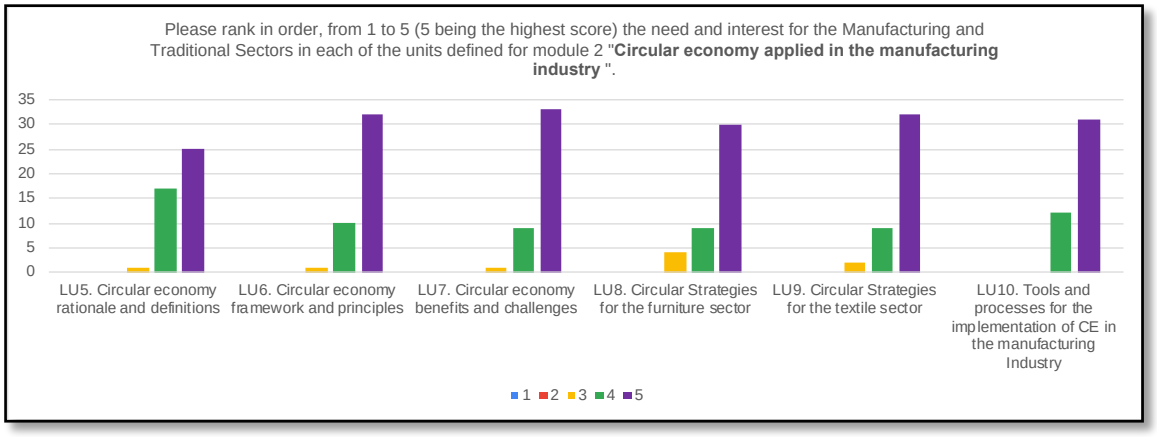
Module 1: Twin transition introduction: towards a green and smart manufacturing industry.



Graphic 4: Ranking of learning units' module one.

Module 2: Circular economy applied in the manufacturing industry.

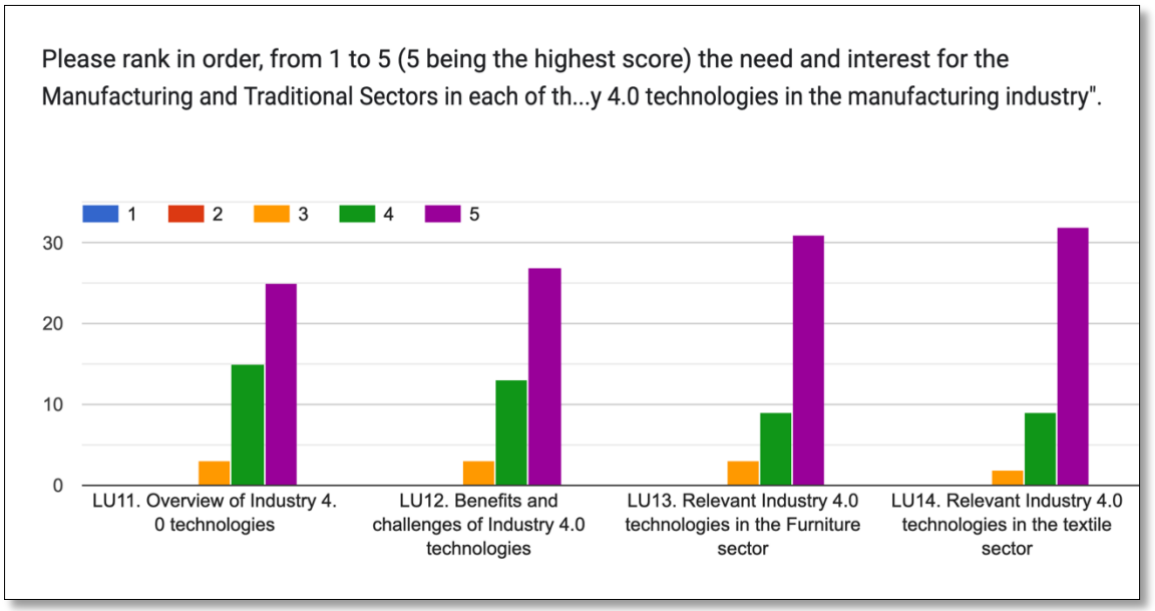
Overall, the responses indicate a high level of perceived necessity and interest all the units within module two, with the majority of respondents giving them a score of 4 or 5. The units with the highest scores were LU6, LU7, LU9 and LU10, which cover the circular economy framework and principles, the benefits and challenges of circular economy, circular strategies for the furniture and textile sectors, and tools for implementing circular economy in manufacturing, respectively.



Graphic 5: Ranking of learning units' module two.

Module 3: Industry 4.0 technologies in the manufacturing industry.

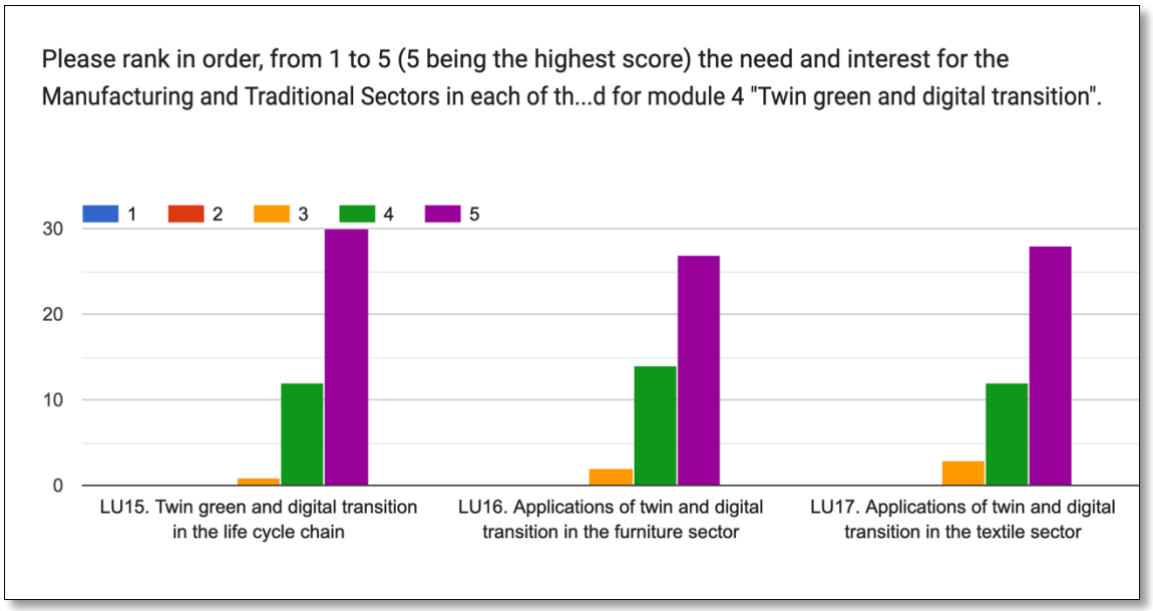
As the modules progressed, an increasing interest in the Manufacturing and Traditional Sectors could be observed. Unit 14 received the highest rating while Unit 11 was rated the lowest. However, it was Unit 13 that had the most divergent responses. Overall, it is worth noting that all units received a high score, as the majority of responses fell between 4 and 5.



Graphic 6: Ranking of learning units' module three.

Module 4: Twin green and digital transition

The majority of survey respondents rated all three proposed units of Module 4 as both interesting and necessary. Specifically, Unit 15 received the highest score, indicating that it was particularly well received. While Unit 17 received a slightly lower score, it still received a very positive evaluation overall.



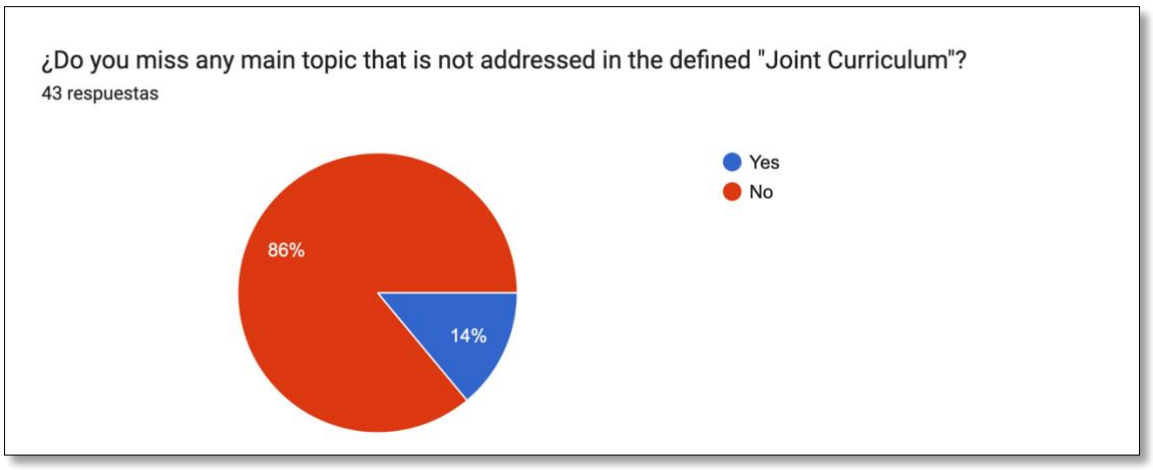
Graphic 7: Ranking of learning units' module four.

Finally, a question was included to determine if the survey respondents felt that any specific topic was missing from the defined Joint Curriculum. The results showed that 86% of respondents answered negatively, indicating a high level of satisfaction with the Joint Curriculum. The remaining 14% answered affirmatively.

Based on the feedback received from respondents, there is notable emphasis placed on the following two points:

- Sustainable design.

- Technological solutions, market niches and adoption strategies in small and medium-sized companies.



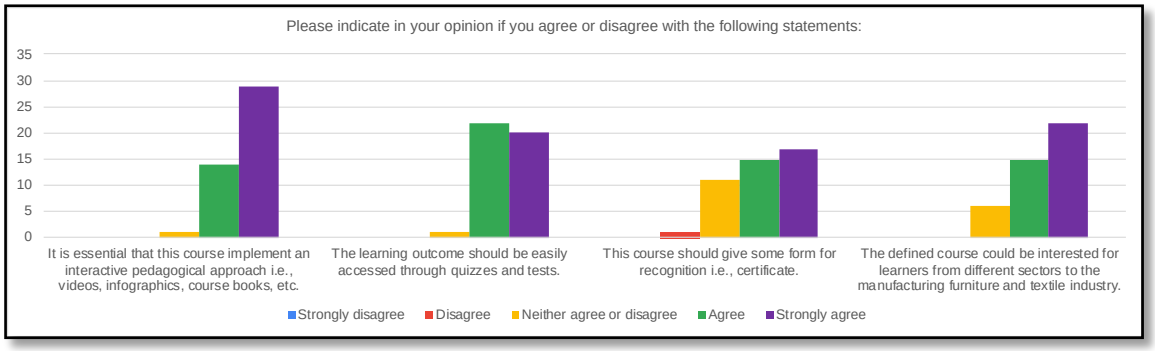
Graphic 8: Missing topics.

TwinRevolution training course

The final section of the survey consisted of several questions regarding the methodology employed in the development of the training course, the perceived usefulness of the proposed course, and the identified barriers to its implementation.

Methodology

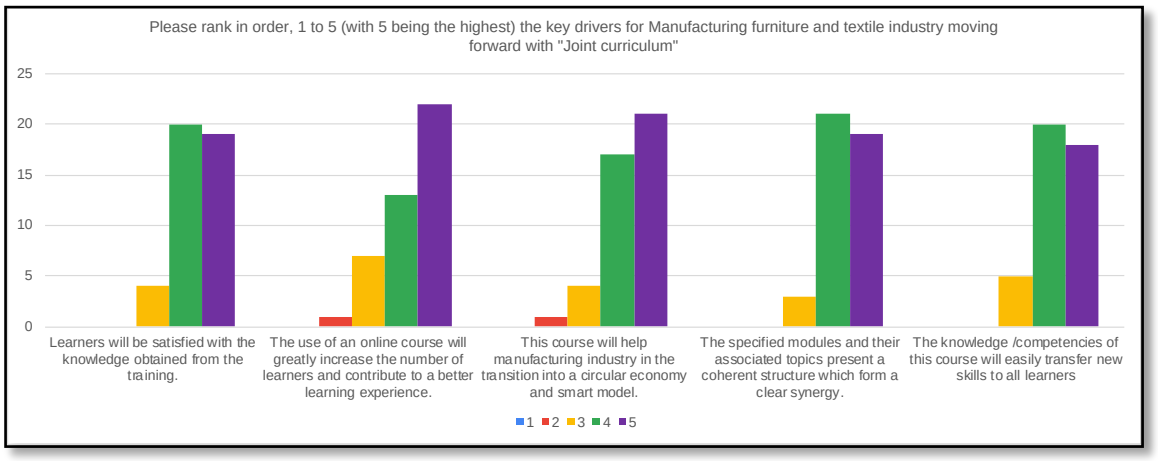
Four questions were asked regarding the methodology and other aspects of the future TWINREVOLUTION training course. The received answers indicate that an interactive pedagogical approach to the training materials, assessments based on quizzes and tests, and a final certificate are necessary to be included. Additionally, survey respondents stated that this course could be of interest to learners from various sectors, not just the manufacturing, furniture, and textile industry, ensuring that the proposed course will have a broad impact.



Graphic 9: Statements. Methodology of the course.

Key drivers

Secondly, participants were asked to rank five statements about the proposed training course and how it could support the transition to a circular business model for companies in the manufacturing furniture and textile industry. The results showed that all statements received strong positive feedback from the participants, with more than 80% ranking each statement with a score of 4 or 5.



Graphic 10: Key drivers ranking.

General comments

Finally, an open-ended question was included at the end of the questionnaire for participants to provide any additional comments about the TWIN REVOLUTION project. Several suggestions were collected, among which the following ones stand out:

- It will be very beneficial for future knowledge. For furniture making I filled the smallest grade, it is out of caution that I cannot judge.
- Good didactic structure.
- These topics should be implemented in VET schools subjects, in curricula, only on-line study is not sufficient. when the teachers don´t start teaching it, the companies will not have skilled employees.
- Importance of training transcending theoretical aspects and providing concrete tools for the start of specific activities for the company's transition, and implementation. The training activities may require students to carry out specific proposals in the companies in which they work, and with concrete examples applied in the context of the sector,

with examples of good practices and explanation of the steps to be taken in their development in real entities of the regions where it is developed (Region of Murcia for example).

- This Joint Curriculum seems to be very useful toll to supplement the current knowledge of experts or the education of the students. The most important is to educate new technical experts with deep knowledge related to materials and manufacturing technologies in textile and furniture sector; then, the knowledge gained thanks to this Joint Curriculum will be very useful to accelerate the transition.
- The course is very well structured and includes important topics for future developments in the two sectors and beyond. I did not find the answer for which EQF level students is meant for and how will you assure that the course will be used beyond the project partners. I would need more information about the content in the general parts about green and digital transition to properly assess if the course is at least in that part transferable to other sectors. I am covering service sector precisely hairdressing on EQF 4 and 5 levels in Slovenia and would be interested to see if there are any similar courses or materials for our schools to use. I am sure my colleagues at CPI covering furniture and textile fields will be willing to share the OER with their VET schools. All the best!

Upon reviewing the aforementioned responses, it is pertinent to emphasize that the respondents hold the view that the course's structure is highly advantageous for students to attain the requisite knowledge for their future professional endeavors, specifically within these particular sectors. Furthermore, they express a strong recommendation for offering this course at Vocational Education and Training (VET) schools.

3. Result analysis

The results are being analyzed in the same order as they are presented in the previous section.

Data of the Participants

The TWINREVOLUTION project has effectively engaged diverse stakeholders, placing a special focus on universities as leading experts in the circular economy and industry transition fields, as well as wood and furniture SMEs. This approach ensures that the Joint Curriculum meets the expectations of the primary target group. Moreover, the project has successfully achieved a strong European representation, with participants hailing from various countries within the consortium partners.

TwinRevolution Joint Curriculum

- **Needs addressed by the Joint Curriculum:**

The questionnaire results provide clear evidence that the defined Joint Curriculum successfully addresses the crucial gaps required for a Twin transition in the Manufacturing sector and Textile industry, as indicated by the overwhelming majority of surveyed participants. Nevertheless, it is important to consider certain suggestions during the development of training materials. For instance, incorporating didactic content on sustainable design and integrating strategies for implementing digitization should be taken into account within the curriculum.

- **Benefits of the Joint Curriculum:**

The results of the questionnaire unequivocally showcase the anticipated positive impact of the TwinRevolution training course, primarily attributed to its well-defined Joint Curriculum. The evident benefits and imperative need for this training in order to effectively implement circular strategies in the textile and furniture industries leave no room for doubt.

- **Training modules:**

All proposed modules have received a great response, with high rankings due to their interest and necessity for the industry.

Learning units:

The analysis of feedback on the different units indicates that while some units may hold slightly more importance than others from the participants' perspective, all units are essential for achieving the ultimate goal of the TwinRevolution training course. However, it would be beneficial to take into account the feedback received from the respondents during the development of the training materials. Some key points to consider are:

- Using an infographic or video to clearly explain the transition towards a greener and smarter manufacturing industry (Module 1).
- Introducing some topics on sustainable design in Module 3.

TwinRevolution training course

- **Methodology**

The feedback received from the last questions clearly indicates the necessity of implementing an interactive pedagogical approach in the TWINREVOLUTION training course, using videos, infographics, and quizzes to provide an innovative and dynamic learning experience. Additionally, the option of obtaining a certificate upon completion of the course is seen as an additional motivation for learners. It is also recommended to broaden the scope of dissemination activities to offer the course to other sectors beyond the manufacturing furniture and textile industry.

- **Key drivers**

The feedback from all the participants clearly indicates the need for training in this area of study, as it will support the twin and digital transition by improving the current skills and knowledge of professionals in the manufacturing and textile industries.

4. Conclusions

Due to the previous analyses, as conclusions it has been stated different improvements in the Joint Curriculum and point to take into account at the hour to develop the TWINREVOLUTION training materials.

Improvements in the Joint Curriculum

Below, we present the proposed improvements suggested by the respondents and outline how they will be incorporated into the curriculum.

- Introduce a topic on sustainable design. This consideration has already been taken into account in the curriculum and is included in Module 4, LU15, titled "Twin Green and Digital Transition."
- Technological solutions, market niches and adoption strategies in small and medium-sized companies. Accompaniment services and achievement of strategic alliances for the implementation in small and medium-sized companies' Specific niches and market opportunities; Specific opportunities for alliances with social economy entities in labour-intensive activities; Collective solutions and free computer tools in the digitization of the company. These topics are specifically addressed in LU13 "4.0 technologies in the textile sector" and LU14 "Twin green and digital transition in the life cycle chain."

Points for developing training materials

- To effectively explain the transition towards a greener and smarter manufacturing industry, it could be beneficial to utilize an infographic or video that visually summarizes the key points of this process.
- Consider incorporating a topic on sustainable design.

The survey results demonstrate that the Joint Curriculum developed for the TWINREVOLUTION project aligns with the industry needs of both sectors. The feedback received from participants will be duly considered to enhance the outcomes. It is worth noting that the overall satisfaction rate exceeds 90%,

thereby meeting the established Key Performance Indicators (KPIs) outlined in the project's quality assurance plan.

5. References

[1] N. Malhotra, "Questionnaire design and scale development. The handbook of marketing research: Uses, misuses, and future advances," 2006.

6. ANNEX 1 - Joint Curriculum Structure.

The aim of TWINREVOLUTION, co-funded by the Erasmus+ Programme of the European Union, is to create an Innovative didactic content to promote the integration of the Circular Economy Principles within the different business models that the furniture and textile sectors specialized in office and contract are currently based. It will comprise a joint curriculum, didactic materials and a collaborative platform in line with the needs of the different target users identified. Learners and workers from the furniture and textile sectors, professionals and entrepreneurs willing to create new businesses towards the circularity of furniture and textile products.

TWINREVOLUTION will develop and implement an innovative practice, a new training curriculum for the furniture and textile sector, specifically for the office furniture/textile and contract sectors, adapted to the future trends and needs of the whole society in terms of circular economy. Thus, TwinRevolution will reinforce the vocational education and training of the target groups, and review those key competences and skills needed for closing the loop of those furniture linear business models.

In this short document, you could see an overview of the planned training course that will be developed in the framework of TwinRevolution project.

You can find more information in the project website: https://twinrevolution.eu

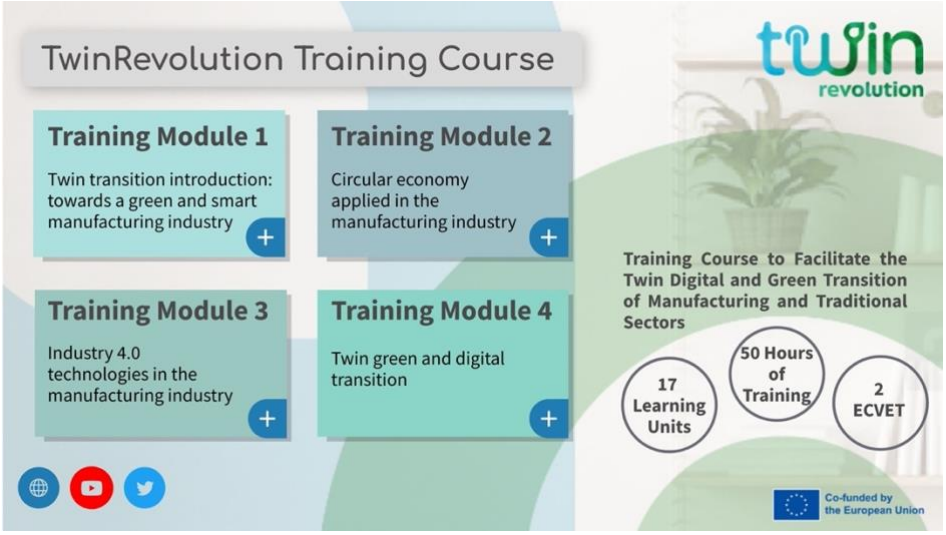


Figure 1: TwinRevolution training course structure.

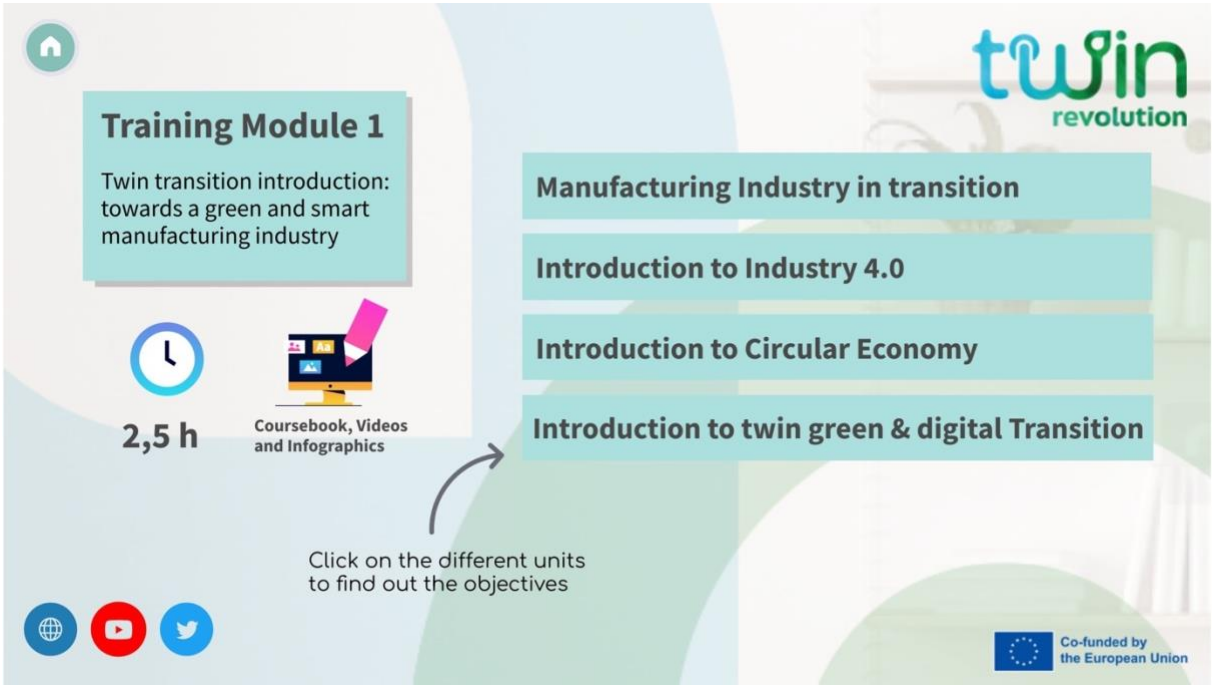


Figure 2: Module 1. Twin transition introduction.

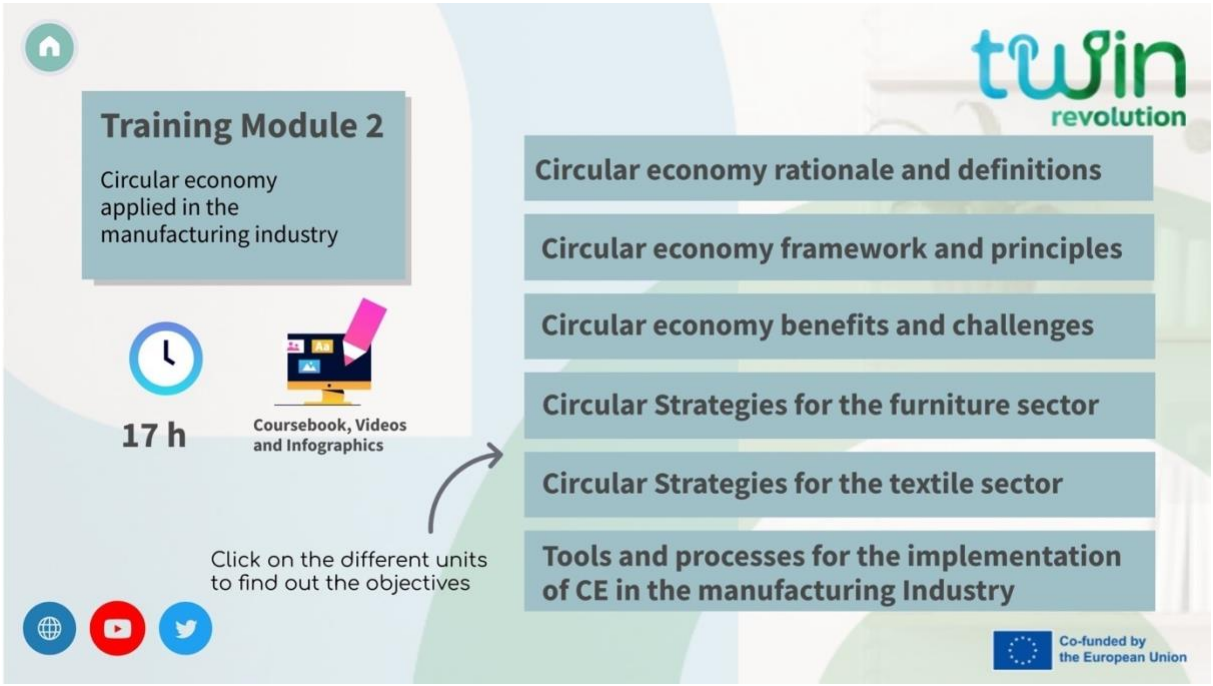


Figure 3: Module 2. Circular economy applied in the manufacturing industry.

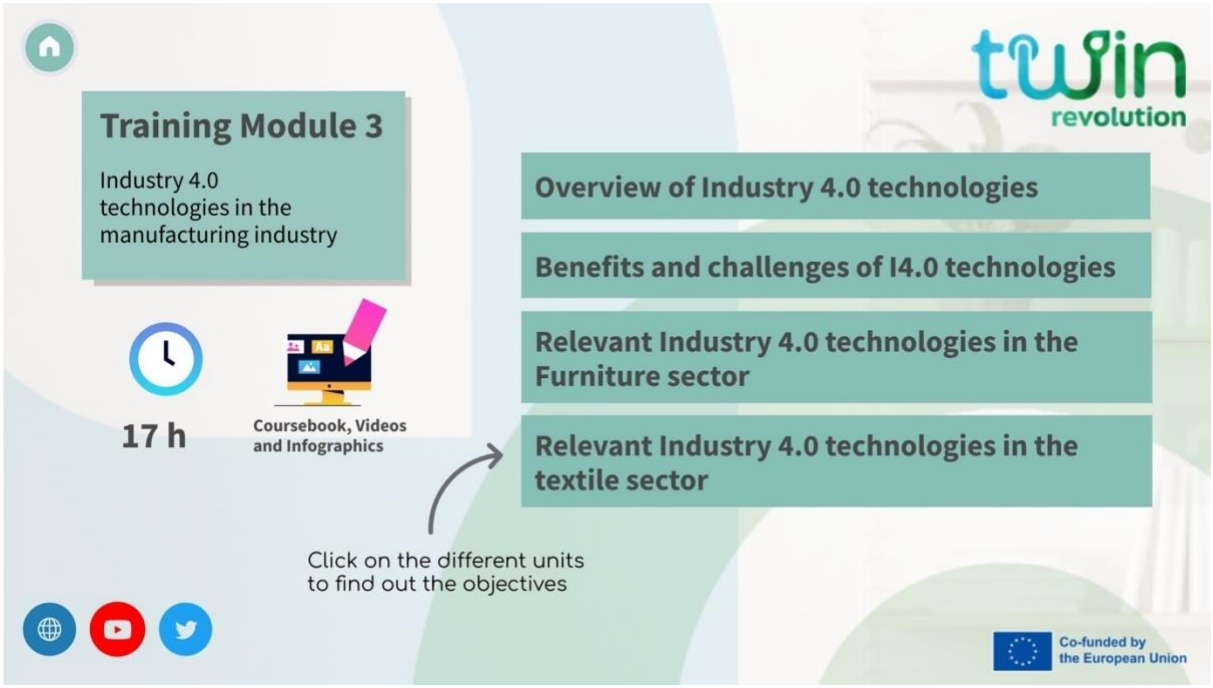


Figure 4; Module 3. Industry 4.0 technologies in the manufacturing industry.

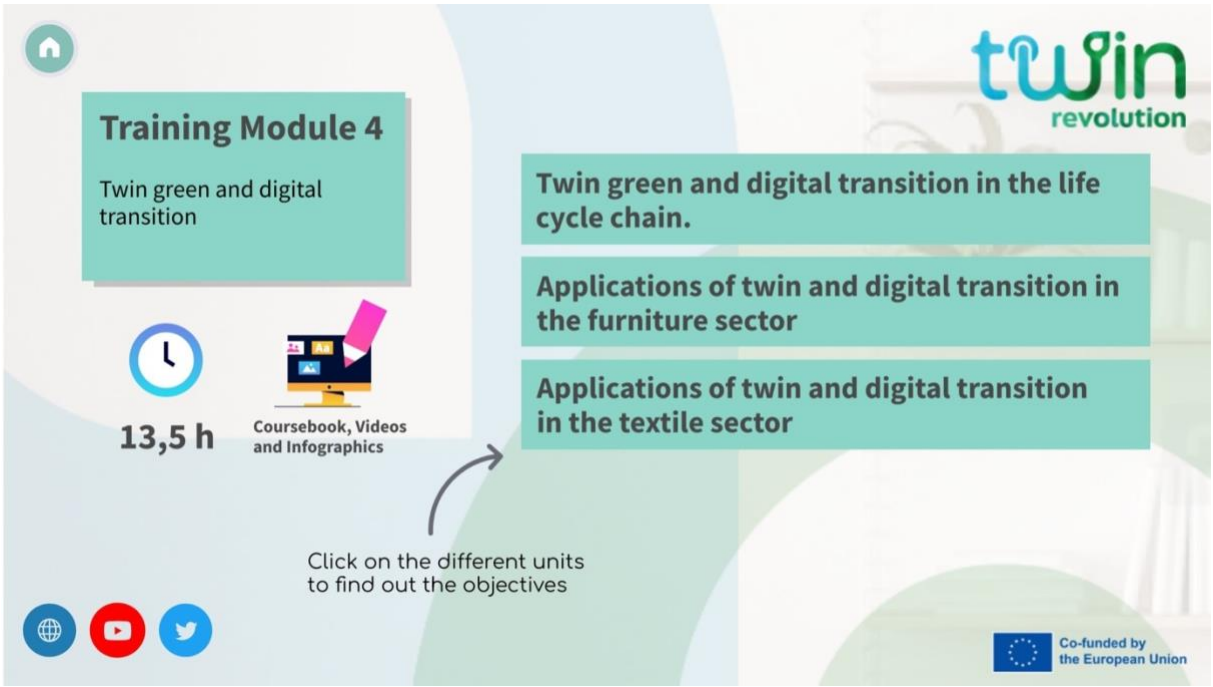


Figure 5: Module 4. Twin green and digital transition.

7. ANNEX 2 - Questionnaire

Validation of the Joint Curriculum: Questionnaire

Please, complete the following survey about the Joint Curriculum on twin transition for the furniture and textile sector developed on the framework of the TwinRevolution, Erasmus+ project.

The answers are strictly confidential and will be only shared with the project partners. Questionnaire data will be only treated in conjunction with other responses.

Please, check the Joint Curriculum overview before answer the questionnaire.

DATA OF THE PARTICIPANT

Name of your organization:

Position:

Country:

Email (by providing your email, you agree to receive information on the TwinRevolution project)

QUESTIONNAIRE

1. In your opinion do you think the draft of the 'Joint curriculum' addresses the needs of the manufacturing and textile industry to implement the necessary changes for a transition to a twin green & digital Transition.

a)	Greatly address the needs	
b)	Somewhat address the needs	
c)	Partially address the needs	
d)	Does not address the needs	

2. Please indicate in your opinion on the following perceived benefits of the 'Joint curriculum'.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
The chosen modules, lessons and topics are essential to the manufacturing furniture and textile industry					
Manufacturing furniture and textile industry will acquire the necessary knowledge on how to work towards a circular company					
The use of the designated modules will Increase HR excellence and advance distance learning opportunities					
The ´Joint Curriculum´ will facilitate the implementation of sustainable practices in the manufacturing industry through the					

implementation of advanced technologies.					
The described joint curriculum will encourage new business opportunities					
The necessary knowledge, skills and competences towards a green and smart industry have been outlined in the 'Joint curriculum'					

3. Please rank in order, 1 to 5 (with 5 being the highest) the necessity and interest for the manufacturing furniture and textile industry on each of the defined modules

	1	2	3	4	5
Module 1. TWIN TRANSITION INTRODUCTION: TOWARDS A GREEN AND SMART MANUFACTURING INDUSTRY					
Module 2. CIRCULAR ECONOMY APPLIED IN THE MANUFACTURING INDUSTRY					
Module 3. INDUSTRY 4.0 TECHNOLOGIES IN THE MANUFACTURING INDUSTRY					

Module 4. TWIN GREEN AND DIGITAL TRANSITION					

4. ¿Do you miss any main topic that is not addressed in the defined ¨Joint Curriculum¨?

Yes	
No	

In case of "YES", what topic do you consider is not addressed?

5. Please rank in order, 1 to 5 (with 5 being the highest) the necessity and interest for the Manufacturing and Traditional Sectors on each of the defined units

Module 1: twin transition introduction: towards a green and smart manufacturing industry	**1**	**2**	**3**	**4**	**5**
LU1. Manufacturing Industry in transition					
LU2. Introduction to Industry 4.0					
LU3. Introduction to Circular Economy					
LU4. Introduction to twin green & digital Transition					

Module 2: circular economy applied in the manufacturing industry	1	2	3	4	5
LU5. Circular economy rationale and definitions					
LU6. Circular economy framework and principles					
LU7. Circular economy benefits and challenges					
LU8. Circular Strategies for the furniture sector					
LU9. Circular Strategies for the textile sector					
LU10. Tools and processes for the implementation of CE in the manufacturing Industry					
Module 3: industry 4.0 technologies in the manufacturing industry	1	2	3	4	5
LU11. Overview of Industry 4.0 technologies					
LU12. Benefits and challenges of Industry 4.0 technologies					
LU13. Relevant Industry 4.0 technologies in the Furniture sector					
LU14. Relevant Industry 4.0 technologies in the textile sector					
Module 4: Twin green and digital transition	1	2	3	4	5

LU15. Twin green and digital transition in the life cycle chain					
LU16. Applications of twin and digital transition in the furniture sector					
LU17. Applications of twin and digital transition in the textile sector					

6. ¿Do you miss any specific topic that is not addressed in the defined ¨Joint Curriculum¨?

Yes	
No	

In case of "YES", what topic do you consider is not addressed.

7. Please indicate in your opinion if you agree or disagree with the following statements:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
It is essential that this course implement an interactive pedagogical approach i.e., videos, infographics, course books, etc.					

The learning outcome should be easily accessed through quizzes and tests					
This course should give some form for recognition i.e., certificate					
The defined course could be interested in learners from different sectors to the manufacturing furniture and textile industry					

8. Please rank in order, 1 to 5 (with 5 being the highest) the key drivers for Manufacturing furniture and textile industry moving forward with 'Joint curriculum'.

	1	2	3	4	5
Learners will be satisfied with the knowledge obtained from the training					
The use of an online course will greatly increase the number of learners and contribute to a better learning experience					
This course will help manufacturing industry in the transition into a circular economy and smart model.					

The specified modules and their associated topics present a coherent structure which form a clear synergy					
The knowledge /competencies of this course will easily transfer new skills to all learners					

9. Please rank in order, 1 to 5 (with 5 being the highest) the main perceived barriers of this course

	1	2	3	4	5
The lessons are not complementary to each other and do not meet the needs of the manufacturing and textile industry					
The topics covered in this course will not add value to my learning outcomes					
The materials designed for such a course will be difficult to manage and deliver					
The modules presented will take up a significant large amount of my time resulting in loss of productivity					
Whether this course is implemented or not it will not have a significant impact on the manufacturing and textile industry return of investment (ROI)					

10. Please add any comment on the ´ TWIN TRANSITION Joint Curriculum´ that you consider.

twin revolution

Twin digital and green transition for furniture and textile industries

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