twin revolution

Twin digital and green transition for furniture and textile industries

Twin transition in the manufacturing sector

A blueprint

Executive summary (English version)

Co-funded by the European Union

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September 2022

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Co-funded by the European Union

This work has been done in the framework of TwinRevolution project, Funded by the European Union - application number 2021-2-DE02-KA220-VET-000050453. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

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About TWIN REVOLUTION

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.

The TwinRevolution project will develop the following results:

- A BLUEPRINT ON TWIN TRANSITION IN THE MANUFACTURING SECTOR: The Blueprint will bridge key enabling technologies with circular strategies to be implemented in textile and furniture industries; compile and analyse European policies that influence the twin transition and the current approach in VET offer; and define the necessary learning outcomes to reskill current and future workforce.
- A JOINT CURRICULUM ON TWIN TRANSITION IN THE MANUFACTURING SECTOR which will define the necessary learning paths to ensure knowledge acquisition, grouping key skills and competences into a set of training modules and units.
- A PORTFOLIO OF TRAINING MATERIALS ON THE TWIN TRANSITION FOR THE MANUFACTURING SECTOR. These online materials will be defined and developed to cover the knowledge gap for a successful green and digital transition.
- A DEDICATED E-LEARNING PLATFORM, which will host the learning materials.

For more information, go to www.twinrevolution.eu

Executive Summary

Although the twin digital and green transition is one of the main priorities of the EU, there is a lack of knowledge on how both transitions could act as complementary drivers for the traditional manufacturing industry, nor guidance on how to transfer this knowledge gap to the existing VET system.

The TwinRevolution project aims to set the ground and update VET systems for the current and future manufacturing industry to be aligned with the twin digital and green transition.

The report offers an overview of the current challenges faced by the textile and furniture industry and details how circular and digital strategies can support the transformation of both sectors. Best practices examples from both industries illustrated how smart and circular approaches can accelerate the transformation of these two sectors.

Following a literature review detailing the current state of industry 4.0 and circular economy in both sectors, the report highlights how specific Key Enabling Technologies can support a twin transition.

In this blueprint, we highlight eight industry4.0 technologies with great sustainability relevance:

Internet of things

Considered the most integrated digital technology for Circular Economy, IoT is useful to collect data during the product life cycle, tracking product flows from the design to the end of use, which can be applied for a better use of resources (product design) and the optimization of disassembly processes.

Big data & analytics

Big data and analytics, closely linked to IoT, serve the circular economy through their potential to optimise processes and enhance

decision-making, using the data collected from the IoT to improve resource management across the entire product life cycle.

Simulation

Simulation can be exploited to virtualize/optimise different processes, such as disassembly processes, before replicating them in the real world. Thus, it is possible to analyse how some processes could be implemented and their respective level of sustainability.

Robotics

The implementation of robotics in manufacturing industries allow to employ robots in an increasing number of applications that could be aligned with CE practices, such as facilitating waste sorting and disassembly and remanufacturing processes.

Additive manufacturing

Additive manufacturing allows for circular design, introducing new materials (including recycled materials) and designs that facilitate product repair. Due to the additive process, it contributes to waste reduction, reduction of handling and transportation activities, and lower energy consumption.

Augmented and virtual reality

Augmented and virtual reality act as virtualization tools, that facilitate the redesign of more repairable and modular products thanks to the simulation of alternative concepts.

System integration

Cyber-physical systems could contribute to the internet of things, as the continuous real-time exchange of data via virtual network, allows the use of resources (material and/or energy) in a more efficient way. Thus, it is possible to inform customers about the different

components of a product in order to ease their disassembly or recycling.

Artificial intelligence

Artificial intelligence can enable circular economy innovation across industries fostering circular design, through iterative machine-learning-assisted design processes that allow for rapid prototyping and testing. Moreover, artificial intelligence can also support the implementation of new circular business models, such as product-as-a-service and leasing, by combining real time and historical data from products and users. Finally, artificial intelligence can improve the reverse logistics tools necessary to close the loop of materials by boosting sort and disassemble, remanufacture, and recycle processes.

The implementation of these promising technologies to support a circular economy is not without barriers: different development speed between sectors, lack of standardisation across Europe, outdated waste management regulations, economic barriers, and lack of incentives to use secondary materials, as well as societal barriers are some of the reasons that hinder the full implementation of a twin transition. Beyond these systemic challenges, a successful transition should also take into account the risk of rebound effects minimising the sustainable potential of such innovative technologies.

Socially, the digital and green divide should be at the centre of the preoccupations towards a twin transition. As there is already a growing gap between highly skilled specialists who can use complex technologies and low skilled workers who might get unemployed because of automation, investing resources in upskilling the current workforce to the challenges of such twin transition remains a top priority. Improving the knowledge, skills, and competences of both the textile and furniture sectors to navigate this multi-sectoral green and digital revolution will therefore ensure that this transition is also socially sustainable. This is the objective of the TWIN

REVOLUTION project, which will in a later phase translate the key learning outcomes identified in this report into a joint training curriculum detailing the learning pathways to be taken by the industry to successfully transition towards a smart and circular future.

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