

CIRCULAR ECONOMY IN THE TEXTILE INDUSTRY: SKILLS AND COMPETENCES FOR A TRANSFORMATIVE SECTOR

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REZUMAT. Lucrarea prezintă primele rezultate obținute în cadrul proiectului " Innovative design practices for achieving a new textile circular sector " Design4Circle, finanțat de programul Erasmus +, privind condițiile și resursele necesare pentru implementarea unui nou tip de de afaceri: economia circulară. În acest scop, prin aplicarea unui chestionar și interpretarea rezultatelor obținute au fost identificate oportunități și modele de bune practici pe care firmele de confecții textile le pot utiliza pentru a realiza trecerea spre un nou model de business, sustenabil, impus de condițiile actuale ale economiei de piață.

Cuvinte cheie: economie circulara, design, produse de modă, eco- inovare.

ABSTRACT. This paper presents the first results obtained in the project "Innovative design practices for achieving a new textile circular sector " Design4Circle, supported by Erasmus+ Programme, Key regarding the needs and required resources for implementing a new type of business: the circular economy. It was surveyed existing practices, challenges and opportunities in the fashion and textile companies and then pointed out which skills and competencies are essential for supporting the transformation of a linear business into a circular one.

Keywords: circular economy, design, fashion products, eco-innovation

1. INTRODUCTION

The world population is growing, and this is affecting the environment. To ensure there are enough food, water and prosperity in 2050, we need to switch the economy model, from a *linear to a circular economy*. [1]

For a long time, the known and used model of the economy was the „linear“ one. Raw materials are used to make a product, and after its use, any waste (e.g. packaging) is thrown away. In an economy based on recycling, materials are reused. In order to ensure that in the future, there will be enough raw materials for food, shelter, heating and other necessities, the economy must turn into a circular model. Making new products from various waste and use materials more efficiently will reduce waste [2]. If new raw materials are needed, these must be obtained sustainably so that the natural and human environment is not damaged.

A circular economy works according to the **3R** approach of "Reduce, Reuse & Recycle". Products

are made of reused parts and materials, and after discarding a product, materials and parts are recycled. In a circular economy, the value is created by focusing on value retention. By keeping material streams as pure as possible during the complete value chain, the value of this material is retained.

Pure materials streams can be used multiple times to provide specific functionality or service while only making one investment. [3]



Fig. 1.1. Economy models, [1].

In a circular economy, manufacturers design products to be reusable [4]. The value of products

and materials is maintained as long as possible. Waste and resources use are minimised, and when a product reaches the end of its life, it is used again to create further value.

The re-use of a product (with new features) brings significant economic benefits, contributing to innovation, growth and job creation.[5]

A circular economy encourages sustainability and competitiveness in the long term. It can also help to:

- preserve resources – including some which are increasingly scarce, or subject to price fluctuation;
- save costs for European industries;
- unlock new business opportunities;
- build a new generation of innovative, resource-efficient European businesses – making and exporting clean products and services around the globe;
- create local low and high-skilled jobs;
- create opportunities for social integration and cohesion.

The eco-design of products is a crucial factor in the community strategy on integrated product policy. As a preventive approach, designed to optimise the environmental performance of products, while maintaining their functional qualities, it provides genuine new opportunities for manufacturers, consumers and society as a whole. In order to maximise the environmental benefits from improved design, it may be necessary to inform consumers about the environmental characteristics and performance of energy-related products and to advise them on how to use products in an environmentally friendly manner.

The objective of the Design4Circle project is to create an innovative learning curriculum in line with the needs of designers of the textile and fashion industry towards a circular business model, being the primary target group current and future fashion designers of the textile industry. Design4Circle will allow designers from the textile sector to reduce environmental impact during the product's life-cycle and to develop new and innovative businesses within the principles of a circular economy.

The following activities will be carried out to reach the project objective:

1. Analysis of current best practices and needs for eco-design and implement a circular business model in the textile sector;
2. Joint Curriculum definition;
3. Development of the training materials with different tools (texts, videos, photos, etc.);
4. Creation of an online MOOC platform to upload the training course and test validation.

In the beginning, it was made an analysis of resources available and needs for eco-design and current best practices in the textile sector:

- to define the best methodology to carry out the necessary research;
- to define the desk research on best practices, last resources available and needs for eco-design in the textile sector;
- to endorse the defined needs and gaps.

2. METHODOLOGICAL APPROACH

The field research, based on survey questionnaires, was designed according to main project objective.[5]

The survey/questionnaire was implemented simultaneously in the 6 EU countries: Latvia, Belgium, Spain, Portugal, Romania, and Macedonia.

The questionnaire is an elaborated semi-structured questionnaire with pre-defined options combined with open questions, and it is divided into two main parts:

Part I contains:

- general information about the companies – company dimension; product/ service and location;
- information about the company circular business model (values proposition, in a nutshell, main activities and resources, key actors, target groups, customer relationships);
- information about the transition process to a circular economy (drivers to experiment with the circular business model, existing resources, and other essential resources which are needed);

Part II: Skills to enable circular business models (Circular skills: the knowledge, abilities, values and attitudes needed to live in, develop and support a society that slows and reduces the impact of business activity on natural resources while creating value throughout the life cycle of products and services).

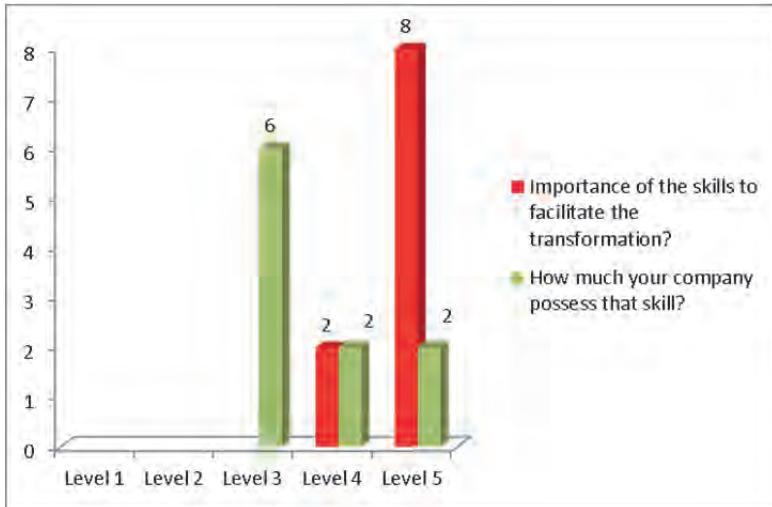
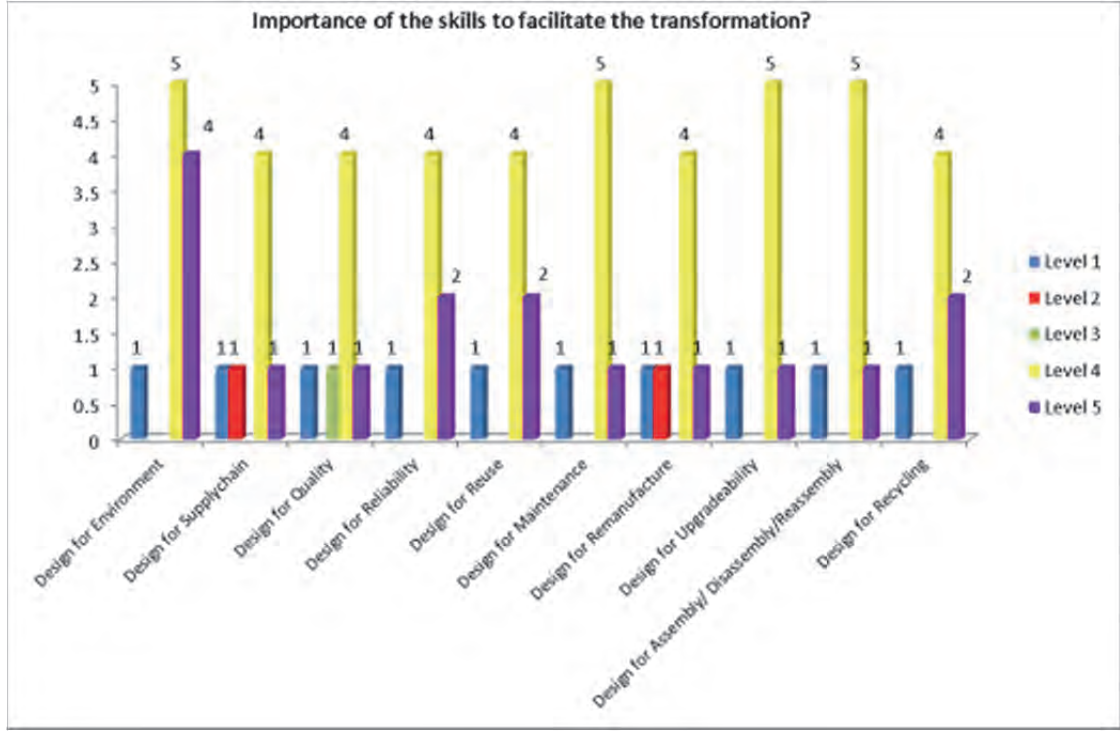
This paper presents the analyse, interpretation and discussion of the answers of Part II of the questionnaire.

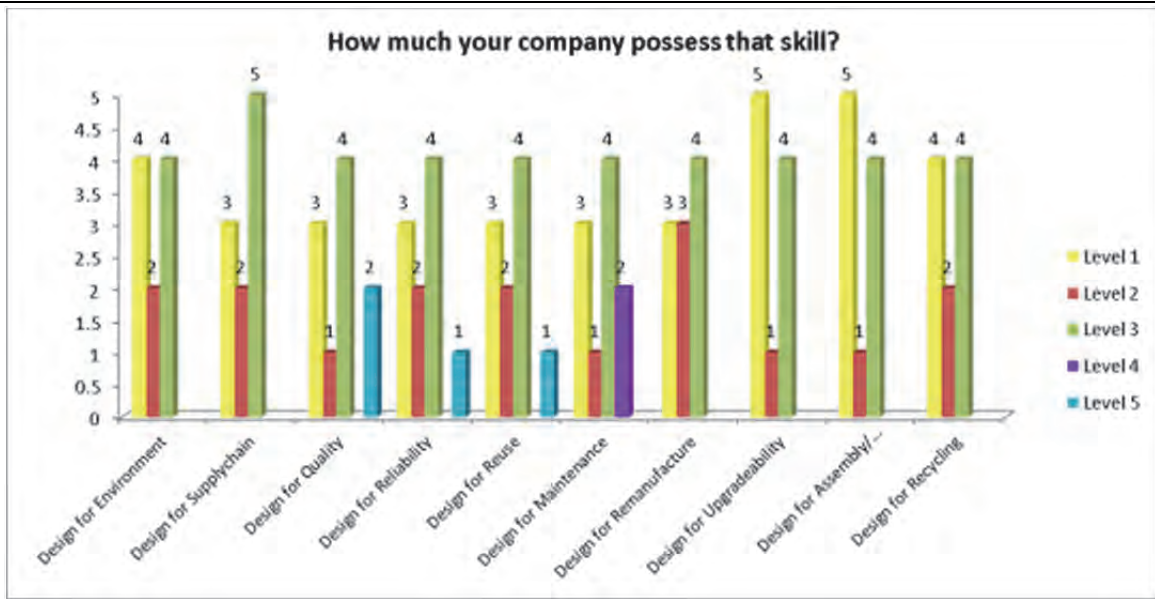
3. SURVEY ANALYSIS

The answers are diversified according to the company size, structure of production, customer network, experience, vision and policies [6].

CIRCULAR ECONOMY IN THE TEXTILE INDUSTRY: SKILLS AND COMPETENCES

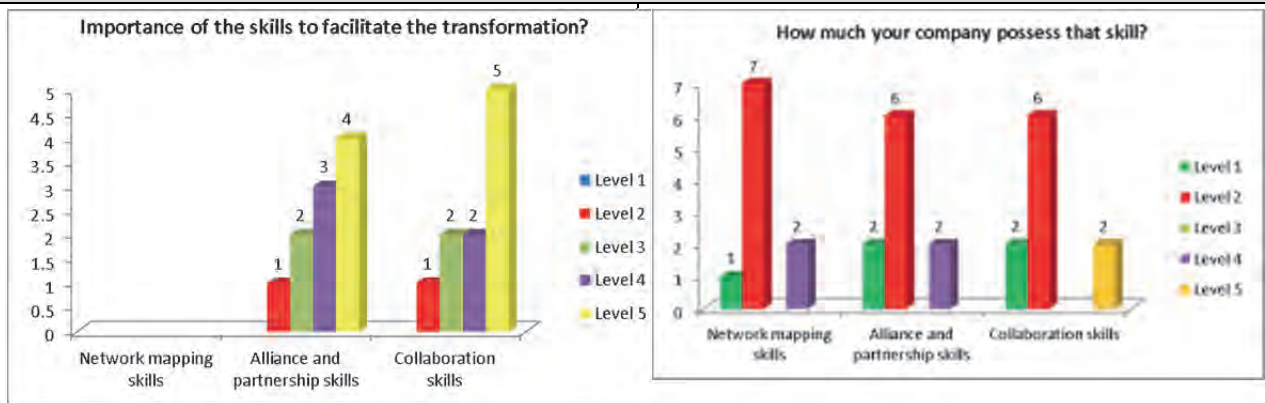
Table 1. Results, discussions and interpretation (part II of the questionnaire)

Resources skills: skills related to the knowledge of materials																																																																			
 <p>A bar chart comparing the importance of skills to facilitate the transformation (red bars) and how much the company possesses that skill (green bars) across Levels 3, 4, and 5. The y-axis represents the number of respondents from 0 to 8. For Level 3, 6 respondents possess the skill and 2 find it important. For Level 4, 2 respondents possess the skill and 2 find it important. For Level 5, 2 respondents possess the skill and 8 find it important.</p> <table border="1"> <thead> <tr> <th>Level</th> <th>How much your company possess that skill?</th> <th>Importance of the skills to facilitate the transformation?</th> </tr> </thead> <tbody> <tr> <td>Level 3</td> <td>6</td> <td>2</td> </tr> <tr> <td>Level 4</td> <td>2</td> <td>2</td> </tr> <tr> <td>Level 5</td> <td>2</td> <td>8</td> </tr> </tbody> </table>	Level	How much your company possess that skill?	Importance of the skills to facilitate the transformation?	Level 3	6	2	Level 4	2	2	Level 5	2	8	<p>8 respondents recognised that skills related with knowledge of materials are essential for implementing the policies of the circular economy (they assigned “Level5”) and the last 2 chose “Level 4”, which means close to remarkable.</p> <p>6 respondents admit that their company have medium skills related with knowledge of the material (“Level 3”) and other respondents chose “Level 4” and “Level 5” (almost and very important).</p>																																																						
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Eco-design skills: skills focusing on developing a new product service that is based on circular economy principles																																																																			
 <p>A grouped bar chart showing the importance of skills to facilitate the transformation for various eco-design criteria across Levels 1 to 5. The y-axis represents the number of respondents from 0 to 5. The x-axis lists ten criteria: Design for Environment, Design for Supplychain, Design for Quality, Design for Reliability, Design for Reuse, Design for Maintenance, Design for Remanufacture, Design for Upgradeability, Design for Assembly/Disassembly/Reassembly, and Design for Recycling. The legend indicates Level 1 (blue), Level 2 (red), Level 3 (green), Level 4 (yellow), and Level 5 (purple).</p> <table border="1"> <thead> <tr> <th>Criteria</th> <th>Level 1</th> <th>Level 2</th> <th>Level 3</th> <th>Level 4</th> <th>Level 5</th> </tr> </thead> <tbody> <tr> <td>Design for Environment</td> <td>1</td> <td>0</td> <td>0</td> <td>5</td> <td>4</td> </tr> <tr> <td>Design for Supplychain</td> <td>1</td> <td>1</td> <td>0</td> <td>4</td> <td>1</td> </tr> <tr> <td>Design for Quality</td> <td>1</td> <td>0</td> <td>1</td> <td>4</td> <td>1</td> </tr> <tr> <td>Design for Reliability</td> <td>1</td> <td>0</td> <td>0</td> <td>4</td> <td>2</td> </tr> <tr> <td>Design for Reuse</td> <td>1</td> <td>0</td> <td>0</td> <td>4</td> <td>2</td> </tr> <tr> <td>Design for Maintenance</td> <td>1</td> <td>0</td> <td>0</td> <td>5</td> <td>1</td> </tr> <tr> <td>Design for Remanufacture</td> <td>1</td> <td>1</td> <td>0</td> <td>4</td> <td>1</td> </tr> <tr> <td>Design for Upgradeability</td> <td>1</td> <td>0</td> <td>0</td> <td>5</td> <td>1</td> </tr> <tr> <td>Design for Assembly/Disassembly/Reassembly</td> <td>1</td> <td>0</td> <td>0</td> <td>5</td> <td>1</td> </tr> <tr> <td>Design for Recycling</td> <td>1</td> <td>0</td> <td>0</td> <td>4</td> <td>2</td> </tr> </tbody> </table>	Criteria	Level 1	Level 2	Level 3	Level 4	Level 5	Design for Environment	1	0	0	5	4	Design for Supplychain	1	1	0	4	1	Design for Quality	1	0	1	4	1	Design for Reliability	1	0	0	4	2	Design for Reuse	1	0	0	4	2	Design for Maintenance	1	0	0	5	1	Design for Remanufacture	1	1	0	4	1	Design for Upgradeability	1	0	0	5	1	Design for Assembly/Disassembly/Reassembly	1	0	0	5	1	Design for Recycling	1	0	0	4	2	<p>Analysing the answers, the conclusions are:</p> <ul style="list-style-type: none"> -all the criteria which define eco-design skills are essential and very important for 50% of the respondents (they assigned “Level 4” and “Level 5”); -at the opposite side, some respondents consider that all analysed criteria are not so crucial for developing new product service in a circular economy business (they assigned “Level 1”)
Criteria	Level 1	Level 2	Level 3	Level 4	Level 5																																																														
Design for Environment	1	0	0	5	4																																																														
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50 % of the respondents assigned “Level 1” and “Level 3” for all criteria, which define eco-design process of new product service when they were invited to evaluate if their company possess that skill. A few respondents admit that “Design for Quality” and “Design for Reuse” are essential in the eco-design process (they assigned “Level 5”). 2 respondents considered that “Design for Maintenance” is essential for new product service in a circular economy (they assigned “Level 4”).

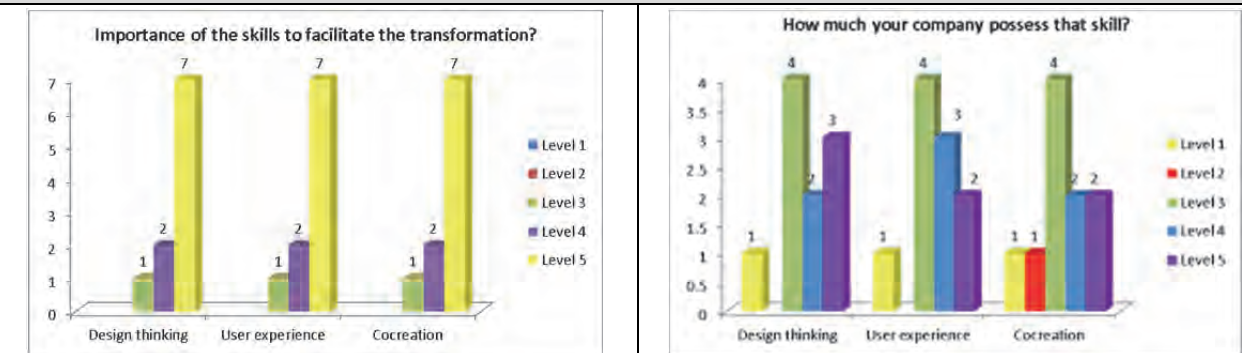
System thinking and Networking skills: skills supporting a whole system view allowing to develop complex business models involving multiple parties.



“Alliance and partnership skills” and “Collaboration skill” are considered essential for developing a complicated business (4 and 5 respondents assigned “Level 4”, respectively “Level 5”). Neither of the respondents considered “Network mapping skills” to take into consideration in developing a complex business model.

Many respondents assigned “Level 2” for all criteria when they have to evaluate if their company had “System thinking” and “Networking skills” (7 and 6 respondents). 2 respondents said that “Collaboration skills” are essential for developing a complex business model.

User-centred approach skills: skills focusing on meeting the customer needs starting from a user issue/challenge/need/

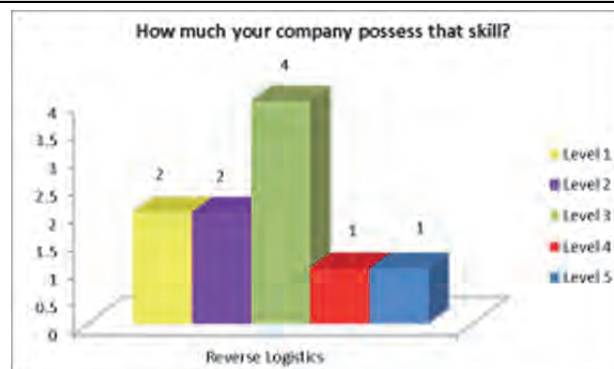
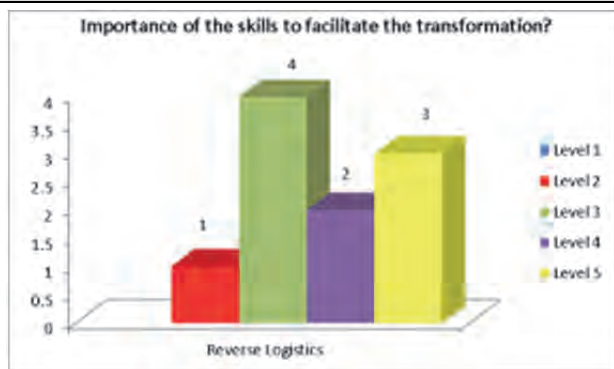


7 respondents considered that all criteria which define skill focusing on meeting the customer need starting from a user issue or challenge are very important (the assigned “Level 5”). All criteria received medium to high-level score (from “Level 3” toward “Level 5”).

Almost 50% (4 respondents) of the respondents chose “Level 3” for all criteria when they had to evaluate if their company had those skills. 3 and 2 respondents considered that they had all criteria in the company (they assigned “Level 5”).

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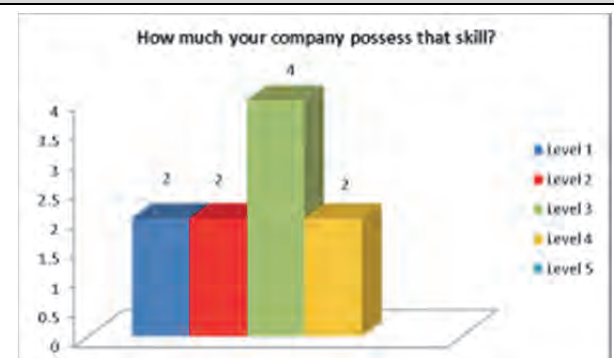
Reverse thinking skills: skills related to reverse supply chain



“Reverse logistics” are significant for **3** companies (they assigned “Level 5”).
4 respondents considered that skills related to reverse supply chain are almost essential (they assigned “Level 3”).

Regarding “Reverse thinking skills”, **4** respondents considered that they have in their companies.

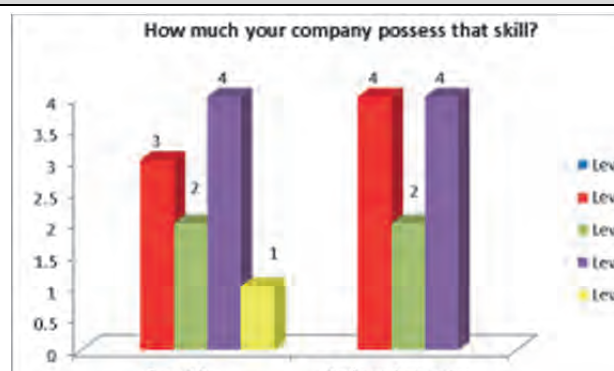
IT skills: skills in information technology allowing to develop new resources/information to be monetarized.



5 respondents considered that “IT skills” are essential to developing new resources/ information for a complex business. The scores are assigned from “Level 3” towards “Level 5”, which means that all respondents are aware of the role and importance of IT skills for a complicated business.

2 companies said that they have IT skills in their companies (assigned “Level 5”, which means that they possess up-dated IT program and information). **4** respondents possess IT skills at a medium level (they assigned “Level 3”).

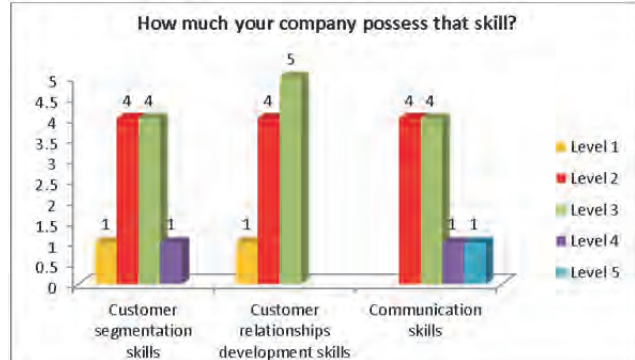
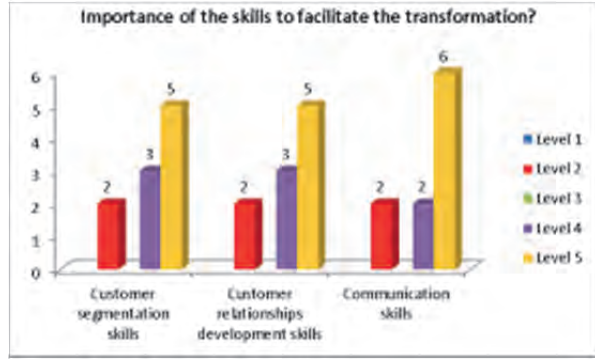
Entrepreneurship skills: skills focusing on new venture creation



7 respondents said that entrepreneurship skills are essential for a new complex business (they assigned “Level 5”, for each feature of entrepreneurship). The rest of the respondents chose “Level 3” (**1**) and “Level 4” (**2**), so they consider entrepreneurship medium towards outstanding for new venture creation. The scores are equally distributed among the two criteria, which define entrepreneurship skills.

4 respondents considered that they have in their companies entrepreneurship skills (they chose “Level 4”). **1** respondent considered that she/he had “Creativity” in the company at a high level (“Level 5”). “Creativity” received the most significant amount of scores, which means that this criterion is present in all companies.

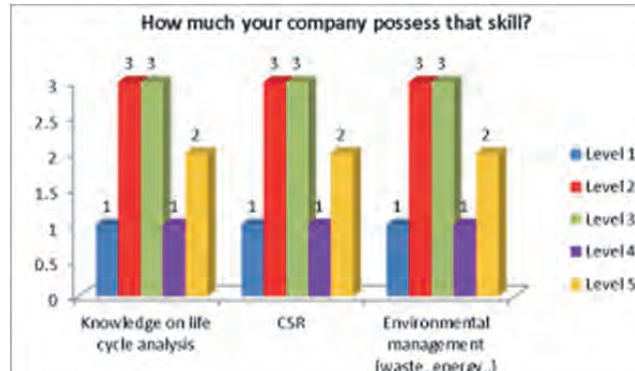
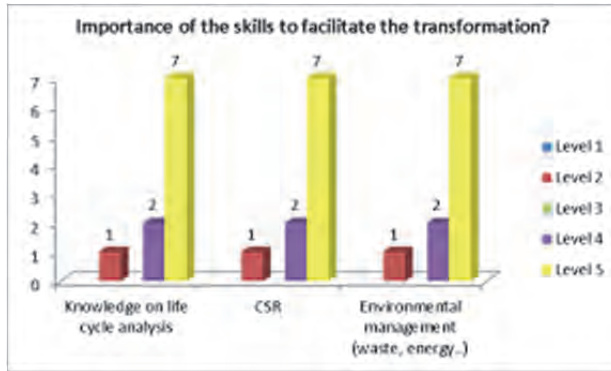
Marketing skills: skills focusing on Communication



50 % of the respondents or more said that marketing skills must be focused on communication (they assigned “Level 5”). The highest level of sum score was assigned to “Customer segmentation skills” and “Customer relationships development skills.”

4 or 5 respondents said that in their companies they have all criteria, which define marketing skills. “Customer segmentation skills” and “Customer relationships development skills” are present in many companies (those criteria got the highest level of sum scores).

Sustainability/environmental management skills: skills allowing the company to take into account the environmental and social impact of the new product services throughout its life cycle.



7 respondents said that “Sustainability /environmental management skills” are essential (they assigned “Level 5”), for each criterion. All criteria, which define “Sustainability /environmental management skills”, received an equal level of sum- scores.

2 companies said that they had in their companies all criteria, which define “Sustainability /environmental management skills” (they assigned “Level 5”). 3 respondents said that they had in their companies all criteria which define “Sustainability /environmental management skills” at a medium level or towards medium (“Level 2” and “Level 3”).

Service management skills: skills allowing to develop a business model focusing on delivering value from servicing instead of selling a product.



4 respondents considered that service management is essential (they assigned “Level 5”) or towards very important (“Level 4”).

4 respondents said that in their companies they have some skills about “Service management” (they assigned “Level 2”). 3 respondents and 1 respondent said that in their companies they have skills about “Service management” (they assigned “Level 4” and “Level 3”).

Are there any other skills you think are important to possess to become circular?

1 respondent share some personal ideas about the circular economy: “The willingness of the final consumer to drive the demand for those products. This is the only significant, driver”.

4. CONCLUSIONS

All interviewed companies conscious the problems of modern society: the decrease of the reserve of natural resources, the consumption, the exploitation, how we can and must protect the environment, how can be reached alternative solutions to produce new product with service and added value in order to meet the diversified needs of the customers, in condition of an globalization economy.

The circular economy business is the new solution for business success because its purpose is to design new products service by "reducing, recycling & reuse-ing "raw materials. This new model implies a new approach for the design process, new system thinking and networking skills, reverse thinking of the supply chain, IT, entrepreneurship and marketing skills in order to have a sustainable business for medium or long term.

This report shows that companies are increasingly aware of circular business: how to train its textile designers to acquire necessary competencies and skills to implement new practices on eco-design, how to develop specific, fundamental and transversal competencies and skills such as management,

entrepreneurship, leadership, digital and creativity skills, and language competence in the field of VET and how to foster the implementation of the EU Action Plan for the Circular Economy, both in a highly polluted sector as the textile one, and other industry sectors where design is a crucial process.

ACKNOWLEDGEMENT

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