



Textile Strategy for Innovative Higher Education

Part 2. Field Research

IO 1 Need analysis and state of the art report: transferring research and innovation in the textile & clothing manufacturing sector

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Disclaimer

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1. Executive summary

This report “Need analysis and state of the art report: transferring research and innovation in the T&C manufacturing sector” has been made within the framework of the project “Textile Strategy for Innovative Higher Education - TEXSTRA”, as a deliverable of the - “IO 1 Need analysis and state of the art report: transferring research and innovation in the textile & clothing manufacturing sector”.

This report contains the results obtained from the field research implemented by all partner countries, targeting three groups from the T&C sector: managers and professionals, experts and aspiring managers. The research is based on specific questionnaires, developed in the Guidelines and discussed by the partners. A minimum number of 10 respondents/target group/country was agreed upon.

The results were collected from all partners by the IO1 lead partner TUIASI. All questionnaires were processed according to methodology, using SPSS v17. The results for each target group were interpreted and discussed. When significant, comparisons were made between the positions of the 3 groups of respondents.

Based on these results and discussions, conclusions were drawn considering the expected outcomes of the IO1. Recommendations were made in reference to the perceived need and importance of knowledge/skills related to research and innovation in the T&C sector, identifying the ones considered by the respondents as the most relevant.

Potential beneficiaries of the report are: educational institutions (universities, institutes of technology), enterprises (SMEs, suppliers, R&D centres, etc.), public bodies (chambers of commerce, local governments, professional associations) and users (students, manufacturing companies, creative companies, teachers, researchers, designers, project managers) at European, national and regional levels.

2. Aims

The textiles and clothing manufacturing sector in Europe is facing several challenges. Owing to the financial crisis, the competition from emerging markets, or the environmental demands, among others, the sector, one of the largest and most important in Europe, in order to rise above the existing and foreseen challenges, needs to reassess its position on one of the most critical factors affecting its competitiveness: the skills of its workforce, in line with the EU strategic position on knowledge and innovation, as competitive advantages.

All these challenges require highly qualified professionals, who should have the right mix of skills, both professional and transversal, in order to demonstrate their competence for applied research, development and technological transfer. Furthermore, the emphasis is on research and innovation in both academia and enterprises; that requires us to focus on making the knowledge triangle work in the textile and clothing industry, by linking higher education (HE), research, and business, which is one of the goals of the EU policies.

Therefore, the industry, now more than ever, needs workforce qualified to manage the research and innovation actions; the application of good practices and the mastery of the most advanced methodologies for transferring the results of research into work environment through real project-based work focused on technological transfer are solutions that effectively answer these challenges.

In this context, the TEXSTRA project will develop the tools necessary for skills enhancement, targeted to higher education, in relation to research and innovation, in order to obtain its objectives:

- To strengthen the knowledge triangle, the cooperation and networking between HEI's, research organizations and private companies in order to reinforce the textile research position in the European context as a potential key in innovation-based development;
- To promote the development of research & innovation based actions, testing and development of new e-learning tools for students, trainers and professionals;
- To promote the application of good practices for the enhancement of innovative skills;
- To provide knowledge, skills and competences by using virtual tools

The TEXSTRA project focuses on identified problems affecting the textiles and clothing industry, related to skills and competences, in conjunction with research and innovation, such as:

- Most of the students from HEI's, as well as trainees, are not sufficiently familiar with the research and innovations aspects and with the latest trends and possibilities in the textile/clothing industry;
- The internships, as part of students' studies or training, are not efficiently directed to the innovative research and development departments. For most students, the internships take place in their countries and this is constricting in terms of maximizing the access to research and development;

- Higher education graduates need to obtain secondary skills to perform research and explore innovative solutions, skills regarding creativity and technological aspects of the advanced manufacturing processes, functionalization processes, digital skills etc;
- HE students' needs for knowledge on real problems and challenges of the textile and clothing SME's are not satisfied with the traditional classroom or internship training methods; new dynamic approaches to teaching are required, in order to obtain a deeper knowledge of the textile and clothing industry operation.

The planned activities and expected results of the TEXSTRA project are shaped to address these needs of the target groups (students, trainers, academics and textile SMEs).

The Intellectual Output O1 is focused on identifying and analysing those characteristics of the textile and clothing manufacturing sector that concern the research and - innovation presence within companies and educational programs.

In particular, regarding the provided education and training, the existing statistical data and trends, the anticipated skills and the perceived training needs, the existing good practices, perceived problems, challenges, new functionalities, gaps and mismatches, related to research & innovation in the textile and clothing sector in Europe using desk and field research (by all partners), will result in a "Need analysis and state of the art report: transferring research and innovation in the T&C -manufacturing sector". The report that will offer a European overview will serve as basis for designing and developing other project outputs and as a starting point for further research in the field.

The report will serve not only as basis for designing and developing other project outputs but also as a starting point for further research in the field. It will offer a European overview about the educational and training offer for textile and clothing manufacturing professionals and willing to be and a comparative study regarding the level of research and innovation within the textile and clothing manufacturing sector.

3. Methodology for the field research

For reaching the purposes of the IO 1, the definition of the methodology and the main tools according to which the field research will be realized in the different countries as well as the indications for a proper conduction and guidelines for reporting is provided.

The **field research**, based on **survey questionnaires**, was designed according to standard research methodology. It was applied to the following three groups of respondents:

Group 1: Managers and professionals from *T&C industries*;

Group 2: Aspiring / potential managers (students) from T&C sector;

Group 3: Relevant experts (experts from HEIs, VET professionals, intermediary organizations belonging to textiles and clothing sector).

The expected outputs of field research consist in significant information regarding:

- 1) Perceived training needs related to research & innovation of managers and professionals of textile and clothing manufacturing industries;
- 2) Perceived training needs related to research & innovation of potential managers and professional (students) of textile and clothing manufacturing industries;
- 3) Perceived problems, challenges, new functionalities, gaps and mismatches existing in the sector;
- 4) Inputs from HEI experts, VET professionals, intermediary organizations about the requested needs of the sector in terms of innovation;
- 5) An assessment of the level of research and innovation within companies and educational programmes addressed in the textile and clothing manufacturing sector.

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3.1. Structure of the questionnaires

The questionnaires contained structured questions of closed-ended type (multiple choice, rating, ranking, scaling) and also a few open-ended, giving the opportunity to the responders to add additional comments/proposals/observations when they are asked for their opinion or additional comments. Their complete content are presented in the ANNEXES of the report.

The questionnaires contained specific questions, according to the respondent profile as well as common questions. They were structured in three parts, as follows.

Part 1. Introduction

- Short presentation of the project and its aims, the purpose of the survey within the framework of the project;

- Indications on how to progress through the questionnaire according to the profile of the respondent, estimation for the time requirement;
- Confidentiality information

Part 2. Body of the questionnaires

a) Questionnaire addressed to managers (ANNEX 1)

- A. Background information:** A general assessment of the organization from which the respondent originates:
 - Company: size, type, profile, number of employees, departments and employees in research and innovation
- B. Perceived training needs related to research & innovation** of managers and professionals of textile and clothing manufacturing industries;
- C. Level of research and innovation within companies and educational programmes** addressed in the textile and clothing manufacturing sector.
- D. Perceived problems, challenges, new functionalities, gaps and mismatches** existing in the sector
- E. Cooperation between companies and HEIs/research centres**
- F. Information about the respondent** (position in the organization, highest qualification, working experience, gender, age, etc.)

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b) Questionnaire addressed to experts (from HEIs, VET, intermediary organizations) (ANNEX 2)

- A. Background information:** A general assessment of the organization from which the respondent originates: Organization: type, profile, departments etc.
- B. Training needs related to research & innovation** of managers and professionals of textile and clothing manufacturing industries;
- C. Level of research and innovation within companies and educational programmes** addressed in the textile and clothing manufacturing sector.
- D. Requested needs of the sector in terms of innovation;**
- E. Perceived problems, challenges, new functionalities, gaps and mismatches** existing in the sector
- F. Cooperation between companies and HEIs/research centres**
- G. Information about the respondent** (position in the organization, highest qualification, working experience, gender, age, etc.)

c) Questionnaire addressed to aspiring managers and students (ANNEX 3)

- A. Background information:** A general assessment of the organization from which the respondent originates:
 - University: type (technical, comprehensive), size (number of students), study programmes offered
- B. Perceived training needs related to research & innovation** of potential managers and professionals (students) of textile and clothing manufacturing industries;

- C. Perceived level of research and innovation within educational programmes** addressed in the textile and clothing manufacturing sector.
- D. Perceived problems, challenges, new functionalities, gaps and mismatches** existing in the sector
- E. Cooperation between HEIs and companies /research centres**
- F. Information about the respondent:** field of study, study programme (enrolled / graduated), highest qualification, working experience, gender, age, etc.

Part 3. End of the questionnaires

The questionnaire ends by thanking the respondent for participating and asking whether would like to receive a brief report on the results. Also a space for comments and proposals will be included.

All 3 questionnaires were translated in the national languages of the partners' countries. For interpretation, the answers (especially where commentaries were added by the respondents) were translated into English.

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3.2. Implementation of the field research

All partners are to be involved in the implementation of the field research. A minimum number of 210 survey questionnaires will be applied in all partners' countries (30 per country). The selected respondents will belong to three different profiles mentioned above.

The steps that were followed in applying the survey questionnaire are:

1. Contact the relevant respondent
2. Send the questionnaire (via e-mail, mail, fax or link to on-line form) mentioning the deadline for completing
3. Check the questionnaire completing
4. Re-contact the respondent(s) in case on not completing
5. Collect the questionnaires from the respondents
6. Create a data base to enable statistical analysis
7. Check data base for errors
8. Perform the survey analysis

The qualitative information from the survey are translated from national languages to English to enable the cross country analysis.

4. Results and discussions

A total of 237 respondents from the seven partners' countries completed the survey. The distribution of all respondents by country of origin is presented in Table 1.

Table 1 Respondents' distribution by country

	Participating countries							Total
	Greece	Lithuania	Romania	Portugal	Italy	Spain	Bulgaria	
Managers and professionals	11	15	14	7	15	11	5	78
Experts	14	15	20	13	11	10	5	88
Aspiring / potential managers (students)	10	15	16	14	1	10	5	71

The questionnaires from all partner countries were processed using SPSS v17. The results obtained for each category (managers and professionals, experts and aspiring managers) are presented below. The results concerning the perceived need and importance for knowledge and skills related to research and innovation are presented separately for all respondents and discussed in comparison.

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4.1. Questionnaire addressed to managers and professionals

A. Background information

The background information concerned the type of company where the respondents activate (Table 2) and the number of employees (Table 3).

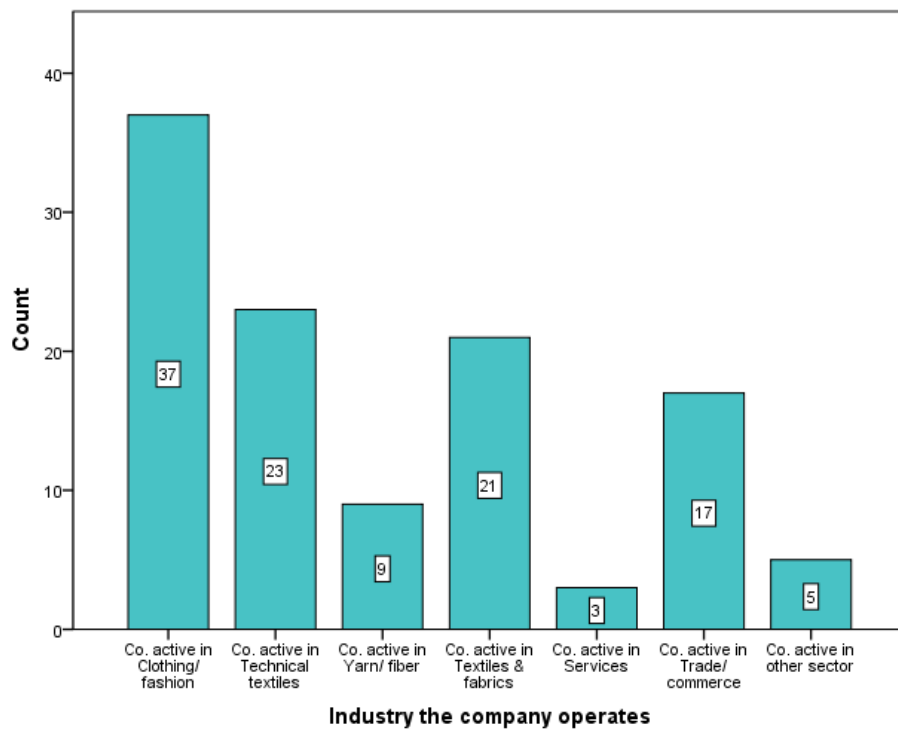
Table 2. Overall distribution of respondents according to type of activity

	Clothing/ fashion	Technical textiles	Yarns/ fibres	Textiles& fabrics	Services	Trade/ commerce	Other
Count	37	23	9	21	3	17	5

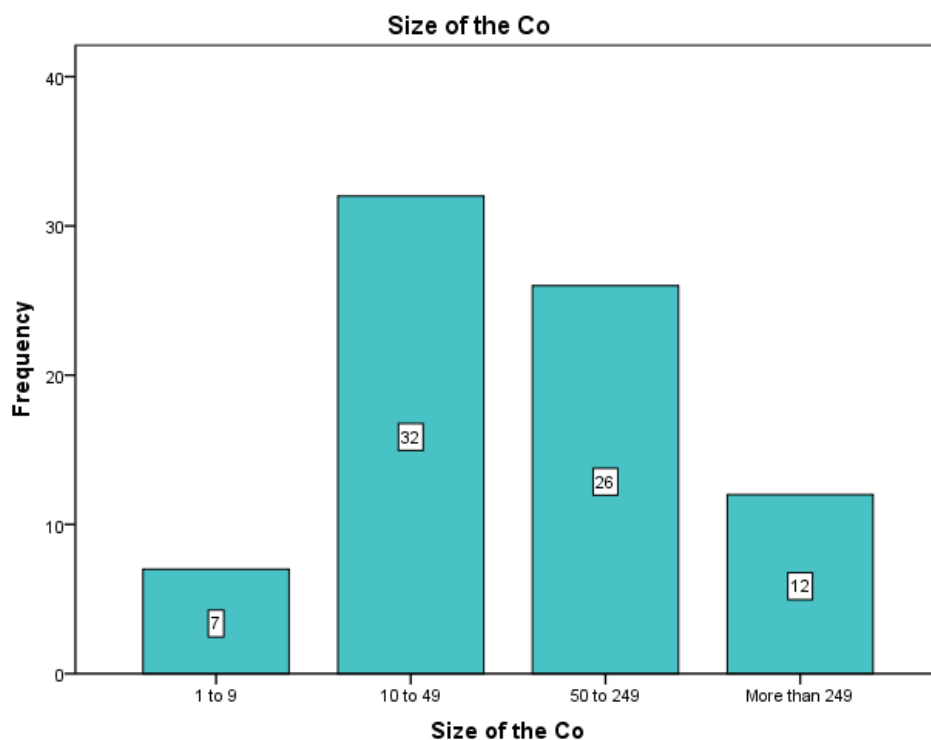
Table 3. Overall distribution of respondents according to numbers of employees

	1-9	10-49	50-249	>250
Count	7	32	26	12

The graphic below shows the total distribution of the respondents per type of company. Most of the respondents came from manufacturing, some of them involved in different types of activities (over 78%), especially in the field clothing/fashion, technical textiles and fabrics. Trade/commerce is also represented (17%). Of the other 5 positions referred to, one was consultant, another customer service and three were in manufacturing (finishing and producer of labels and tags).



The overwhelming majority of the respondents came from SMEs – approx. 75%. This situation reflects well the type of T&C companies that are currently activating throughout EU. The distribution of respondents according to the size of the company is shown in the figure below.



B. Level of research and innovation within companies

Respondents were asked to provide information related to the existence of an R&D department within their company and the type of innovation their company applied/introduced/developed in the last 5 years.

The answers received show that over half of the companies (%) do not have an R&D department, which can be explained based on the fact that most respondents came from SMEs where there are few departments and the employees are involved in different activities.

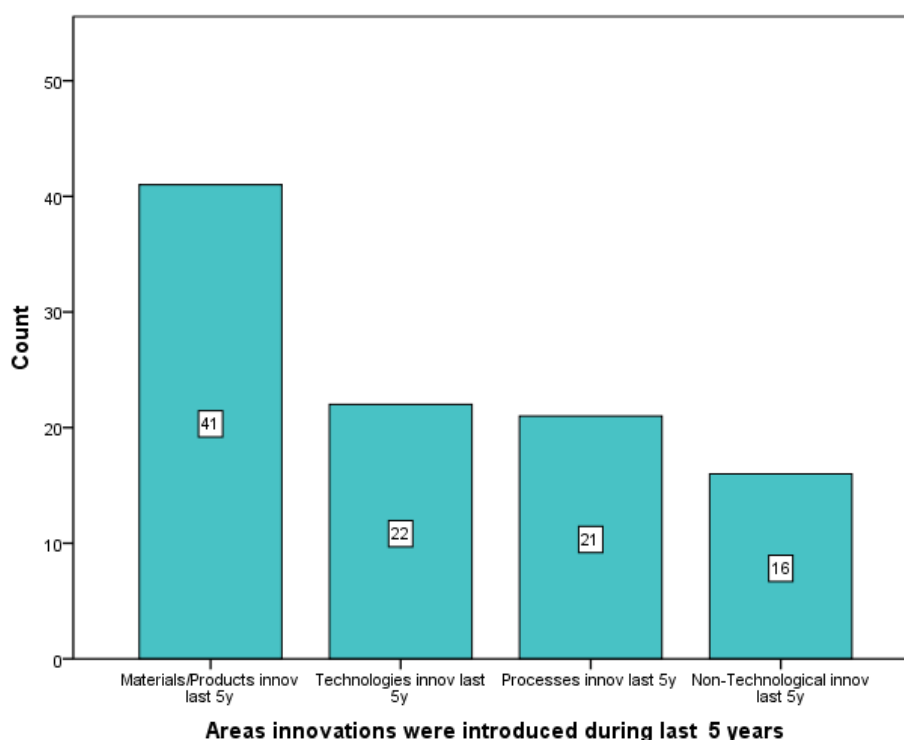
Table 4. Companies with/without a R&D department

YES	NO
24	35

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Materials and products represent the area where companies are most interested to apply/introduce/develop innovation, as shown in the figure below. Such innovation requires less investment than the other types of technological innovation (process and technology) and it has direct and immediate results on the competitiveness of the companies.

Non-technological innovation was less applied by the companies included in the survey.



C. Collaboration between companies and HEIs/Research centres

This chapter in the survey targeted the level of cooperation between companies and HEIs/research centres, sources of funding and the degree of satisfaction with this cooperation.

Table 5 presents the number of companies that indicated that they cooperated with HEIs/research centres on research projects. When considering the numbers shown in the table, it must be emphasised that 25% of the respondents worked in companies that specialise in services and trade/commerce and such companies are not involved in research and innovation.

Table 5. Cooperation between companies and HEIs/research centres

Cooperation with HEIs		Cooperation with Research centres	
YES	NO	YES	NO
25	35	21	37

The answers to the question regarding if the companies were satisfied by this cooperation (see Table 6) indicates that the cooperation is seen in a positive manner by most companies.

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Table 6. Satisfaction with the cooperation with HEIs/research centres

Satisfaction in cooperation with HEIs		Satisfaction in cooperation with Research centres	
YES	NO	YES	NO
24	4	19	4

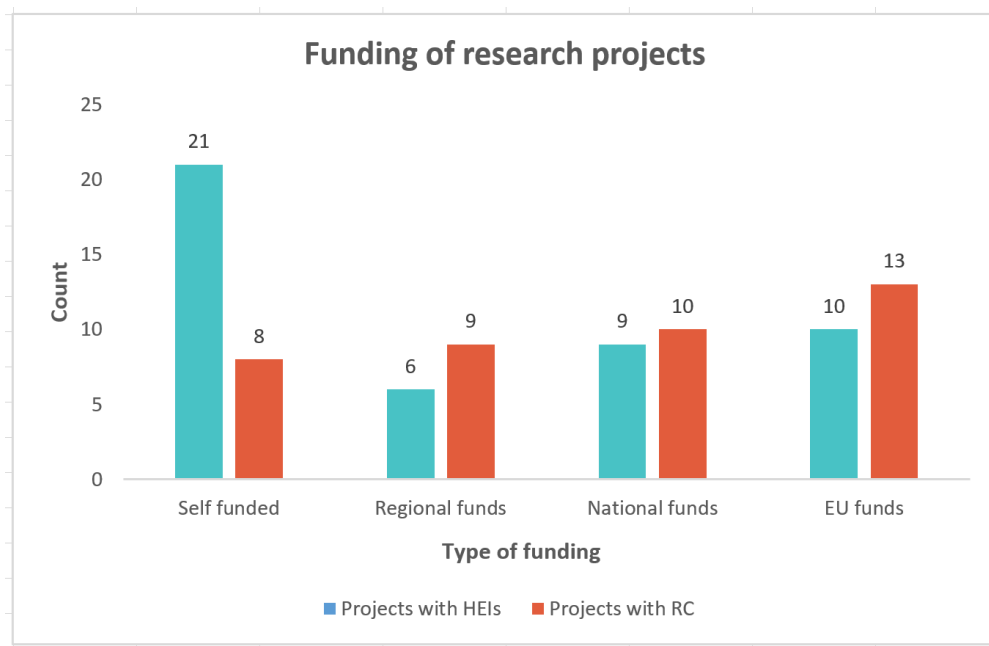
The reasons given by the companies for not cooperating with HEIs/research centres refer mainly to distrust toward HEIs/research centres, different agendas and lack of stimulating conditions:

- Doubts that HEIs can provide knowledge
- Incompetence
- Lack of communication/information/own resources
- Not stimulating legislation, lack of staff, bureaucracy
- No opportunity
- High cost risks without any guarantees of investment recovery
- Lack of common research ideas. Lack of innovation from the RC that can be useful for the company

The sources for funding these research projects is detailed in the table and figure below, for both HEIs and research centres.

Table 7. Sources of funding joint research

	Self-financed projects	Regionally funded projects	nationally funded projects	EU funded
HEIs	21	6	9	10
Research Centres	8	9	10	13



The higher number of self-financed projects in which companies cooperate with HEIs indicates that companies prefer HEIs when solving problems of specialised applied research and that HEIs are more flexible in reference to such topics. Financing at regional level depends the existence of regional governments and corresponding budgets. Companies enter research partnerships with both HEIs and research centres in national and EU projects. The lower numbers of projects can be caused by the fact that at this level involves high competition which limits to a certain extent the presence of T&C companies, as well as the fact that the research and innovation targets of many companies may not correspond to such project calls.

D. Perceived training needs related to research & innovation

This is the most important chapter of the questionnaire that tries to evaluate perceived needs for knowledge/skills related to research and innovation and their importance.

In this part of the questionnaire, a set of fields of knowledge and a set of skills related to research and innovation were proposed to the respondents that were asked to rate their need and importance and to propose new knowledge/skills they considered significant. The answers received will be presented separately, for all 3 types of respondents, in a comparative manner in order to emphasise the general results and conclusions.

The respondents were asked if they consider that company staff needs further training in the area of research and innovation and the overwhelming majority of respondents had a positive answer, as presented in Table 8.

Table 8. Necessity of further training in research and innovation

YES	NO
50	8

Most of the respondents indicated that their companies are interested in online training courses (see Table 9).

Table 9. Necessity of further training in research and innovation

YES	NO
46	14

The respondents were asked to grade the perceived need for training in skills related to research and innovation and the importance of that knowledge / skills.

Due to their importance for the future Intellectual Outputs of this project, the results will be presented separately and comparatively for all type of respondents, in order to create a general image of the responses.

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E. Cooperation with universities on educational programmes

The questions were intended to identify the level to which companies are involved in academic educational programmes.

While in the past 3 years few companies were involved in any activities of universities for the definition or validation of curricula (see Table 10), almost half of the respondents stated that their company provided places for students' practice (internships), as illustrated in Table 11. It is important to point out that a significant part of those internships (47%) included activities related to research and innovation.

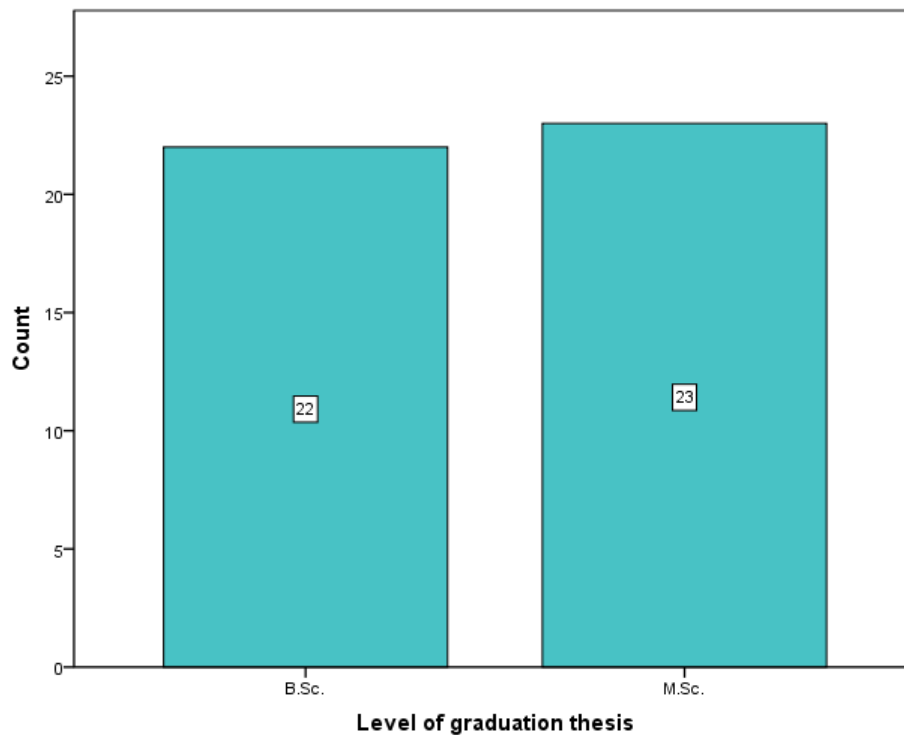
Table 10. Companies involved in curricula definition or validation

YES	NO
15	44

Table 11. Companies accepting students for practice (internship)

YES	NO
34	24

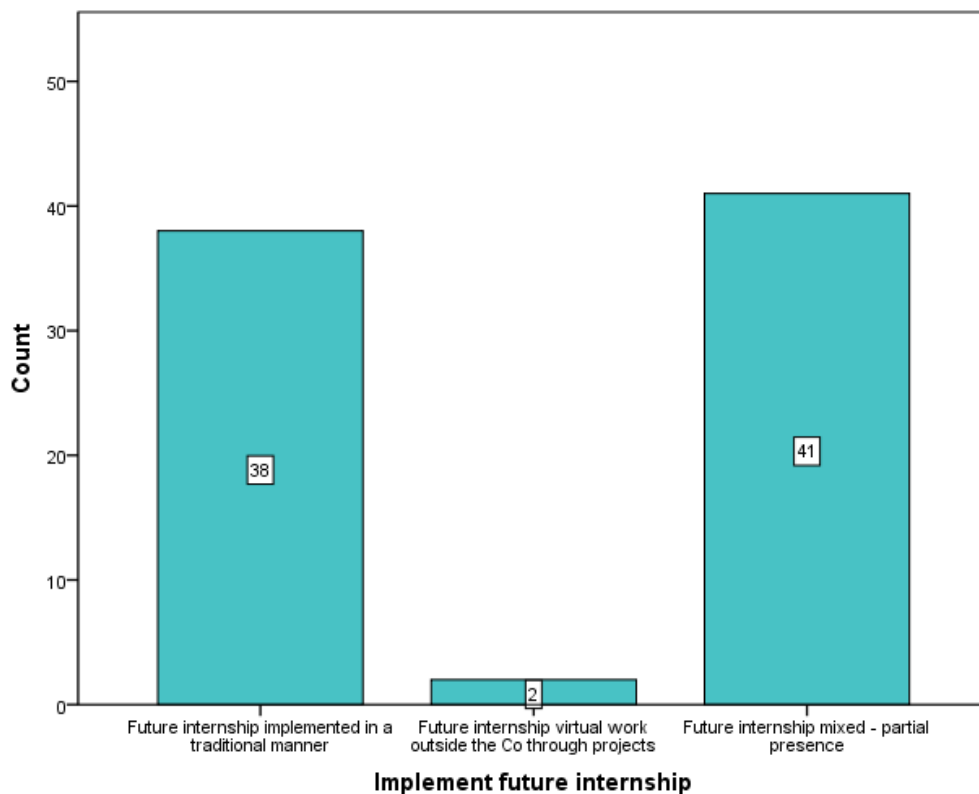
Less than half of the companies cooperated, in the past 3 years, with HEIs for supporting students' graduation thesis, both for B.Sc. and for M.Sc. level (43.6%). These values indicate that the T&C sector is opened to this type of cooperation with the academic environment and that HEIs could work more to increase this cooperation. The level of thesis supported by companies (B.Sc. or M.Sc.) is almost equal, as illustrated in figure below. A significant number of these companies declared to have supported graduation theses at both levels.



Respondents were asked to state how they see the future implementing of internships in the companies, selecting from three possibilities:

- traditional
- virtual
- mixed (a combination between traditional and virtual internship)

The answers showed that a significant number of respondents preferred internships conducted in a traditional manner (48%), but they were also opened to a mixed approach to such internships, as 51% indicated that they are considering it as a viable option. The graph from the figure below presents the preferences expressed for the type of internship to be used in the future.

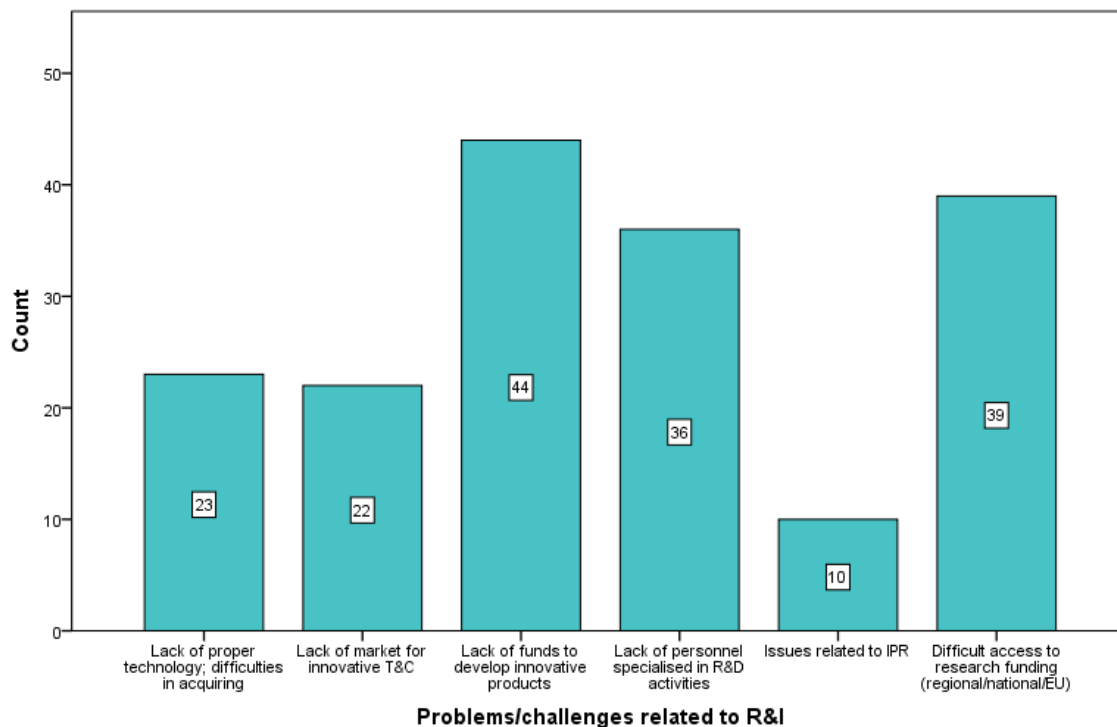


F. Level of research and innovation within companies

The two questions included in this chapter were intended to identify the perceived problems/challenges the companies face in relation to research and innovation, as well as the gaps and mismatches that affect the promotion of R&I activities within the companies.

The respondents indicated the lack of funding, both for developing products and accessing research projects, as the main problem affect research and innovation in the T&C sector (see figure below). Together, the problems concerning lack of funding represent almost half of the total answers (48%).

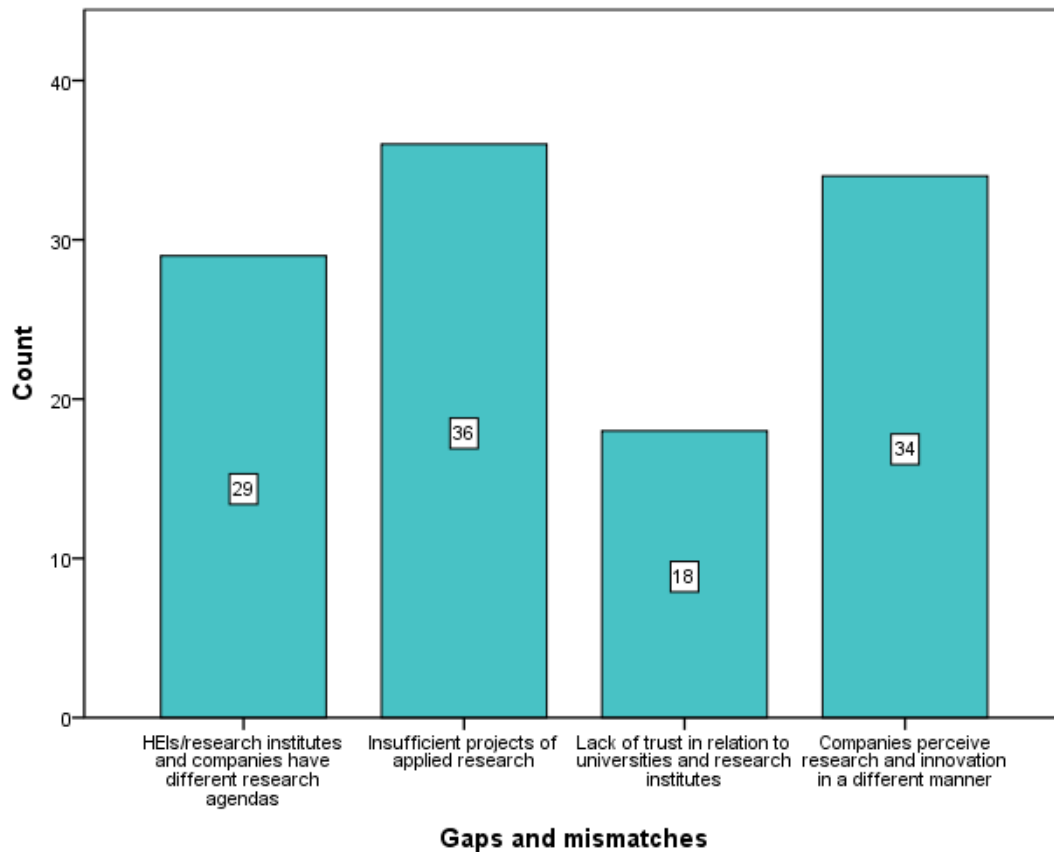
The lack of personnel specialising in R&I activities (21%) shows that the need for training students and young graduates in the field of research and innovation is perceived as important and necessary by the companies.



Lack of proper technology and lack of market for innovative T&C (31%) are problems specific to SMEs, especially if it is the case of manufacturing companies. It may also vary from country to country, as the attitude toward research and innovation is different.

The issues related to IPR are perceived as less affecting the implementation of research and innovation. This shows that IPR are considered a positive factor in stimulating and consolidating research, especially within companies dealing with technical textiles and high-tech or special materials and products. Such companies base their development on patents, so IPR is an essential part of their R&I activities. For companies involved in fashion, most common form of IP is industrial design, but not many companies are willing to invest time and money for products that have a short life cycle.

In reference gaps and mismatches hindering the development of research and innovation projects in cooperation with HEIs or research centres, the respondents indicated that they consider there are important differences between their views on R&I: different agendas and different approaches to R&I correspond to 55.5% of the total answers. Most significant gap/mismatch is seen to be the focus on applied research, specifically to subjects companies are directly interested in (31%).



The positive aspect is that lack of trust in HEIs or research centres is not perceived as such an important issue, indicating that future cooperation in research and innovation require only improving the existing cooperation and the adaptation of HEIs/research centres to what companies really need in this field.

G. Information about the respondent

The distribution of the respondents according to their position, presented in Table 12 shows that the respondents come from especially from the superior levels of a company and they possess the experience required to guarantee the relevance of the survey.

Table 12. Distribution of respondents according to the position in the organisation

	Owner/CEO	Head of Marketing	Head of R&D	Head of Manufacturing	Head of Quality control	Head of Export	Other
Position in the organisation	28	2	4	13	3	9	11

The other position mentioned by the respondents included: application engineer; assistant manager; consultant; customer service; head of marketing, manufacturing, export; innovation manager; IPR; R&D engineer; technician (2).

The distribution of the respondents according to their highest qualification is presented in Table 13, while Table 14 shows the distribution according to age.

Table 13. Distribution of the respondents according to qualification

Qualification	Bachelor	Master	PhD	Other
	14	27	7	Secondary education (1)

Table 14. Distribution of the respondents according to age

Age group	25-29	30-39	40-49	50-59	60+
	5	22	22	17	11

4.2. Questionnaire addressed to experts

A. Background information

Background information on the experts that participated in the survey refer to their type of organisation and their type of activity.

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Most of the respondents work either in a HEI or a research centre, representing 77.5% of the total number of questionnaires. The respondents work mostly in education and research, many of them indicating both activities. The distribution is presented in Table 15 and in corresponding following figure.

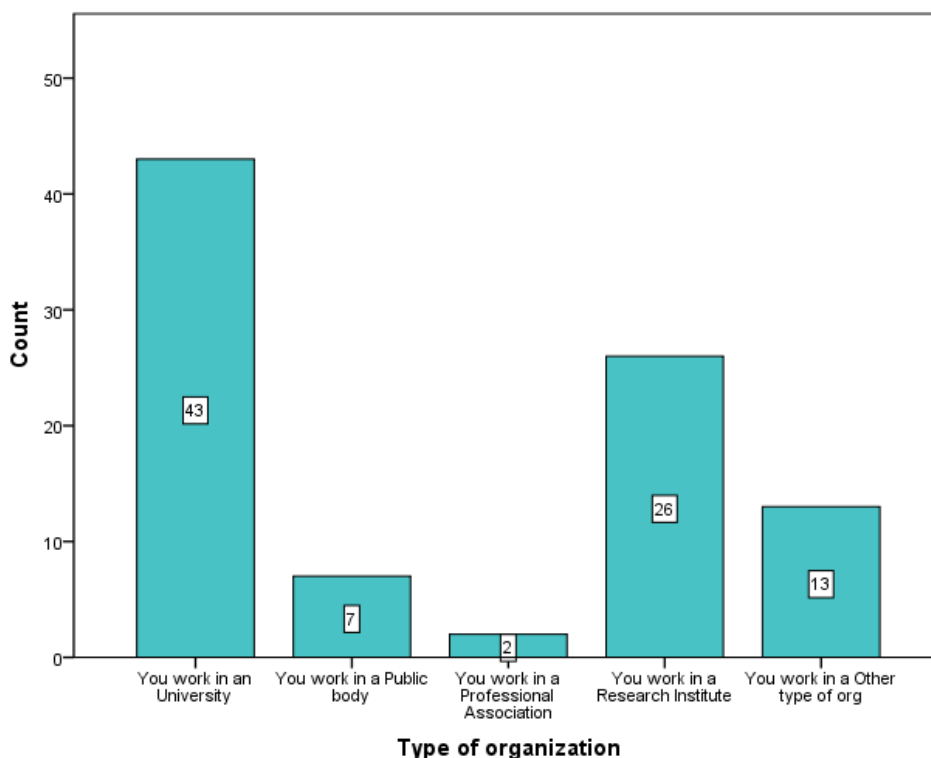
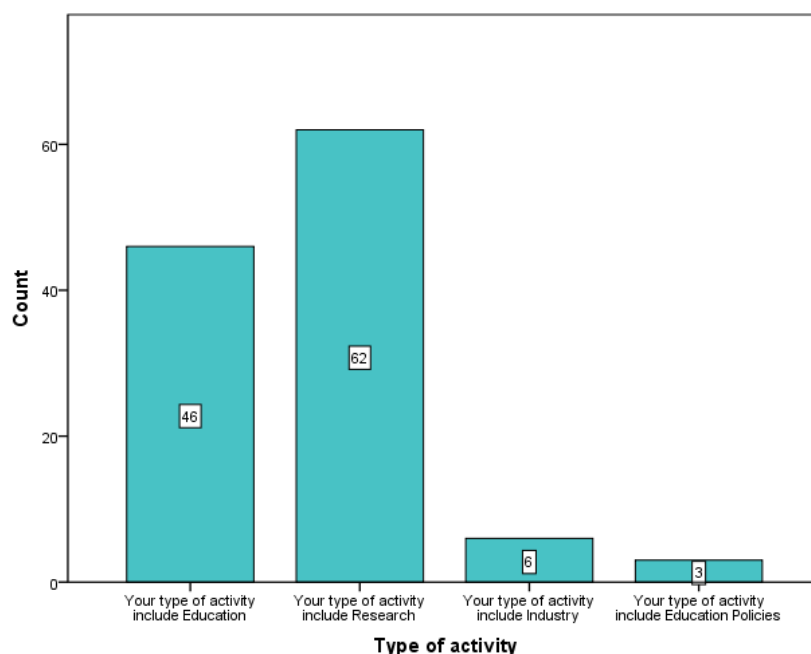


Table 15. Distribution of experts according to the type of activity

Type of activity	Education	Research	Industry	Education policies
	46	62	6	3



B. Perceived training needs related to research & innovation

In this part of the questionnaire, a set of fields of knowledge and a set of skills related to research and innovation were proposed to the respondents that were asked to rate their need and importance and to propose new knowledge/skills they considered significant. The answers received will be presented separately, for all 3 types of respondents, in a comparative manner in order to emphasise the general results and conclusions.

The respondents were also asked to indicate if they were favourable to promote the online courses to be developed in the frame of this project. Most of them (almost 70%) showed their willingness to promote such courses.

Table 16. Respondents' position toward promoting R&I online courses

YES	NO
62	26

C. Level of research and innovation within the educational programmes

This chapter contained a set of general questions addressed to all respondents and a set of questions addressed only to academics.

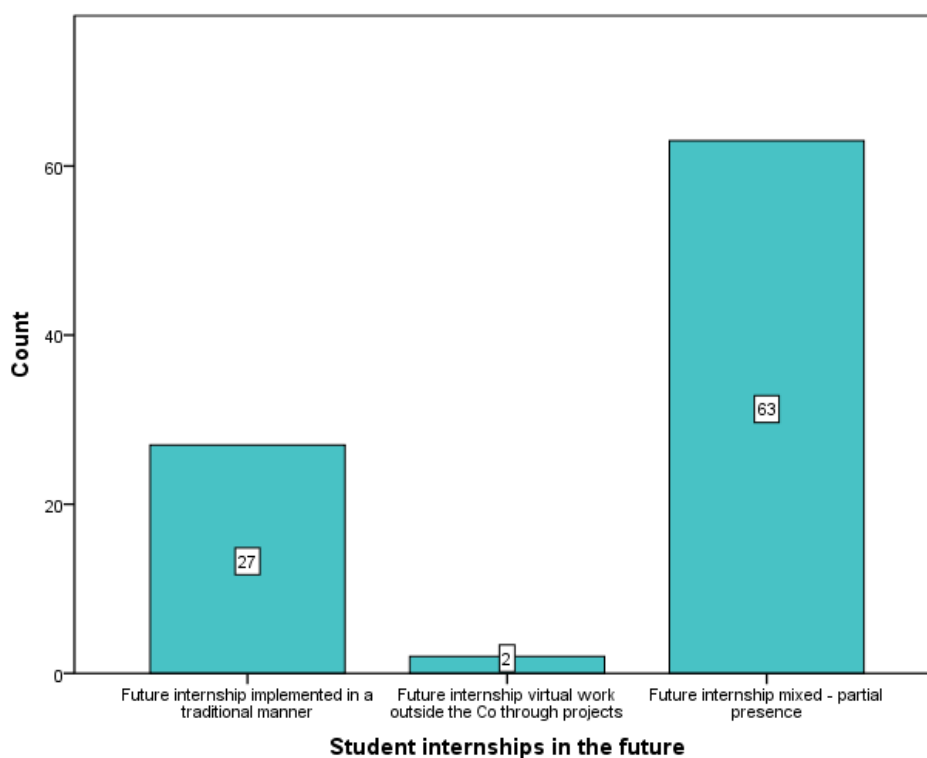
The first set concerned if the graduates possess sufficient skills and knowledge for jobs related to research and innovation, as well as how should future internships should be carried out: in a traditional manner, virtual internship or a mix between traditional and virtual.

In the opinion of most of the respondents, graduates do not possess sufficient skills and knowledge for jobs related to research and innovation (approx. 75%).

Table 17. Do graduates possess sufficient skills and knowledge?

YES	NO
22	66

As for the manner in which future internships should take place, the respondents indicated they favoured the mixed internship (71%), as shown in the figure below. Few of the answers indicated both traditional and mixed internship.



The questions addressed exclusively to academic experts investigated the level of education related to research and innovation in HEIs and the cooperation between HEIs and the industry in terms of curricula development and internships for students.

Almost all academic experts indicated that the T&C curricula should develop courses on innovation and creativity (95%). As for the existing curricula containing courses on research and innovation, almost two

thirds of the respondents (63%) stated that their curricula include such courses, addressed both to B.Sc. and M.Sc. levels, as presented in Table 18, with an accent on EQF 7.

Table 18. EQF level for existing courses related to research and innovation

B.Sc.	M.Sc.
21	48

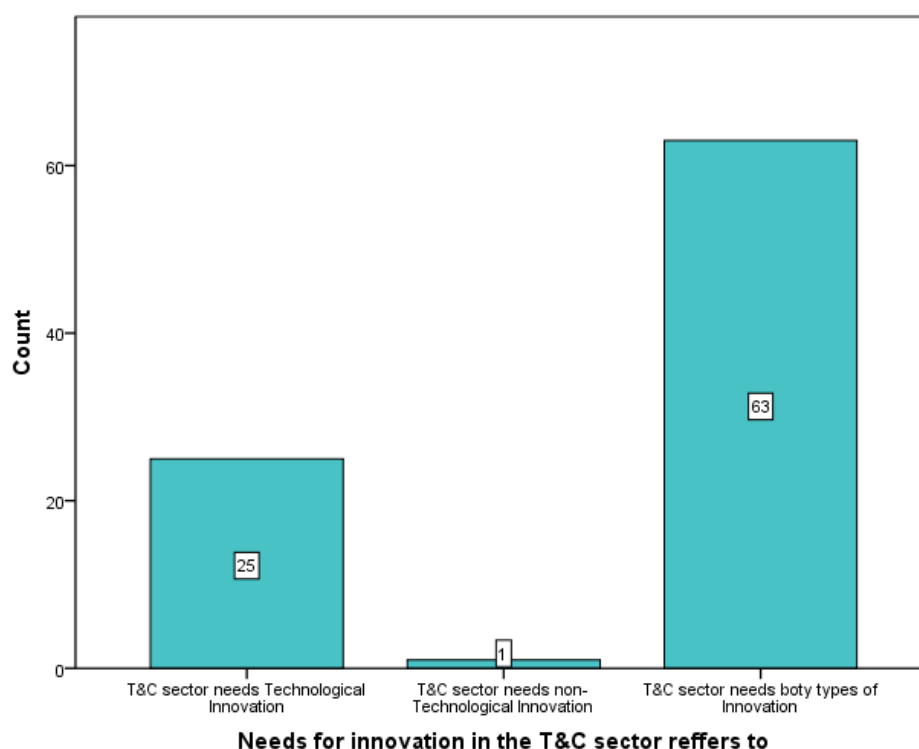
More of three quarters of the respondents (76%) indicated that, in the past 3 years, their HEI involved T&C companies in activities related to the definition or validation of curricula (to address skills requirements).

Also, 72% of the respondents had placed students in internships in T&C companies. Out of all positive responses, in 85% of cases the internships included any activities related to research and innovation.

D. Requested needs of the T&C sector in terms of innovation

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This chapter investigated the opinion of the respondents regarding the need for innovation and the way to address this issue. In respect to the need for technological as well as non-technological innovation, the respondents view both types of innovation as equally important – over 70% of them declared that both are needed in the T&C sector (see figure below).



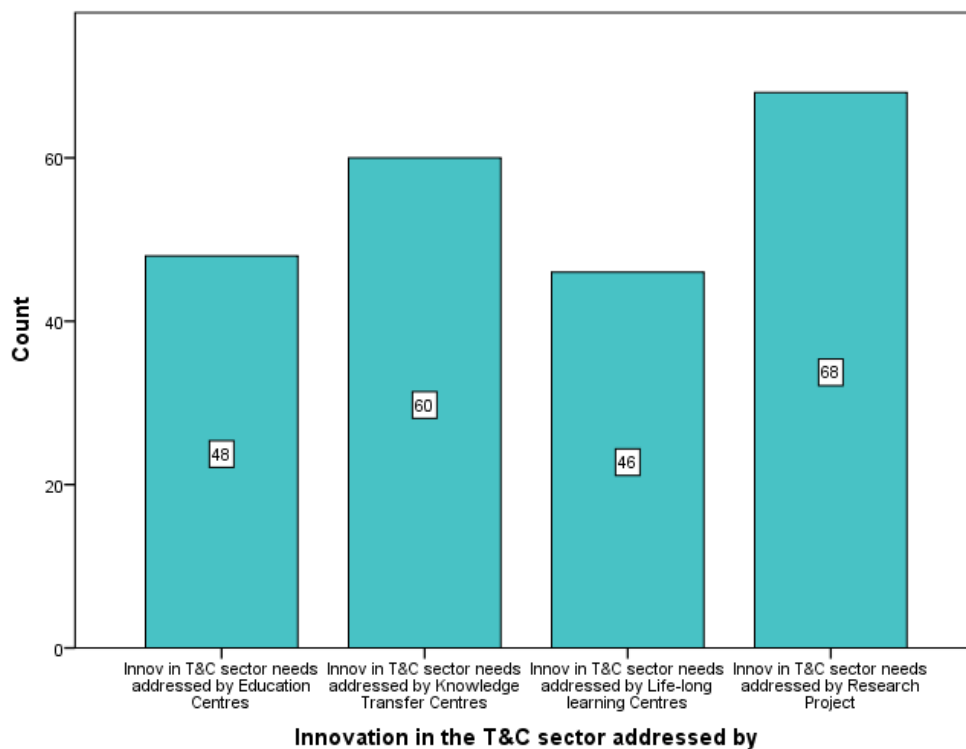
Being asked to provide reasons for their views, the respondents stated the followings:

- All related to Industry 4.0
- All the issues related with T&C business should be added
- Any innovation helps because imports are reduced and the Greek economy can also export. Combination lowers the cost after using the existing situation.
- Because we can develop technological innovation but we also have to develop methods to analyse the components that are part of technological innovation
- Both are correlated in practice
- Both are needed to maintain the competitiveness of the sector
- Considering the trans disciplinary approach of a R&D innovation project the needs for both technological and non-technological innovations are also very important
- Due to globalization, Europe should stand-out for innovation in every way
- For companies in the fashion industry, non-technological innovation are as important for the customer as technological ones (development of functional products, digital printing, etc.)
- functional and aesthetic innovation in textiles is linked to chemistry
- Holistically, technological innovation is one of the possible forms of innovation
- Innovation in T&C sector should include trainings on specific design software
- Innovation in the field of sustainability
- Innovation is a systematic process that includes all area of activity in a company
- Innovation related to creativity, design, etc. are needed in addition to technological ones
- Innovation in both aspects is needed
- It should include not only technological solutions but also “sales” of ideas and new products
- New productive processes
- One does not exclude the other
- Other kind of innovation are already being tackled in the course. However, technology is evolving at such a big pace that the University needs to make a bigger effort in presenting new technological advances
- Technological innovation linked with ITC/software/apps; digitization of manufacturing; non-technological innovation; development of new services focused on green products, sustainability and circular economy
- Technological innovations can lead to diversified value added products or optimization of production or distribution systems that also enable the creation and delivery of quality improved, more economical or innovative products. Similarly, non-technological innovations with differentiated business strategies, especially when using technology products such as IT products, can give impetus to both middle and large companies in the field of administration as well as to all businesses and in particular start-ups in marketing
- The needs for innovations to be considered in a larger context
- The students must be updated with technological developments, but also with the economic and social environment
- The technological and non-technological innovations are strongly connected. Combining product and

process innovation with marketing and management innovation will lead to improved performances in relation to manufacturing, quality

- The use of digital technology and smart processes ... (not intelligible)
- There will be a qualitative improvement of the final product as well as possible reduction of production time and cost.
- We are in an environment where interdisciplinary is an important factor

As for the way to address this need, all the directions proposed in the questionnaire were deemed important, underlying the fact that innovation must be developed through education, technology transfer and research. Research is seen as the most important way to ensure the needs for innovation (representing 30% of the total options), followed closely by the existence of Knowledge transfer centres (together they total 58% of the options).



E. Perceived problems, challenges, new functionalities, gaps and mismatches

As in the questionnaire addressed to companies, the chapter was intended to identify the opinion of experts on the perceived problems/challenges companies face in relation to research and innovation, as well as the gaps and mismatches that affect the promotion of R&I activities within the T&C sector.

Table 19 presents the distribution of answers concerning the perceived problems/challenges companies face in relation to research and innovation.

Table 19. Perceived problems/challenges companies face in relation to research and innovation

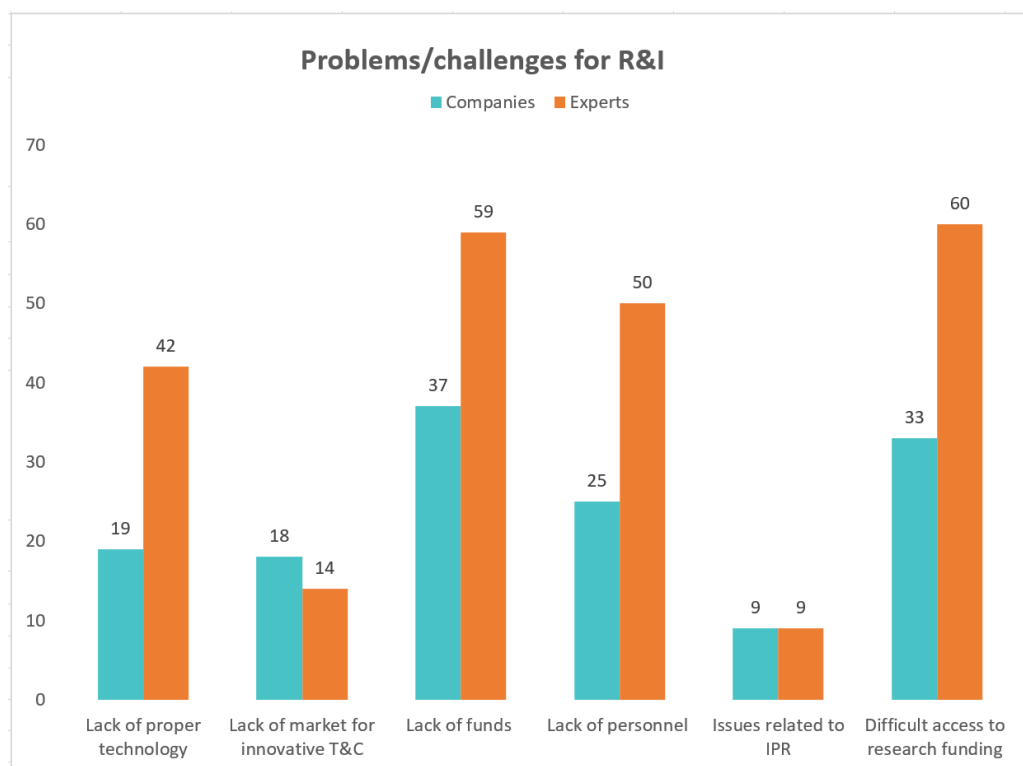
Lack of proper technology; difficulties in acquiring such technologies	Lack of market for innovative textiles and clothing	Lack of funds to develop innovative products	Lack of personnel specialised in R&D activities	Issues related to IPR	Difficult access to research funding (regional/national/EU)
42	14	59	50	9	60

Only three respondents offered their personal opinion in regard to the problems confronting the promotion of innovation, as follows:

- Differences between the market requirements and the price for T&C products they are willing to pay
- Lack of funding for non-technological innovation; SMEs often focus on day-to-day
- Lack of motivation

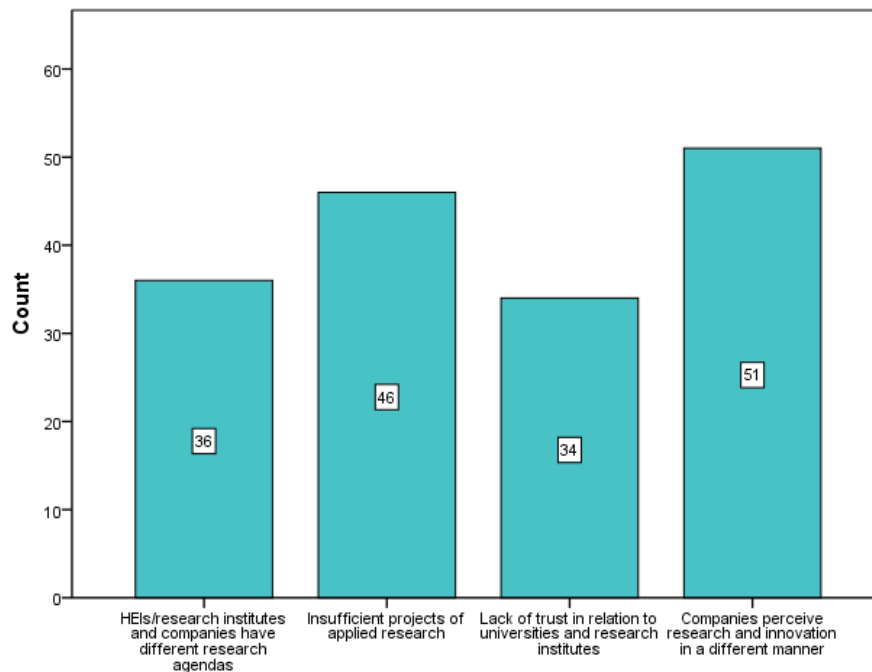
When comparing these answers with the ones recorded for companies, one can see that both groups have similar views, pointing out lack of funds and access to research projects as the most serious problems in promoting research and innovation, as illustrated in the graph below. Experts perceive the lack of proper technology as more significant problem as representatives from the companies, while experts consider that market presents opportunities for innovative T&C products to a higher degree. Both types of respondents have a similar position toward IPR.

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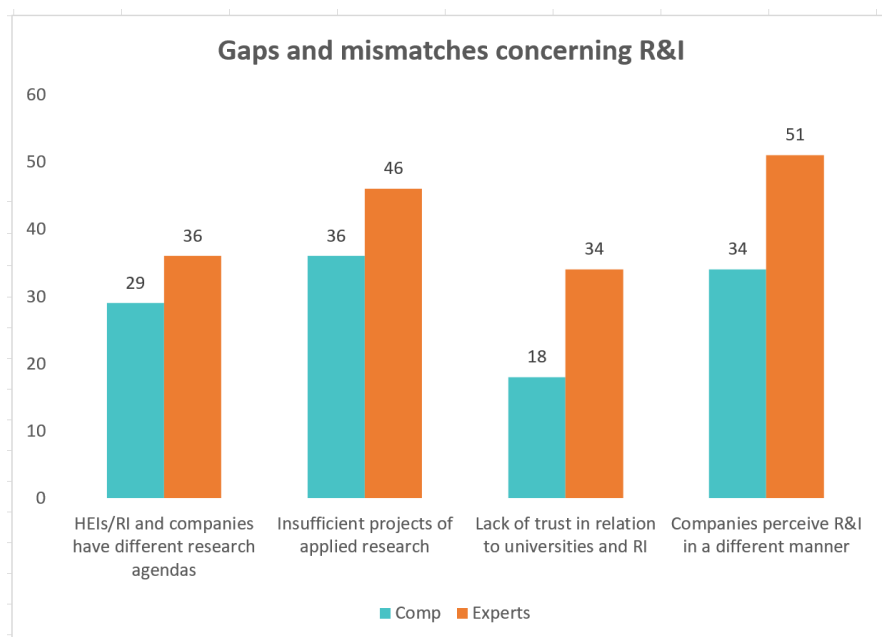
In reference gaps and mismatches hindering the development of research and innovation projects in cooperation with HEIs or research centres, the respondents indicated that they consider there are

important differences between the views on R&I: different agendas and different approaches to R&I correspond to 55.5% of the total answers. Most significant gap/mismatch is seen to be the focus on applied research, specifically to subjects companies are directly interested in (31%).



Gaps and mismatches concerning R&I

When comparing the answers from experts with the ones from companies' representatives, as illustrated in the figure below, the opinions are similar, which shows that there is a certain consensus regarding the existing gaps and problems affecting the research and innovation in the sector.



G. Information about the respondents

The distribution of the respondents according to their position, presented in Table 20 shows that the respondents come from especially from the superior levels of a company and they possess the experience required to guarantee the relevance of the survey.

Table 20. Distribution of respondents according to the position in the organisation

	Managerial position	Teaching staff	Researcher	Other
Position in the organisation	6	27	37	6

The other positions mentioned by the respondents included: development engineer; head of training office; innovation consultant; responsible for innovation projects; school inspector; trainer.

The distribution of the respondents according to their highest qualification is presented in Table 21, while Table 22 shows the distribution according to age. 29 respondents were female, while the rest were males.

Table 21. Distribution of the respondents according to qualification

Qualification	Bachelor	Master	PhD	Other
	4	18	45	-

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Table 22. Distribution of the respondents according to age

Age group	25-29	30-39	40-49	50-59	60+
	7	17	24	22	6

4.3. Questionnaire addressed to aspiring managers

The questionnaire addressed to aspiring managers (young engineers and M.Sc. students) was focused on the way respondents perceived the need and importance of knowledge/skills related to research and innovation, the level of research and innovation within educational programs and the needs for innovation in the T&C sector.

A. Background information

The qualification of most of the respondents is B.Sc. (58.9%), while 20.5% have a M.Sc. degree and 6.8% completed their Ph.D. studies. 13.7% of the respondents did not indicate their last qualification being as the ones indicated in the answer.

Only 43.8% of respondents declared that they were involved in research projects during their studies, which can be considered a good number, seeing that over half of them only completed the B.Sc. studies, when normally the students are less involved in such activities.

B. Perceived training needs related to research & innovation

As stated before, for comparison purposes, the perceived needs and importance of knowledge/skills related to research and innovation will be discussed separately, together with the results for companies' representatives and experts.

Aspiring managers were also asked if they would participate in online courses developed by the team of the project. The majority of the respondents (80.8%) expressed their intention to take part in these courses, which shows that young graduates are interested in improving their knowledge.

C. Level of research and innovation within the educational programmes

Respondents are divided with regard to the skills and knowledge the graduates currently possess for jobs related to research and innovation: 53.4% consider that the acquired knowledge and skills are not enough, 45.2% think that they are sufficient for such jobs, while 1.4% did not answer this question.

In the case of having courses related to research and innovation, the response was similar: almost half of the respondents (46.6%) stated that they had such courses during their academic years, while 49.3% stated that they did not have such courses in their curricula. The significant number of graduates declaring that they did not participated in courses addressing research and innovation is justified by the fact that a lot of respondents finished only B.Sc. studies. Usually, HEIs include such courses in their M.Sc. and doctoral programs.

The need to include courses regarding innovation and creativity, 45.2% of the aspiring managers consider that such courses should be included in B.Sc. programmes, while 53.4% think M.Sc. programmes should contain these courses.

Table 23. Need to include courses regarding innovation and creativity

B.Sc.	M.Sc.
33	39

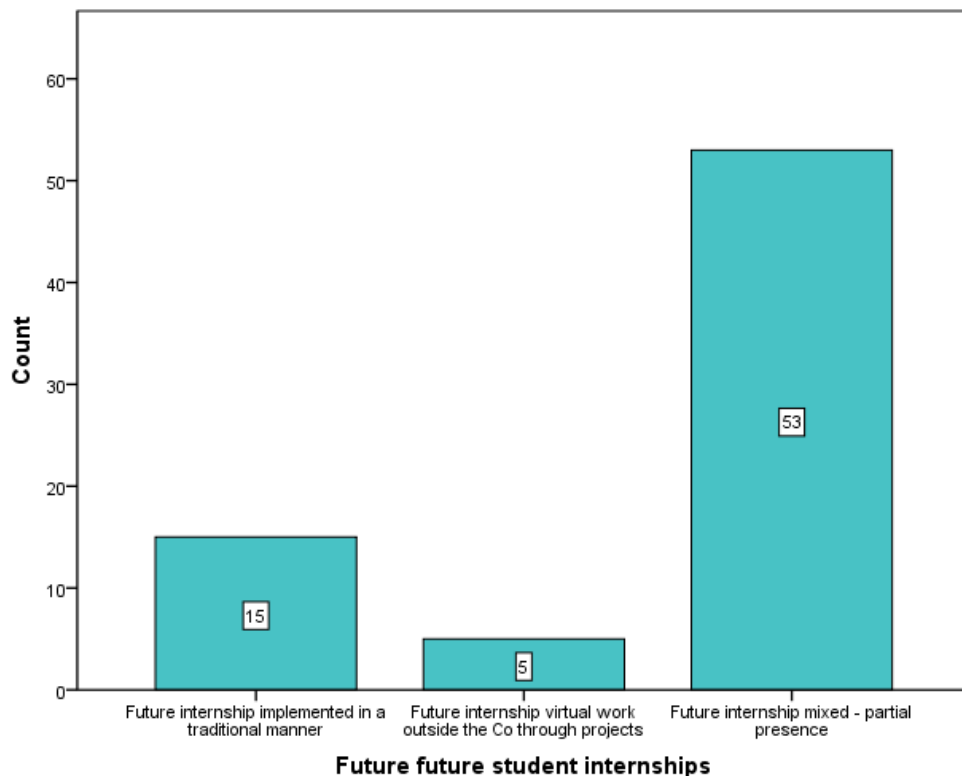
Almost all respondents (98.6%) consider that the T&C curricula should develop courses on innovation and creativity, 52% of the respondents indicating that such courses should be developed for the B.Sc. level, while 45.2% seeing these courses more suited for M.Sc. programmes (as illustrated in Table 23).

Table 23. EQF level for courses related to research and innovation

B.Sc.	M.Sc.
38	33

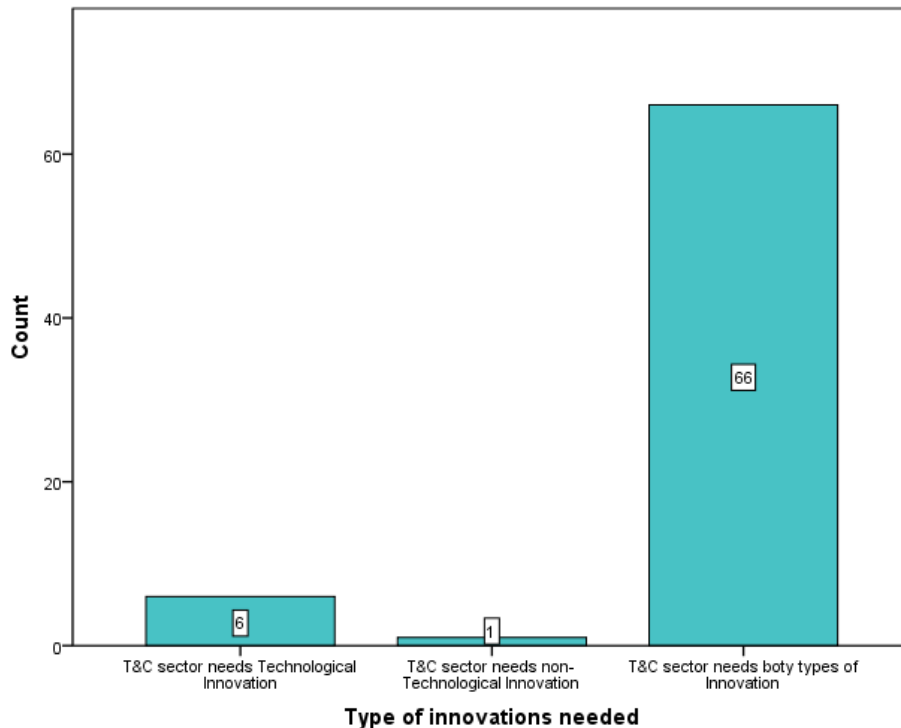
Only 31 respondents (42%) declared to have had internships in T&C companies, suggesting that this is a situation that has to be improved through a better, more efficient cooperation between companies and HEIs. Only 10 respondents (32% of the positive answers) had activities related to research and innovation during their internships.

With regard to the way internships should be implemented in the future, the answers are illustrated graphically in the figure below. Most of the respondents (72.6%) tend to favour the mixed approach, including both the traditional form of internship and the virtual one, while 20.5% of the respondents consider the traditional manner as preferable, while 6.9% think that virtual internship is better.



D. Requested needs of the T&C sector in terms of innovation

The aspiring manager perceive the needs for innovation in the T&C sector address the technological innovation as well as non-technological innovation, as 90% indicated that both are required for further of the sector (see figure below).

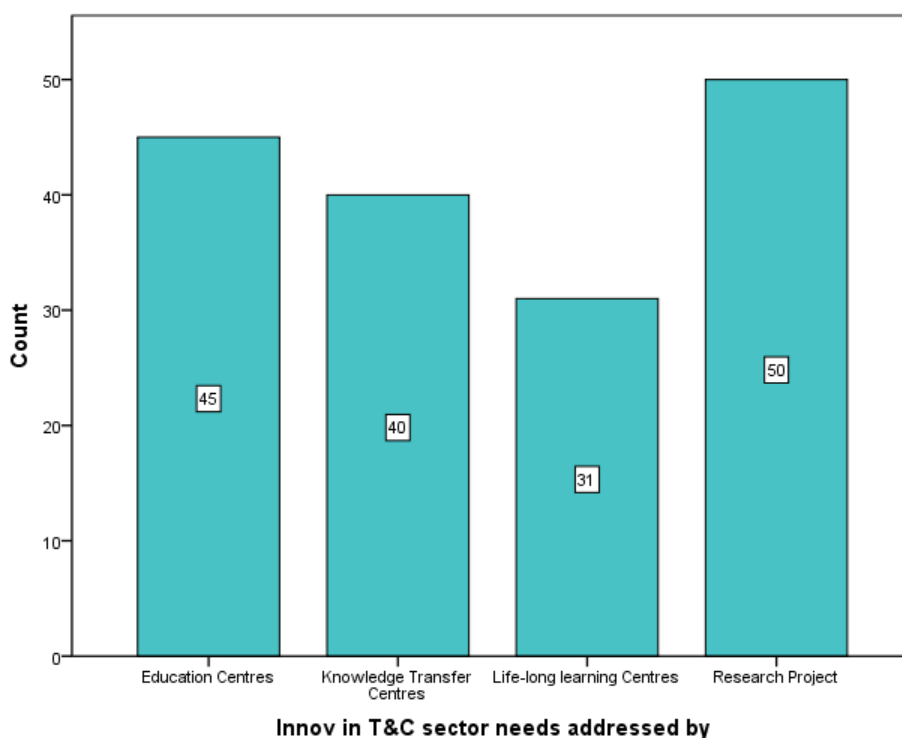


Many respondents chose to justify their position toward innovation in the sector, making the following comments:

- Technological innovation is very important for the future to continue developing our industry to compete with other industry.
- All innovation is positive.
- All innovation that reduces costs (in every way, including costs of treatment and waste management costs) without losing quality, will be important for the development of the sector
- Both technological and non-technological innovation have an important contribution.
- Depending on technological innovation, spectacular results can be obtained.
- From my point of view, both have a great importance.
- From my point of view, technological and non-technological innovation are highly important in order to keep the T&C industry going, since they cannot work one without the other.
- I believe that all the courses related to textile science and especially innovation are important, as the knowledge necessities in this area are diverse.
- I think that technological innovation will bring new products and methods less pollutant, protecting the environment
- ICT is being extended to all fields of application including textiles and innovation is still necessary in other aspects such as sustainability for example.
- Important to think beyond technology
- Innovation in clean and sustainable technology, as well as improvement of the current textile processes (equipment and performance)

- Innovation in this sector must be both technological and non-technological
- It is important the technological innovation combined with new ideas and materials.
- It is needed to know and do everything
- It is very important for students to see and understand technological and non-technological innovation because they can form an overall idea and know exactly what they want.
- Should be both because are important
- T&C sector needs innovation in both technological and non-technological aspects. TC sector should improve, so people feel attracted to invest and work in it.
- Technological - complex machinery eliminating unskilled work, technology focused on clean energy. Non-technological - design a space where industry where industry and training merge. Continuous training company staff and students in order to adapt to the changing needs of the sector.
- Technological and non-technological innovation are both important for T&C sector because there is a need for innovative specialty fibres, design fast fashion, etc. but also in investments of companies in this sector, commercial and marketing innovation.
- Technological innovation in the sector is advanced, but non-technological innovation is costly to be introduced
- Technological innovation is important in the T&C sector because without technology you cannot sustain new methods of communication.
- Technological innovation is the first step in the T&C sector.
- Textile sector is still traditional in many aspects. Currently and taking into account the impossibility of competing with countries such as China, Bangladesh, etc. in production costs, the textile sector in Spain needs to differentiate itself and add value to its products. Innovation is essential and students become aware of this and obtain the necessary knowledge during their studies and apply.
- The level of teaching in Bachelor should focus differently since it seems that it has stagnated for years and no importance is given to the new developments in the sector
- The machinery is a little bit outdated
- The T&C sector should refer to both technological and non-technological innovation because they are highly interconnected. Technological innovators should combine their product and process innovation with marketing and organizational innovation.
- The two are necessary to industry to produce more and better
- There is still a long way to go when it comes to technical ... (non-intelligible), the management aspect of the T&C industry has a lot that can be fixed.
- You cannot innovate without using technology, and you cannot use the latest technology without having new fabrics.

When asked how these needs for innovation in the T&C should sector be addressed by universities/research centres, the aspiring managers see all four options as important, as shown in the figure below. Many respondents chose to select multiple options, suggesting that this problem requires the application of more solutions.



Education is seen as a very important component in developing innovation. Addressing sector needs for innovation through education represent 61% of the total answers. This must be added to the other form of education, life-long learning that was indicated by 42% of the respondents. These number show that education is considered an essential tool in creating value for the industry, as well as its future development.

The answers concerning knowledge transfer centres totalled 54.8%; the young specialists in the T&C industry consider that such a transfer is beneficial and are clearly open to it.

Research projects are considered the most efficient way to promote innovation in the sector, being indicated by 68.5% of the respondents.

E. Information about the respondents

The distribution of the respondents according to their position, presented in Table 24 shows that the respondents come from especially from the superior levels of a company and they possess the experience required to guarantee the relevance of the survey.

Table 24. Distribution of respondents according to the position in the organisation

	Engineer	Teaching staff	Researcher	Technician	Student	Other
Position in the organisation	10	2	3	4	49	5

The other positions mentioned by the respondents included: business analyst, manager, production engineer, sales adviser.

The distribution of the respondents according to their highest qualification is presented in Table 25, while Table 26 shows the distribution according to age. 10 of respondents have only EQF 5. 19 respondents were female, while the rest (54) were males. Most of the respondents were under 30 years of age (69.9%).

Table 25. Distribution of the respondents according to qualification

Qualification	Bachelor	Master	PhD	Other
	42	18	3	10

Table 26. Distribution of the respondents according to age

Age group	25-29	30-39	40-49	50-59	60+
	51	10	11	1	-

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4.4. Perceived need for training and importance of knowledge /skill related to research and innovation

As stated previously, due to their significance for the project, the ratings for the perceived need for training and importance of knowledge /skills related to research and innovation are presented for all three types of respondents. Table 26 contains the average ratings calculated based on the responses.

Table 26. Perceived need for training and importance of knowledge /skill related to research and innovation

		Needs for training			Level of importance		
		Companies	Experts	Aspiring managers	Companies	Experts	Aspiring managers
	Knowledge/ awareness about						
1	Traditional textiles and clothing technologies	3.26	3.41	3.36	3.97	3.70	4.11
2	New advanced textile raw materials, products	3.93	4.18	4.05	4.41	4.45	4.53
3	Modern production methods	3.84	4.19	4.27	4.27	4.39	4.66
4	Clean technologies	3.56	4.20	4.00	3.71	4.31	4.45
5	Sustainable value chains specific to T&C sector	3.38	3.93	4.04	3.66	4.10	4.34
6	Functionalization methods and processes for textiles	3.51	3.71	3.97	3.75	3.97	4.35
7	Non-technical aspects of advanced manufacturing specific to the T&C sector	3.29	3.43	3.78	3.42	3.45	3.92
8	Project management concepts	3.25	3.48	4.00	3.48	3.72	4.16
9	Research methods and techniques specific to T&C field	3.35	3.83	4.13	3.64	3.93	4.29

	Skills and competencies						
1	Search for, process and analyse information from different sources	3.27	3.71	3.49	3.72	4.24	4.32
2	Present scientific materials and arguments in writing and orally	2.92	3.77	3.97	3.33	4.10	4.36
3	Capacity to generate new ideas (creativity) for the development of textile materials and products	3.68	4.07	4.04	4.16	4.42	4.47
4	Conduct risk assessment analysis in R&D projects for textiles and clothing	3.03	3.43	3.48	3.15	3.63	3.87
5	Plan, design and execute research projects referring to T&C	3.26	3.58	3.83	3.45	3.84	4.22
6	Understand and use the requirements specific to the application domain – multidisciplinary approach to the design of textiles and clothing	3.30	3.78	3.72	3.46	3.91	3.94
7	Advanced digital skills; ability to use specific software for design and production of textiles and clothing (CAD/CAM systems)	3.32	3.92	3.83	3.59	3.95	3.99
8	Competence in following fashion/ market trends	3.63	3.51	4.00	3.97	3.81	4.24

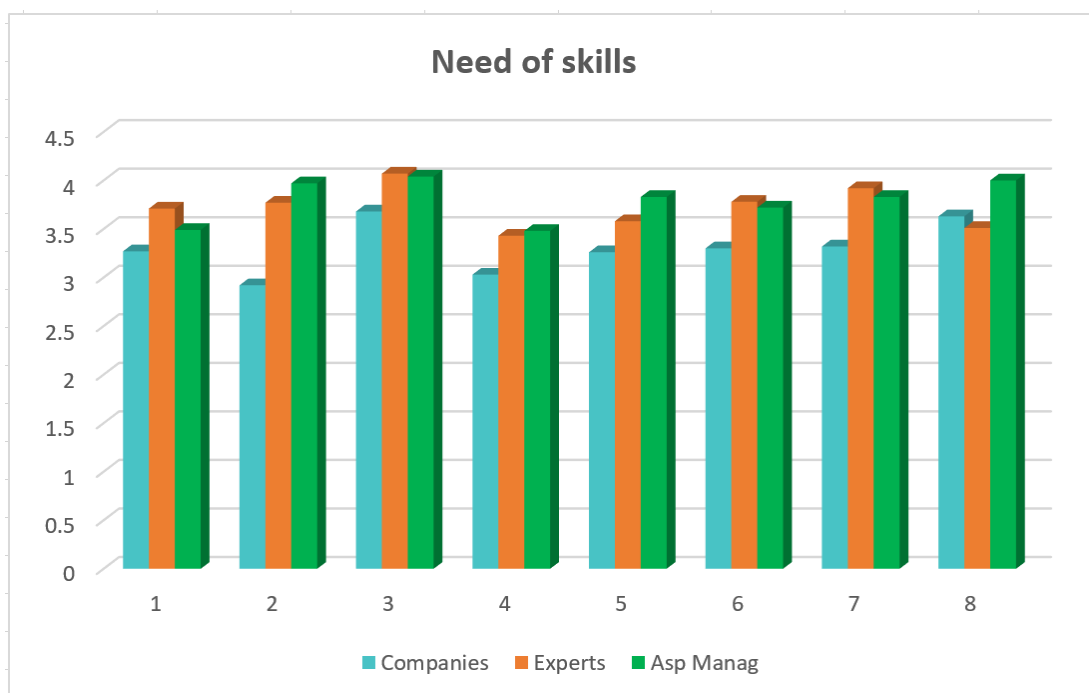
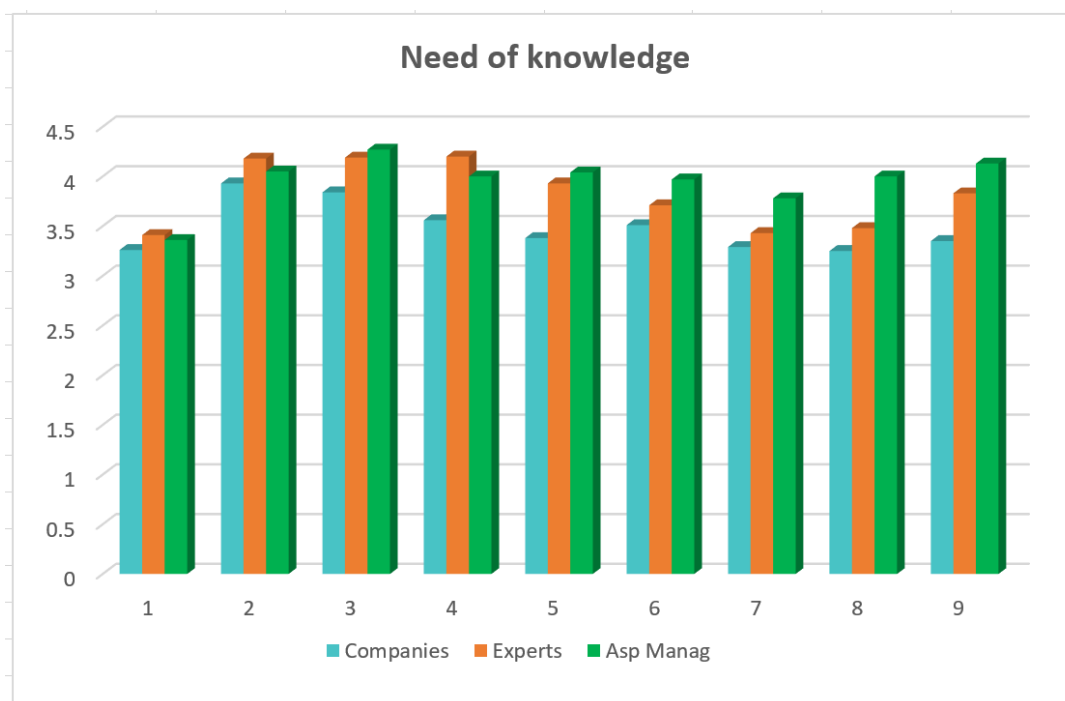
Respondents had the possibility to propose other subjects for knowledge and other skills that can be related to research and innovation. Very few respondents suggest other options, but they proposed particular subjects that can be integrated in the ones included in the questionnaire (for example, comfort science).

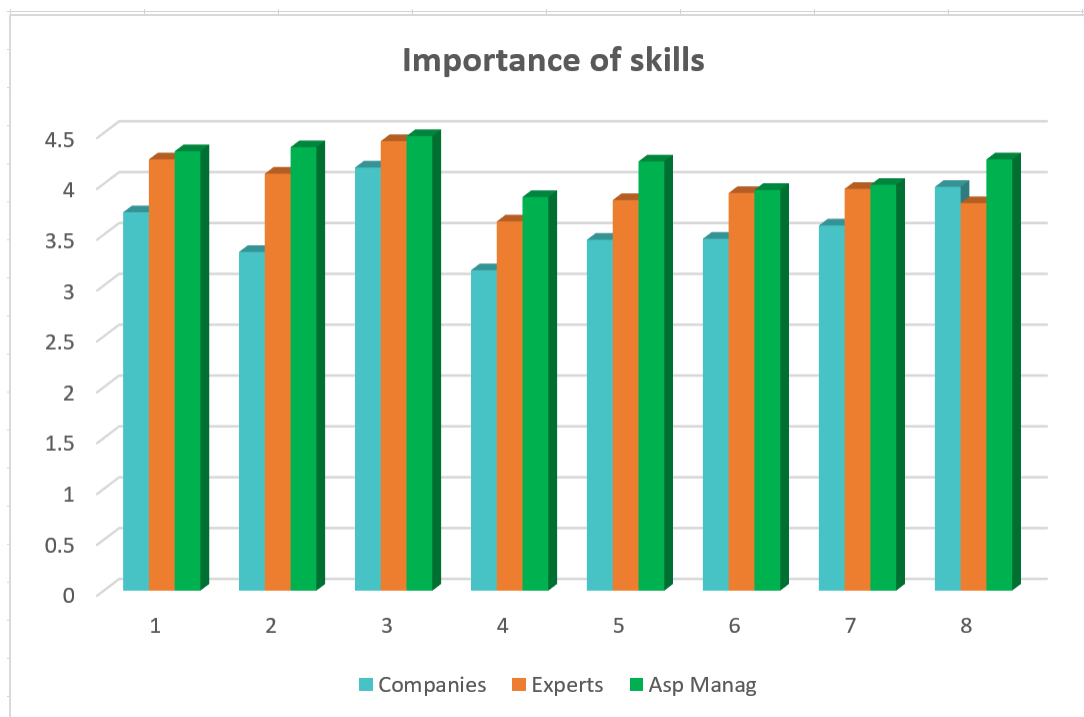
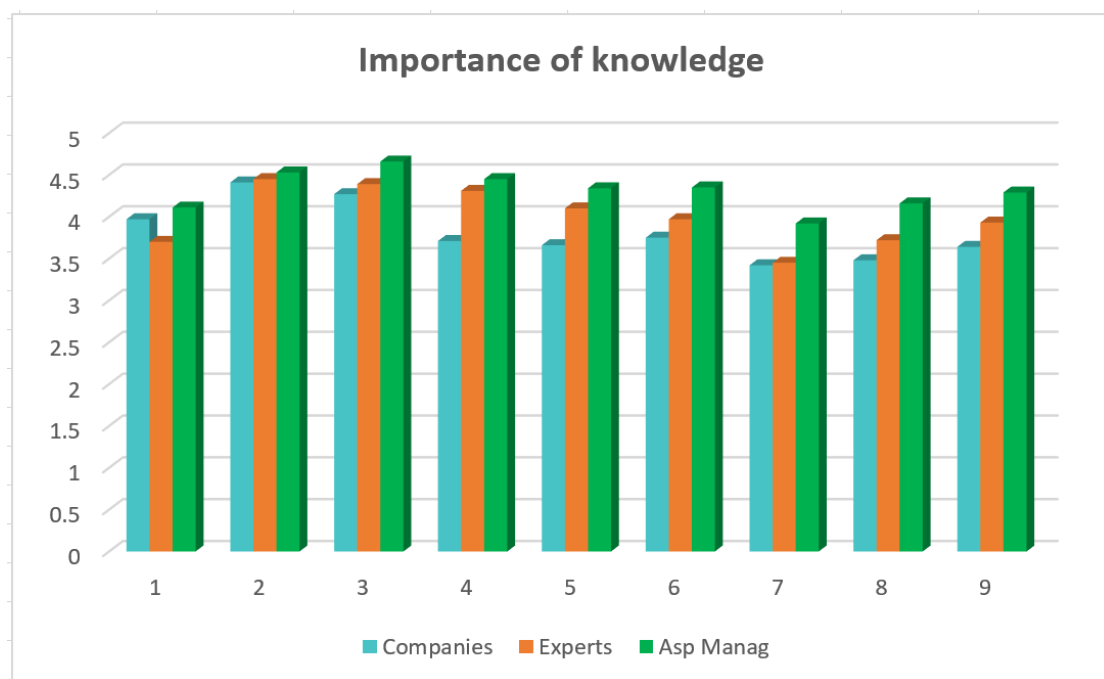
The following conclusions can be drawn considering the average ratings presented in Table 26:

- In general, the respondents from companies rated constantly lower the need for and importance of knowledge/skills than the other two types of respondents. This points out that companies perceive these needs and their importance slightly different, as well as the position toward education is more practical.

The figures below show the general average ratings (for all 3 types of respondents) for the need / importance of the knowledge, respectively for the skills investigated. The notation from 1 to 9, respectively 1 to 8 correspond to the domain of knowledge / skills proposed in the questionnaire.

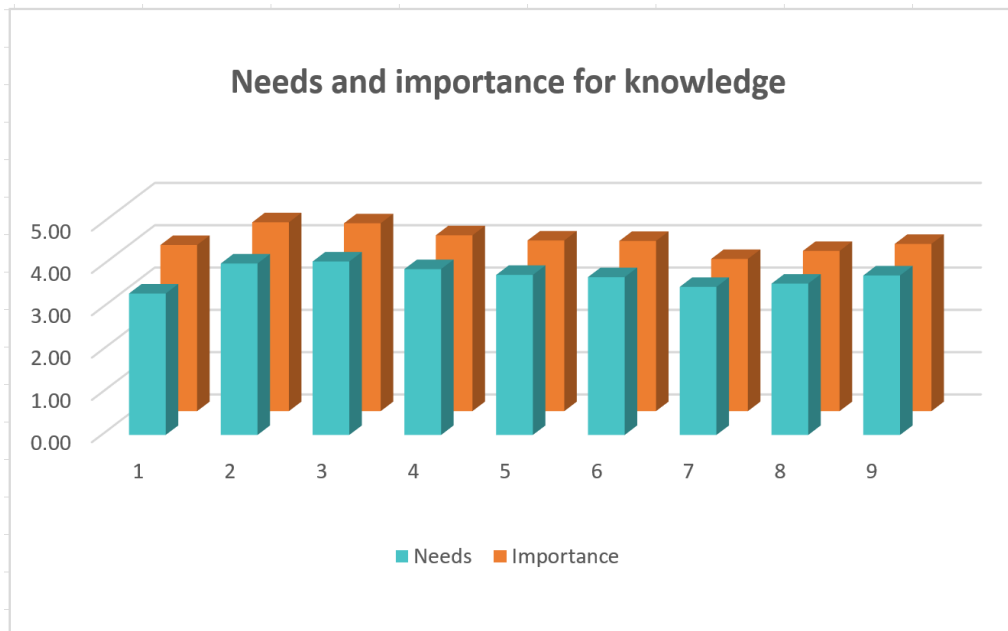
The highest ratings belong to the aspiring managers and suggest that they are more open to further education and development, especially due to the fact that in most cases they graduated recently and are still in touch with HEIs.



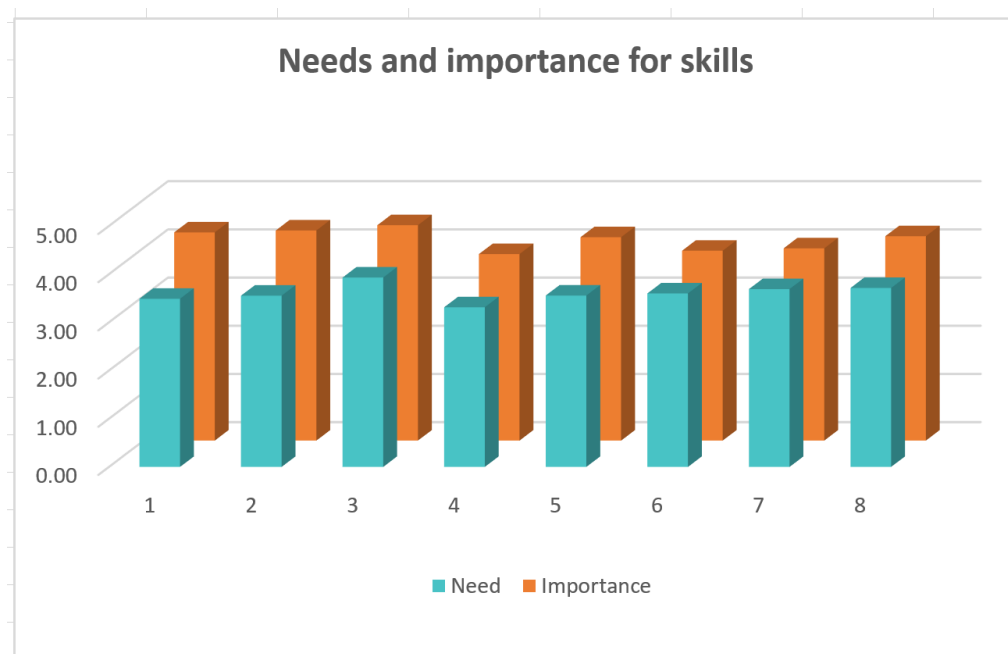


The four graphics presented above also show the higher rating for the importance of knowledge/skills in comparison to the rating for the need. This is presented in a synthetic manner in the graphics below that

consider the general average for both knowledge and skills, calculated from the averages for each category of respondents.



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When comparing the general averages obtained for the need and importance for knowledge/skills related to research and innovation, this difference in rating is obvious. This situation indicate that:

- the knowledge/skills were well selected for the field research and the results confirm the significance of this selection

- the T&C industry already has specialists with such skills and knowledge and for certain skills and knowledge domains therefore there is a lesser need for such people (especially in traditional T&C technologies)
- In the case of knowledge regarding research and innovation, the following subjects obtained the best ratings:
 - New advanced textile raw materials, products
 - Modern production methods
 - Clean technologies
 - Sustainable value chains specific to T&C sector
 - Functionalization methods and processes for textiles

The subjects with the highest ratings can be generally grouped into **new materials and technologies** and **sustainable, environmental friendly technologies/value chains**. All respondents agree that these are the subjects needing to be developed by education providers in the future.

The results correspond to the research trends in textile and fashion for the next decade, that consider smart, high-performance materials, advanced digitised manufacturing, value chains and business models and circular economy and resource efficiency as the most important research fields (according to ETP's document Towards a 4th Industrial Revolution of Textiles and Clothing A Strategic Innovation and Research Agenda for the European Textile and Clothing Industry, published in 2016).

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- In the case of skills related to research and innovation, the following skills were considered the most important:
 - Capacity to generate new ideas (creativity) for the development of textile materials and products
 - Advanced digital skills; ability to use specific software for design and production of textiles and clothing (CAD/CAM systems)
 - Competence in following fashion/ market trends

Creativity and innovation are seen as the most significant skills (highest rating), especially in the context of the subjects deemed important in the first part of the Table 26 (knowledge /awareness). Considering the specificities of the T&C sector, the capacity to generate new ideas has to be regarded as having two sides:

- technical creativity - developing new materials, new applications, also involving patents, as well as IPR issues
- artistic creativity – expressed mostly through fashion design (including fabric design)

Advanced digital skills are fundamental for the future development of the concept of Industry 4.0. Digitisation of textile production will have an impact on machines, processes, workplaces, factories, supply chains and value creation networks. It will affect all levels and steps of the textile process from the shop floor to the business level. This includes aspects of inter-company resources or computer-aided manufacturing technologies.

While the first two skills refer to technological innovation, the third skill deemed significant refer to non-technological innovation, confirming the general opinion that both types of innovation are important in the development of the T&C sector in Europe. It also is closely connected to the dynamic aspect of fashion and ability of companies to predict and adapt to future trends.

5. Conclusions and recommendations

The present field research was designed to identify main problems gaps and mismatches existing in the T&C sector as well as the level of research and innovation within companies and educational programmes addressed in the textile and clothing manufacturing sector.

The field research followed the methodology defined in the Guidelines and the results are presented and interpreted for each category. After analysing the results, the following general conclusions and recommendations can be formulated in reference to the main topics of investigation included in the questionnaires:

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1. All 3 groups of respondents had mostly similar positions and options regarding the questionnaires that they answered.
2. With regard to the manner of implementing student internships in the future, comparing the answers provided by all three types of respondents (companies' representatives, experts and aspiring managers), the data show that a mixed internship is preferred by most of respondents.

The respondents from companies are divided in their options between the traditional and the mixed internship, while the other two groups of respondents clearly prefer the mixed internship. It is clear that the development of a form of virtual internship is needed in the near future, addressing the needs related to research and innovation.

3. There is a limited cooperation between companies and HEIs/research centres in research projects, but the respondents from both sides indicate clearly their openness toward such joint efforts. However, both groups have a similar point of view in regard to the perceived problems/challenges companies face in relation to research and innovation, naming lack of funds and difficulties in accessing research funding the most important problems affecting the development and innovation in the T&C sector.

The survey also pointed out that there are gaps in the cooperation between companies and HEIs/research centres, mostly generated by different approaches to research and different agendas.

4. In the case of knowledge regarding research and innovation, the following subjects obtained the best ratings and can be seen as the base for the future IO of the TEXSTRA project:
 - a. New advanced textile raw materials, products
 - b. Modern production methods

- c. Clean technologies
- d. Sustainable value chains specific to T&C sector
- e. Functionalization methods and processes for textiles

Therefore, the recommendation to be made concerning the design and development of IO2 (Online platform for transferring research and innovation through project based training) and IO3 (Book of lectures “Innovative and Creative thinking in the Textile & Clothing manufacturing sector”) is that these IO should consider to include these topics:

- new and advanced textile materials and manufacturing methods
 - circular economy and sustainability
5. In the case of skills related to research and innovation, the following skills were considered the most important and are to be considered in developing the future Intellectual outputs of the TEXSTRA project:
- a. Capacity to generate new ideas (creativity) for the development of textile materials and products
 - b. Advanced digital skills; ability to use specific software for design and production of textiles and clothing (CAD/CAM systems)
 - c. Competence in following fashion/ market trends

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The need for non-technological innovation emphasised by the importance of competence in following fashion/ market trends, leads to the recommendation that E-commerce is a topic that should be considered for the future Intellectual Outputs.

ANNEXES

ANNEX 1. Questionnaire for companies

Introduction

The project Textile Strategy for Innovative Higher Education (TEXSTRA) is co-funded by the European Commission under the Erasmus+ programme.

One of its main objectives is the designing of the curriculum for training on Research & Innovation in the field of textiles and clothing through the identification and analysis of those characteristics of the sector that concern the presence of research and non-technological innovation within companies and educational programmes and the needs of adequate skills.

The survey focuses on identifying main problems affecting the textiles and clothing industry related to skills and competences concerning research and innovation.

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Therefore, you are kindly asked to provide us with input by filling in the following questionnaire, which will enable us to design and develop a training programme and e-learning contents for transferring research and innovation to T&C students and companies.

It should take no more than 15 minutes to complete the questionnaire. Most of the questions can be answered by clicking boxes that have the best correspondence with your expectations.

All responses will be treated with the strictest confidence and no responder will be identifiable in the published report.

Please return your completed questionnaire by e-mail or fax no later than *[deadline]*.

Contact details: *[TEXSTRA member]*

Email: *[TEXSTRA member]*

Fax: *[TEXSTRA member]*

TEXSTRA Team

QUESTIONNAIRE

A. Background information

1. In what industry does your company operate? *(Please tick multiple if appropriate)*

- 1 ☐ Clothing/ fashion 2 ☐ Technical textiles 3 ☐ Yarn/ fibre producer 4 ☐ Textiles & fabrics
5 ☐ Services 6 ☐ Trade/ commerce 7 ☐ Other (please specify) _____

2. How would you classify your company according to the number of employees?

- 1 ☐ 1 to 9 2 ☐ 10 to 49 3 ☐ 50 to 249 4 ☐ more than 249

B. Level of research and innovation within companies

3. Does your company have a R&D department?

- 1 ☐ Yes 2 ☐ No

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4. In the last 5 years, have your company applied/introduced/developed innovation? *(Please tick multiple if appropriate)*

- 1 ☐ materials/products 2 ☐ technologies 3 ☐ processes 4 ☐ non-technological innovation

C. Collaboration between companies and HEIs/Research centres

5. Does your company cooperate on research projects with Universities? 1 ☐ Yes 2 ☐ No

6. If yes, please indicate the who is financing the project(s) *(please tick multiple if required)*

- 1 ☐ Self-financed projects 2 ☐ Regionally funded project 3 ☐ nationally funded project 4 ☐ EU funded

7. If you do joint-research, are you satisfied with the cooperation? 1 ☐ Yes 2 ☐ No

8. If not, please provide the key reasons that deters you to cooperate with a University

9. Does your Company cooperate on research projects with Research Centres? 1 ☐ Yes 2 ☐ No

10. If yes, please indicate who is financing your project(s) *(please tick multiple if required)*

- 1 ☐ Self-financed projects 2 ☐ Regionally funded projects
3 ☐ Nationally funded projects 4 ☐ EU funded

11. If you do joint research, are you satisfied with the cooperation? 1 ☐ Yes 2 ☐ No

12. If not, please provide the key reasons that deter you from cooperating with Research Centres

D. Perceived training needs related to research & innovation

13. Do you consider that your staff needs further training related to research and innovation?

1 ☐ Yes 2 ☐ No

14. Please state your perceived need for training in the following skills related to research and innovation and the importance of that knowledge /skill for you.

Circle the appropriate assessment using the following scale: 1 – None; 2 – Very weak; 3 – Weak; 4 – Considerable; 5 – Strong

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	Knowledge / skills / competencies	Needs for training					Level of importance				
	Knowledge/ awareness about:										
1	Traditional textiles and clothing technologies	1	2	3	4	5	1	2	3	4	5
2	New advanced textile raw materials, products	1	2	3	4	5	1	2	3	4	5
3	Modern production methods	1	2	3	4	5	1	2	3	4	5
4	Clean technologies	1	2	3	4	5	1	2	3	4	5
5	Sustainable value chains specific to T&C sector	1	2	3	4	5	1	2	3	4	5
6	Functionalization methods and processes for textiles	1	2	3	4	5	1	2	3	4	5
7	Non-technical aspects of advanced manufacturing specific to the T&C sector	1	2	3	4	5	1	2	3	4	5
8	Project management concepts	1	2	3	4	5	1	2	3	4	5
9	Research methods and techniques specific to textile and clothing field	1	2	3	4	5	1	2	3	4	5
10	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5
11	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5
	Skills and competencies										
12	Search for, process and analyse information from different sources	1	2	3	4	5	1	2	3	4	5
13	Present scientific materials and arguments in writing and orally	1	2	3	4	5	1	2	3	4	5
14	Capacity to generate new ideas (creativity) for the development of textile materials and products	1	2	3	4	5	1	2	3	4	5
15	Conduct risk assessment analysis in R&D projects for textiles and clothing	1	2	3	4	5	1	2	3	4	5
16	Plan, design and execute research projects referring to textiles and clothing	1	2	3	4	5	1	2	3	4	5
17	Understand and use the requirements specific to the application domain – multidisciplinary approach to the design of textiles and clothing	1	2	3	4	5	1	2	3	4	5
18	Advanced digital skills; ability to use specific software for design and production of textiles and clothing (CAD/CAM systems)	1	2	3	4	5	1	2	3	4	5
19	Competence in following fashion/ market trends	1	2	3	4	5	1	2	3	4	5
20	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5
21	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5

15. This project will design and develop several online courses. Is your company open to online training?

1 ☐ Yes 2 ☐ No

E. Cooperation with universities on educational programmes

16. Has your company been involved in the past three years in any activities of universities for the definition or validation of curricula (to address skills requirements)?

1 ☐ Yes 2 ☐ No

17. Has your company provided places for students' practice (internships) in the past three years?

1 ☐ Yes 2 ☐ No

18. If yes, have the internships included any activities related to research and innovation?

1 ☐ Yes 2 ☐ No

19. If you will accept internships in the future, how do you see them being implemented?

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- 1 ☐ in a traditional manner, the intern comes to and stays in the company
- 2 ☐ virtual internship, the intern works from outside the company through projects on themes selected by the company
- 3 ☐ mixed (partial presence, partial virtual internship)

20. Has your company cooperated, in the past three years, with any university for supporting students' graduation theses?

1 ☐ Yes 2 ☐ No

21. If yes, please specify the level of the graduation theses?

1 ☐ B.Sc. 2 ☐ M.Sc.

F. Perceived problems, challenges, new functionalities, gaps and mismatches related to research and innovation

22. Please state the main problems/challenges your company faces in relation to research and innovation (Please tick multiple if appropriate)

- 1. Lack of proper technology; difficulties in acquiring such technologies ☐
- 2. Lack of market for innovative textiles and clothing ☐
- 3. Lack of funds to develop innovative products ☐
- 4. Lack of personnel specialised in R&D activities ☐
- 5. Issues related to IPR ☐
- 6. Difficult access to research funding (regional/national/EU) ☐
- 7. Others (please describe below):

23. Do you consider as important the following gaps and mismatches concerning the promotion of research and innovation in your company? *(Please tick multiple if appropriate)*

1. HEIs/research institutes and companies have different research agendas ☐
2. Insufficient projects of applied research ☐
3. Lack of trust in relation to universities and research institutes ☐
4. Companies perceive research and innovation in a different manner ☐
5. If necessary, identify other options (please describe below):

G. Information about the respondent

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24. Please let us know:

- **Your position in the company:**

- 1 ☐ Owner/ CEO 2 ☐ Head of Marketing 3 ☐ Head of R&D 4 ☐ Head of Manufacturing
- 5 ☐ Head of Qual. control 6 ☐ Head of Export 7 ☐ Other (please specify) _____

- **Your highest qualification:** 1 ☐ Bachelor 2 ☐ Master 3 ☐ PhD. 4 ☐ Other _____

- **Gender:** 1 ☐ M 2 ☐ F

- **Age:** 1 ☐ 25-29 2 ☐ 30-39 3 ☐ 40-49 4 ☐ 50-59 5 ☐ 60+

If you would like to know about the survey results, please visit the project website (www.texstra.eu) and select "Intellectual outputs" where the report will be accessible after June 1-st, 2018.

Thank you for your time and support in responding to this questionnaire.

ANNEX 2. Questionnaire for experts

Introduction

The project Textile Strategy for Innovative Higher Education (TEXSTRA) is co-funded by the European Commission under the Erasmus+ programme.

One of its main objectives is the designing of the curriculum for training on Research & Innovation in the field of textiles and clothing through the identification and analysis of those characteristics of the sector that concern the presence of research and non-technological innovation within companies and educational programmes and the needs of adequate skills.

The survey focuses on identifying main problems affecting the textiles and clothing industry related to skills and competences concerning research and innovation.

Therefore, you are kindly asked to provide us with input by filling in the following questionnaire, which will enable us to design and develop a training programme and e-learning contents for transferring research and innovation to T&C students and companies.

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It should take no more than 15 minutes to complete the questionnaire. Most of the questions can be answered by clicking boxes that have the best correspondence with your expectations.

All responses will be treated with the strictest confidence and no responder will be identifiable in the published report.

Please return your completed questionnaire by e-mail or fax no later than *[deadline]*.

Contact details: *[TEXSTRA member]*

Email: *[TEXSTRA member]*

Fax: *[TEXSTRA member]*

TEXSTRA Team

QUESTIONNAIRE

A. Background information

1. In what type of organisation do you work? (Please tick multiple if appropriate)

1 ☐ University 2 ☐ Public body 3 ☐ Professional association 4 ☐ Research institutes

5 ☐ Other (please specify) _____

2. What is your type of activity? (Please tick multiple if appropriate)

1 ☐ education 2 ☐ research 3 ☐ industry 4 ☐ education policies

B. Perceived training needs related to research & innovation

3. Please state ***your perceived need for training*** in the following skills related to research and innovation and the ***importance of that knowledge /skill*** for you.

Circle the appropriate assessment using the following scale: **1** – None; **2** – Very weak; **3** – Weak; **4** – Considerable; **5** – Strong

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	Knowledge / skills / competencies	Needs for training					Level of importance				
	Knowledge/ awareness about:										
1	Traditional textiles and clothing technologies	1	2	3	4	5	1	2	3	4	5
2	New advanced textile raw materials, products	1	2	3	4	5	1	2	3	4	5
3	Modern production methods	1	2	3	4	5	1	2	3	4	5
4	Clean technologies	1	2	3	4	5	1	2	3	4	5
5	Sustainable value chains specific to T&C sector	1	2	3	4	5	1	2	3	4	5
6	Functionalization methods and processes for textiles	1	2	3	4	5	1	2	3	4	5
7	Non-technical aspects of advanced manufacturing specific to the T&C sector	1	2	3	4	5	1	2	3	4	5
8	Project management concepts	1	2	3	4	5	1	2	3	4	5
9	Research methods and techniques specific to textile and clothing field	1	2	3	4	5	1	2	3	4	5
10	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5
11	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5
	Skills and competencies										
12	Search for, process and analyse information from different sources	1	2	3	4	5	1	2	3	4	5
13	Present scientific materials and arguments in writing and orally	1	2	3	4	5	1	2	3	4	5
14	Capacity to generate new ideas (creativity) for the development of textile materials and products	1	2	3	4	5	1	2	3	4	5
15	Conduct risk assessment analysis in R&D projects for textiles and clothing	1	2	3	4	5	1	2	3	4	5
16	Plan, design and execute research projects referring to textiles and clothing	1	2	3	4	5	1	2	3	4	5
17	Understand and use the requirements specific to the application domain – multidisciplinary approach to the design of textiles and clothing	1	2	3	4	5	1	2	3	4	5
18	Advanced digital skills; ability to use specific software for design and production of textiles and clothing (CAD/CAM systems)	1	2	3	4	5	1	2	3	4	5
19	Competence in following fashion/ market trends	1	2	3	4	5	1	2	3	4	5
20	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5
21	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5

4. This project will design and develop several online courses. Will you promote these courses?

1 ☐ Yes 2 ☐ No

C. Level of research and innovation within the educational programmes

5. Do you think that graduates possess sufficient skills and knowledge for jobs related to research and innovation?

1 ☐ Yes 2 ☐ No

6. How do you see the best way to implement student internships in the future?

- 1 ☐ in a traditional manner, the intern goes to and stays in the company
 2 ☐ virtual internship, the intern works from outside the company through projects on themes selected by the company, with the help of teaching staff
 3 ☐ mixed (partial presence, partial virtual internship)

The following questions are addressed only to experts from universities:

7. Do you think that the T&C curricula should develop courses on innovation and creativity?

1 ☐ Yes 2 ☐ No

8. Do your curricula contain courses on research and innovation?

1 ☐ Yes 2 ☐ No

9. For what EQF level?

1 ☐ Bachelor 2 ☐ Master

10. Has your university involved T&C companies in the past three years in any activities related to for the definition or validation of curricula (to address skills requirements)?

1 ☐ Yes 2 ☐ No

11. Has your university placed students for internships in T&C companies in the past 3 years?

1 ☐ Yes 2 ☐ No

12. If yes, have the internships included any activities related to research and innovation?

1 ☐ Yes 2 ☐ No

D. Requested needs of the T&C sector in terms of innovation

13. Do you think that the needs for innovation in the T&C sector should refer to?

1 ☐ technological innovation 2 ☐ non-technological innovation 3 ☐ both

Please explain your opinion

14. How should the needs for innovation in the T&C sector be addressed by universities/research centres? *(Please tick multiple if appropriate)*

- 1 ☐ education 2 ☐ knowledge transfer 3 ☐ life-long learning 4 ☐ research project

E. Perceived problems, challenges, new functionalities, gaps and mismatches

15. Please state the main problems/challenges in relation to research and innovation in the T&C sector *(Please tick multiple if appropriate)*

- | | |
|---|--------------------------|
| 1. Lack of proper technology; difficulties in acquiring such technologies | <input type="checkbox"/> |
| 2. Lack of market for innovative textiles and clothing | <input type="checkbox"/> |
| 3. Lack of funds to develop innovative products | <input type="checkbox"/> |
| 4. Lack of personnel specialised in R&D activities | <input type="checkbox"/> |
| 5. Issues related to IPR | <input type="checkbox"/> |
| 6. Difficult access to research funding (regional/national/EU) | <input type="checkbox"/> |
| 7. Others (please describe) | |

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16. What are the main gaps and mismatches concerning research and innovation in T&C sector? *(Please tick multiple if appropriate)*

- | | |
|---|--------------------------|
| 1. HEIs/research institutes and companies have different research agendas | <input type="checkbox"/> |
| 2. Insufficient projects of applied research | <input type="checkbox"/> |
| 3. Lack of trust of companies in relation to universities and research institutes | <input type="checkbox"/> |
| 4. Companies perceive research and innovation in a different manner | <input type="checkbox"/> |
| 5. Others (please describe) | |

F. Collaboration between HEIs/Research centres and companies

17. Does your University/Research centre cooperate on research projects with T&C companies?

- 1 ☐ Yes 2 ☐ No 3 ☐ Not applicable

18. If yes, please indicate the who is financing the project(s) *(please tick multiple if required)*

- 1 ☐ Self-financed projects 2 ☐ Regionally funded project 3 ☐ nationally funded project 4 ☐ EU funded

19. If you do joint-research, are you satisfied with the cooperation? 1 ☐ Yes 2 ☐ No

20. If not, please provide the key reasons that deters you to cooperate with T&C companies

G. Information about the respondent

21. Please let us know:

- **Your position in the organisation**

1 ☐ Managerial position 2 ☐ Teaching staff from HEIs 3 ☐ VET professional 4 ☐ Researcher

5 ☐ Other (please specify) _____

- **Your highest qualification** 1 ☐ Bachelor 2 ☐ Master 3 ☐ PhD. 4 ☐ Other _____

- **Gender** 1 ☐ M 2 ☐ F

- **Age** 1 ☐ 25-29 2 ☐ 30-39 3 ☐ 40-49 4 ☐ 50-59 5 ☐ 60+

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If you would like to know about the survey results, please visit the project website (www.texstra.eu) and select "Intellectual outputs" where the report will be accessible after June 1-st, 2018.

Thank you for your time and support in responding to this questionnaire.

ANNEX 3. Questionnaire for aspiring managers / students

Introduction

The project Textile Strategy for Innovative Higher Education (TEXSTRA) is co-funded by the European Commission under the Erasmus+ programme.

One of its main objectives is the designing of the curriculum for training on Research & Innovation in the field of textiles and clothing through the identification and analysis of those characteristics of the sector that concern the presence of research and non-technological innovation within companies and educational programmes and the needs of adequate skills.

The survey focuses on identifying main problems affecting the textiles and clothing industry related to skills and competences concerning research and innovation.

Therefore, you are kindly asked to provide us with input by filling in the following questionnaire, which will enable us to design and develop a training programme and e-learning contents for transferring research and innovation to T&C students and companies.

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It should take no more than 15 minutes to complete the questionnaire. Most of the questions can be answered by clicking boxes that have the best correspondence with your expectations.

All responses will be treated with the strictest confidence and no responder will be identifiable in the published report.

Please return your completed questionnaire by e-mail or fax no later than *[deadline]*.

Contact details: *[TEXSTRA member]*

Email: *[TEXSTRA member]*

Fax: *[TEXSTRA member]*

TEXSTRA Team

QUESTIONNAIRE

A. Background information

1. What is your latest qualification?

1 ☐ Bachelor 2 ☐ Master 3 ☐ Ph.D.

2. During your studies, have you been involved in research projects?

1 ☐ Yes 2 ☐ No

B. Perceived training needs related to research & innovation

3. Please state your perceived need for training in the following skills related to research and innovation and the importance of that knowledge /skill for you.

Circle the appropriate assessment using the following scale: **1** – None; **2** – Very weak; **3** – Weak; **4** – Considerable; **5** – Strong

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	Knowledge / skills / competencies	Needs for training					Level of importance				
	Knowledge/ awareness about:										
1	Traditional textiles and clothing technologies	1	2	3	4	5	1	2	3	4	5
2	New advanced textile raw materials, products	1	2	3	4	5	1	2	3	4	5
3	Modern production methods	1	2	3	4	5	1	2	3	4	5
4	Clean technologies	1	2	3	4	5	1	2	3	4	5
5	Sustainable value chains specific to T&C sector	1	2	3	4	5	1	2	3	4	5
6	Functionalization methods and processes for textiles	1	2	3	4	5	1	2	3	4	5
7	Non-technical aspects of advanced manufacturing specific to the T&C sector	1	2	3	4	5	1	2	3	4	5
8	Project management concepts	1	2	3	4	5	1	2	3	4	5
9	Research methods and techniques specific to textile and clothing field	1	2	3	4	5	1	2	3	4	5
10	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5
11	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5
	Skills and competencies										
12	Search for, process and analyse information from different sources	1	2	3	4	5	1	2	3	4	5
13	Present scientific materials and arguments in writing and orally	1	2	3	4	5	1	2	3	4	5
14	Capacity to generate new ideas (creativity) for the development of textile materials and products	1	2	3	4	5	1	2	3	4	5
15	Conduct risk assessment analysis in R&D projects for textiles and clothing	1	2	3	4	5	1	2	3	4	5
16	Plan, design and execute research projects referring to textiles and clothing	1	2	3	4	5	1	2	3	4	5
17	Understand and use the requirements specific to the application domain – multidisciplinary approach to the design of textiles and clothing	1	2	3	4	5	1	2	3	4	5
18	Advanced digital skills; ability to use specific software for design and production of textiles and clothing (CAD/CAM systems)	1	2	3	4	5	1	2	3	4	5
19	Competence in following fashion/ market trends	1	2	3	4	5	1	2	3	4	5
20	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5
21	OTHER (please specify):	1	2	3	4	5	1	2	3	4	5

4. This project will design and develop several online courses. Will you participate in these courses?

1 ☐ Yes 2 ☐ No

C. Level of research and innovation within the educational programmes

5. Do you think that graduates possess sufficient skills and knowledge for jobs related to research and innovation?

1 ☐ Yes 2 ☐ No

6. Did you have any courses related to research and innovation?

1 ☐ Yes 2 ☐ No

7. Do you think that the T&C curricula should develop courses on innovation and creativity?

1 ☐ Yes 2 ☐ No

9. For what EQF level?

1 ☐ Bachelor 2 ☐ Master

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10. During your studies, have you had internships in T&C companies?

1 ☐ Yes 2 ☐ No

11. If yes, have the internships included any activities related to research and innovation?

1 ☐ Yes 2 ☐ No

12. How do you see the best way to implement student internships in the future?

1 ☐ in a traditional manner, the intern goes to and stays in the company

2 ☐ virtual internship, the intern works from outside the company through projects on themes selected by the company, with the help of teaching staff

3 ☐ mixed (partial presence, partial virtual internship)

D. Requested needs of the T&C sector in terms of innovation

13. Do you think that the needs for innovation in the T&C sector should refer to?

1 ☐ technological innovation 2 ☐ non-technological innovation 3 ☐ both

Please explain your opinion

14. How should the needs for innovation in the T&C sector be addressed by universities/research centres? *(Please tick multiple if appropriate)*

1 ☐ education 2 ☐ knowledge transfer 3 ☐ life-long learning 4 ☐ research projects

E. Information about the respondent

15. Please let us know:

- **Your position in the organisation**

1 ☐ Engineer 2 ☐ Teaching staff 2 ☐ Researcher 3 ☐ Technician 4 ☐ Student
4 ☐ Other (please specify) _____

- **Your highest qualification** 1 ☐ Bachelor 2 ☐ Master 3 ☐ PhD. 4 ☐ Other _____

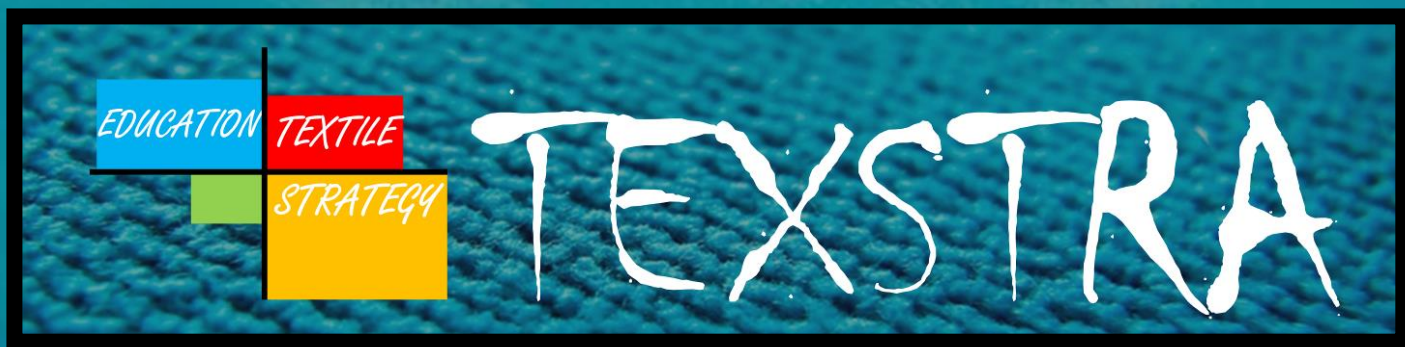
- **Gender** 1 ☐ M 2 ☐ F

- **Age** 1 ☐ <25 2 ☐ 25-29 3 ☐ 30-39 4 ☐ ≥ 40

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If you would like to know about the survey results, please visit the project website (www.texstra.eu) and select "Intellectual outputs" where the report will be accessible after June 1-st, 2018.

Thank you for your time and support in responding to this questionnaire.



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