

Advancing industrial digital and green innovations in the advanced textile industry through innovation in learning and training

WP2 Greek National Report





Project acronym:	ADDTEX
Project full title:	Advancing industrial digital and green innovations in the advanced textile industry through innovation in learning and training
Grant agreement no .:	101056303 — ADDTEX — ERASMUS-EDU-2021-PI-ALL- INNO
Responsible partner for deliverable:	CITEVE & TUS
Contributing partners:	All partners
Author(s):	Cre.Thi.Dev.
Target Group(s):	Institution
Distribution level:	Public
Total number of pages:	26
Version:	Final
Language	English
Reviewed by:	Peer review
Status:	Final
Delivery date:	10.01.2023

Version control:

Number	Date	Description

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor the granting authority can be held responsible for them."

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1. Introduction

As member of the consortium in the ADDTEX project, Cre.Thi.Dev. carried the list of activities within the timeframe regarding Work Package 2. Due to the resources and the expertise of Cre.Thi.Dev. in the textile sector in Greece as well as in the Erasmus+ projects, the activities and the research were conducted successfully. All activities took place in Greece, and in online forms.

During the first two months, September and October, the organization worked on gathering information from its partners for conducting the desk research. With a focus on textile and clothing sector, Cre.Thi.Dev. completed the results about the current situation in education and industry that the country is under. For the second part of the time left, the organisation contacted its affiliates and organized the meetups and the living labs, according to the guidelines given by the responsible. There were two meetups conducted, while the living labs were combined with the second meet-up. During the first discussion, Cre.Thi.Dev. gathered 3 HEIs and 1 VET provider during an online session. As for the second meet-up and the living labs, the session participated 8 stakeholders (7 companies and 1 research center) and 3 HEIs, where there were issues discussed regarding the connection between the Greek textile industry and the education.

The list of partners included in all online sessions are:

- 1. HEIs
 - a. International Hellenic University (IHU)
 - b. Technical University of Crete (TUC)
 - c. University of West Attica (UNIWA)
- 2. VET providers
 - a. PANSIK Fashion school
- 3. Textile and Fashion Industry stakeholders
 - a. 3Quarters
 - b. C.Siamidis
 - c. MUSA collection
 - d. Cutcutuur
 - e. Emi Tsakalou (researcher)
 - f. Cl. Dimitriadou (researcher)
 - g. Sioutaris George (researcher and employee)
 - h. Foundation for Research and Technology Hellas/ Institute of Chemical Engineering Sciences (FORTH/ ICE-HT)

Starting with the desk research, the results were conducted through online research, reach out to affiliates for information and from the organization's portfolio of activities on advanced textiles and green/ digital/ smart development. There is a wide variety of projects performed and discussions organised on a national and international level, but still the sector is scarce, and a large group of the market is still unaware of both advanced textiles and even sustainability-based thinking.

Moving on to the results of the discussions and maps designed during the meetups and living labs. More specifically, during the first session with the HEIs and VETs, the focus of discussion was on what was available for education and towards which directions are the institutes moving to reach green, digital and smart development and knowledge. On the other hand, the discussions with the companies were first to realise the existing technology in the Greek industry, and secondly the correlation of the industry and the HEIs. We also asked the stakeholders, about the discussion of their activities and to what extent they take actions for communicating them.

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2. Technologies / innovation /documents /tools

In this section, we provide the results of discussions during the second meetup and the living labs, that were conducted also online including educators and textile industry stakeholders. To maintain a specific pace and gather the required information without moving out of line, we first divided the of high importance activities which all stakeholders agreed upon. Then, according to the companies' processes and activities, we categorised the aforementioned, in green, digital and smart categories. For the final findings, there was extended discussion between education and industry about existing technologies, methods and tools used, lack of information and resources, future and ongoing processes. For each one of these, the participants stated strengths, threats, opportunities, and barriers that are faced in the Greek industry.

2.1.1 Green transition

Table 1. Green

Functional areas of the	Technology/innovation/	knowledge needed to	Topics to be addressed
company	changes	perform the process	
Sustainable based thinking	Waste management	Train the staff and prepare	Methods of recycling/
	right choice of raw	students accordingly	repurposing
	materials	Maintenance of new	Why choose something
	changes in the supply	technologies	sustainable and how to
	chain stages	Learn about new	recognise it
	New methods of energy	hardware and software	What means energy
	management	that will assist with the	maintenance
		innovative methods of	What means waste
		sustainability	management
		Strategic management for	
		waste management and	
		energy saving	
Raw materials	Regulations and ISO	For raw materials it is	Transparency
		important to know about	Follow regulations and ISO
		origins, how they were	standards
		produced, under what	Bring awareness
		conditions and how much	Train the local market
		waste did they produce.	
Packaging	Recycled materials	More or less the same as	Transparency
		for any material that	Effectiveness and
		wants to follow the	durability
		regulations. Know about	ISO standards and
		the origins, when where	regulations
		and how.	

2.1.2 Digital transition

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Table 2. Digital

Functional areas of the company	Technology/innovation/ changes	knowledge needed to perform the process	Topics to be addressed
Product design and production	3D design, 3D cutting, digitised processes in the supply chain	Software Hardware New channels	This is a constantly growing area Train the staff and be up to date for changes and innovative ideas
Product distribution	Online websites	Basic skills and methods for reaching out to new channels in the digital world	Keeping up to date and renewing the knowledge on new marketing vendors
Product advertising	Online websites	Marketing skills marketing influencer New software	Third party companies to meet expectations New collaborations with respective partners

2.1.3 Smart transition

Table 3. Smart

Functional areas of the company	Technology/innovation/ changes	knowledge needed to perform the process	Topics to be addressed
Product advertising	Innovation	3D software	Strategies
	Strategic planning		Business models
			Software knowledge
Sales	Customisation	Marketing channels	Smart sales
	Online channels	Software	Customisation
	3D technologies		
Customisation	Data process	Ability to analyse data	Digital tools
	Data collection	Ability to support	
	On time services	customisation through tools	
Transparency	Raw materials	New technologies	Design for sustainability
	Packaging	Regulations and standards	Be open and how to
	Processes		bring awareness





3. Existing Initiatives (Projects/strategies/documents/tools)

• Identification of projects and documents at national and regional level with a focus on the advanced materials targeted on green, smart, digital knowledge and impact of COVID 19 on the adoption of new working methodologies in the Advanced Textiles industry.

Industry			
Country		Greece	
Partner name		CRETHIDEV	
materials targeted or	Identification of projects and documents at national and regional level with a focus on the advanced materials targeted on green, smart, digital knowledge and impact of COVID 19 on the adoption of new working methodologies in industry .		
Target application	areas of the producers of te	xtile materials in your country	
-	he level of the most emergin dium term to the market nee	g skills that result in occupations that will best respond ds.	
□ Areas of knowled	ge development for new cros	s-cutting knowledge and business models	
Typology of resource		 Strategy Project Report, study Other (please, specify) 	
Website, link, contact:	http://yfatronic.physics.au	ith.gr/	
	Professor S. Logothetidis, I	PROJECT COORDINATOR	
Relevant information:	Please explain when was conducted, the target group, and the main results achieved.		
	YFATRONIC – Developmen (National funding)	nt of Integrated Flexible Textile & Electronic Products	
	Project Duration: Decembe	er 2010 - December 2013	
	of flexible organic photov tents, clothing etc.) and the support OPVs for the charg how acquired from this pr flexible electronic devices	IIC was the technology development for the integration voltaic devices onto textile products (e.g. textiles for e design of the appropriate electronic circuits which will ging of external portable electronics devices. The know- oject will be the base for the integration of other kind onto textile products, like sensors, displays, antennas, of the above goals YFATRONIC combined all the Greek in this field.	
	The goals of YFATRONIC w	ere:	
		organic photovoltaic devices (OPVs) onto flexible s, polyester textiles) by printing techniques which will	

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be characterized by significant operational stability, long lifetime (1-2 years), high efficiency (4-5%) and the their flexible use on textile products (e.g. clothes).
2. The development of electronic circuits which will drive the OPV devices for the utilization of the energy produced to charge external portable electronic devices.
3. The integration of OPVs and electrical circuits onto textile products (e.g. clothes, jackets, tents) for the passive production of electric energy from the functional textile and its use for charging portable electronic devices (mobile phones, MP3 players, electronic book, etc).
4. The exploitation and transfer of the results for further research on the field for the integration of other flexible electronic devices onto textiles, such as sensors, biosensors, flexible displays, antennas, etc.

Industry			
Country		Greece	
Partner name		CRETHIDEV	
	on green, smart, digital know	onal and regional level with a focus on the advanced ledge and impact of COVID 19 on the adoption of new	
Target applicatio	n areas of the producers of te	extile materials in your country	
	the level of the most emergir edium term to the market nee	ng skills that result in occupations that will best respondeds.	
Areas of knowled	lge development for new cros	ss-cutting knowledge and business models	
Typology of resource		Project	
Website, link, contact:	https://hacktex.eu/	https://hacktex.eu/	
Relevant information:	Please explain when was conducted, the target group, and the main results achieved.		
	Duration of the project: 0	1/11/2021 – 01/05/2024	
	ERASMUS+ HACKTEX project aims at developing innovative pedagogical tools to improve the skills of engineering students on higher education in relation to innovation and, particularly, in the field of smart textiles.		
	dynamics by enhancing generations, producing co	osal that is oriented to the reassessment of the sector and targeting the skills of the future workforce ompetitive products, developing the 4.0 industry and ability to external inputs and demands in conclusion,	

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endow the textile industry with resilience starting from the beginning of its value chain: the students' education and training.
Deepening in smart textiles and matching the science field with new technologies and the textile sector, means giving a renewed potential, a consolidated competitivity and an important green component to the European textile industry.

Industry		
Country		Greece
Partner name		
	green, smart, digital knowl	onal and regional level with a focus on the advanced edge and impact of COVID 19 on the adoption of new
Target application	areas of the producers of te	xtile materials in your country
-	he level of the most emergin lium term to the market nee	g skills that result in occupations that will best respondeds.
Areas of knowledg	e development for new cros	s-cutting knowledge and business models
Typology of resource		 Strategy Project Report, study Other - Financial Instrument
Website, link, contact:	https://www.espa.gr/el/Pa	ages/programs 21-27.aspx
	http://21-27.antagonistiko antagwnistikothtas/	otita.gr/enisxush-epixeirimatikothtas-
Relevant information:	Please explain when was conducted, the target group, and the main results achieved.	
	Partnership Agreement fo	or Regional Development (ESPA) 2021-2027:
	of SMEs for their digital to national development po the "Competitiveness" of principal financial instrum Programming Period. (Nat a) The support of re b) The support of of euro)	b environmentally friendly processes and the support transformation are two main areas where the Greek licy focuses on. In this framework Greece has set up Operational Programme 2021-2027, which is the nent to support research and innovation during this tional and European Funding of 3,9 billion euro) for: search and innovation (773 million euro) entrepreneurship and competitiveness (1584 million companies' access to funding (921 million euro)
		Human Capital (531 million euro)

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Its objective is to connect research and innovation with entrepreneurship and enhancing national and regional advantages and alignment with EU policies on digital and green transformation.

Specific objectives of the programme are:

- The strengthening of research and innovation capabilities and of the utilization of advanced technologies
- The development of skills for smart specialization, for the industrial transition and for entrepreneurship
- The exploitation of the benefits of digitalization for businesses (eg development of digital innovations)
- The strengthening of sustainable development and competitiveness of SMEs and the creation of jobs in SMEs, including productive investment (eg. Adaptation / modernization of the production process with emphasis in the green transition)
- The promotion of adaptation of workers, businesses and entrepreneurs in change (eg the Upskilling or reskilling of professionals, training, certification knowledge, skills and professional qualifications of workers based on modern recognized standards or reskilling-upskilling of workers in green transition skills)

Strengthening of Research and Innovation

The promotion of research and innovation is fully aligned with the country's strategy to place innovation at the heart of a sustainable and resilient recovery from the pandemic, to accelerate the green and digital transition and ensure Greece's technological development. Accordingly, human resources need to develop the required skills to support upgraded business activity across all sectors.

Enhancing Entrepreneurship and Competitiveness

At the heart of the national development policy is the upgrading, expansion and shift of the production base to environmentally friendly processes, the enlargement of the manufacturing sector, the interconnection with international markets as well as support for the digital transformation of Greek small and medium enterprises so that they can face international challenges and remain competitive.

Development of Human Capital

The human capital of entrepreneurship will be supported through the development of SMEs and very small enterprises and priority will be given to innovative business ideas aiming to the creation of sustainable jobs that will contribute to the adaptation of companies to the new requirements.

Small and Medium Size Enterprises

The main aim is to improve the position of Greek production in the international markets, through the operational flexibility and performance of businesses, faster production speeds and the organization of partnerships and new business models in smart value chains based on environmentally friendly processes and products.

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Industry		
Country		Greece
Partner name		CRETHIDEV
advanced materials ta		national and regional level with a focus on the digital knowledge and impact of COVID 19 on the dustry.
Target application	areas of the producers o	f textile materials in your country
-	he level of the most eme and medium term to the	erging skills that result in occupations that will best e market needs.
Areas of knowledg	e development for new o	cross-cutting knowledge and business models
Typology of resource	 □ Strategy □ Project □ Report, study □ Other (please, specify) 	
Website, link, contact:	General Secretariat for	Research and Innovation (GSRI).
	https://gsri.gov.gr/en/r specialization-ris3/	esearch-innovation-strategy-for-smart-
Relevant information:	Please explain when was conducted, the target group, and the main results achieved.	
	Research & Innovation	Strategy for Smart Specialization (RIS3)
	Developing a Research and Innovation Strategy for Smart Specialization (RIS3) was among the conditionalities for securing funding for research and innovation actions under the 2014-2020 Partnership Agreement (PA). At national level, the GSRI was responsible for defining the 2014-2020 RIS3 which was approved by the Greek government in 2015. For the 2021-2027 Programming Period, the new national Smart Specialization Strategy is a comprehensive economic transformation agenda in conformity with the European Structural Funds Policy objective 1 (PO1): "A smarter Europe – innovative & smart economic transformation". PO1 specific objectives include:	
	 advanced tech reaping the begovernments; enhancing gro 	enefits of digitization for citizens, companies and wth & competitiveness of SMEs; Ils for smart specialization, industrial transition and

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In order to formulate the new Strategy, it is imperative that all co- competent ministries and departments cooperate closely; to this end, in line with the Ministry of Development and Investments' mandate, the General Secretariat for Research and Innovation cooperates with the General Secretariat for Industry, under the coordination of the General Secretariat of Public Investment and NSRF.
2. THE METHODOLOGY USED FOR DEVELOPING THE STRATEGY CONSISTS IN:
Identifying dynamic thematic areas or sectors expected to contribute to the country's growth;
Specifying the thematic areas/sectors and identifying (together with the business sector and the research community) activities which, capitalizing on Research, Technology and Innovation, can facilitate structural change (e.g. modernization, differentiation and transition etc.) in enterprises of the sector concerned, and improve their competitiveness;
Highlighting the critical research areas/technologies (and appropriate policy tools) that should be included in the national RTDI strategy, taking into account the regional strategies developed by each Region.
At regional level, Greek regions and local communities are expected to identify, structure and make optimal use of their competitive advantages, support innovation and concentrate investments, in order to achieve the intended transformation of local economies through engagement of stakeholders in all stages.
This is the so-called entrepreunerial discovery process, a bottom-up approach focusing on enterprises identifying new, innovative activities and the relevant technology needs.

Industry		
Country	Greece	
Partner name	CRETHIDEV	

□ Target application areas of the producers of textile materials in your country

□ Specific needs at the level of the most emerging skills that result in occupations that will best respond in the short and medium term to the market needs.

□ Areas of knowledge development for new cross-cutting knowledge and business models

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Typology of resource		 Strategy Project Report, study Other (please, specify)
Website, link, contact:	https://greece20.gov.gr/w content/uploads/2021/07/	<u>'p-</u> /NRRP_Greece_2_0_English.pdf
Relevant information:	Please explain when was conducted, the target group, and the main results achieved. Greece 2.0: Greece's Recovery and Resilience Plan contains a comprehensive and coherent set of reforms and investments, structured into four (4) pillars: a) Greer transitions, b) Digital transformation, c) Employment, skills, and social cohesion and d) Private investment and transformation of the economy The investments and reforms include among others: for Digital transformation • The digital transformation of small and medium enterprises via procurement of equipment, cloud services and on-line services, such as modern technologies of electronic payment, work from home, digita office etc. for Employment, skills and social cohesion • Additional skilling, up-skilling and reskilling programmes boosting employment, with an emphasis on green and digital skills	
	 Reforms and in Universities in r research program in terms of skills a The digital tran infrastructure and Private investment and tran 	insformation of the economy new, next-generation industrial parks and acceleration

Industry		
Country	Greece	
Partner name	CRETHIDEV	

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Target application areas of the producers of textile materials in your country

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□ Areas of knowledge development for new cross-cutting knowledge and business models

Typology of resource		Strategy		
		Project		
		Report, study		
		Other (please, specify) Programme		
		<mark>(national/European funding)</mark>		
Website, link, contact:	https://greece20.gov.gr/?c	<u>calls=exypni-metapoiisi</u>		
Relevant information:	mation: <i>Please explain when was conducted, the target group, and the main r achieved.</i>			
		ramme aiming at the modernization and improvemen in sectors of the Greek economy		
	Target groups: very small, small and medium sized enterprises.			
	<u>Budget:</u> €73.227.620,00			
	Greek industrial ecosyste	ery small, small and medium-sized enterprises of the m are subsidized to strengthen their technologica e their manufacturing equipment using smart cutting v environmental impact.		
	digital production manage and digitally controlled in	aim to improve business resilience through upgrading ement and control systems, procurement of advanced ndustrial equipment, digitization of interconnection upply chain, and production systems and technology prmation.		
	production lines using Indu	hat can be implemented, concern: digitalization o istry 4.0 technologies, automation and interconnection and production of smart products and services facturing technologies		

Industry	
Country	Greece
Partner name	CRETHIDEV

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Target application areas of the producers of textile materials in your country

□ Specific needs at the level of the most emerging skills that result in occupations that will best respond in the short and medium term to the market needs.

□ Areas of knowledge development for new cross-cutting knowledge and business models

Typology of resource	 Strategy Project Report, study Other (please, specify) 	
Website, link, contact:		
Relevant information:		

Industry		
Country	Greece	
Partner name	CRETHIDEV	

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Target application areas of the producers of textile materials in your country

□ Specific needs at the level of the most emerging skills that result in occupations that will best respond in the short and medium term to the market needs.

□ Areas of knowledge development for new cross-cutting knowledge and business models

Typology of resource		 Strategy Project Report, study Other (please, specify) 	
Website, link, contact:	http://nanorganic.physics.a	uth.gr/index.html	
Relevant information:	Please explain when was a achieved.	conducted, the target group, and the main results	
		nt of Nonostructured Organic & Inorganic materials luction of Organic Electronic Devices	
	The main idea of NanOrganic project was to create a full organic electronic technology which includes:		
	molecules), transparent ele printing techniques and vac	vanced organic semiconductors (polymers and smal ectrodes and nano-structural barrier materials with cuum, characterized by improved properties (optical d morphology, by determining the chemica	
	organic electronic devices s	ing technologies and vacuum for the development o such as a hard and flexible substrates such as organic organic circuits (Organic Thin Film Transistor-OTFT	
	low cost (large-scale, low manufacture electronic de	erials and technical development processes scale and -cost) for direct application in industrial scale to evices on polymeric substrates. To achieve these combines all the Greek excellence and expertise in this	
	The technology developed in NanOrganic can be used beyond the scope of the project, to produce a variety of other organic electronic devices such as sensors, OLEDs, RFIDs, etc., or more complex electronic devices and systems.		
	Duration: December 2010 – December 2013		
	<u>Funding</u> : NanOrganic was fu ACTION I:«Small Scale Coop	nded by the NATIONAL ACTION: COOPERATION» SUB perative Projects»	

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Industry			
Country		Greece	
Partner name		CRETHIDEV	
	n green, smart, digital knowl	onal and regional level with a focus on the advanced edge and impact of COVID 19 on the adoption of new	
Target application	n areas of the producers of te	xtile materials in your country	
-	the level of the most emergin dium term to the market nee	g skills that result in occupations that will best respondeds.	
Areas of knowled	ge development for new cros	s-cutting knowledge and business models	
Typology of resource		 Strategy Project Report, study Other (please, specify) 	
Website, link, contact:	https://imegsevee.gr/ Gavroglou S., Kotsios V., "S	Skills – Myths & Reality", 2021	
Relevant information:	Please explain when was conducted, the target group, and the main results achieved.		
	In Greece, in most sectors, proportionally fewer people are employed in high- skilled positions than the average of the Eurozone countries, with the exception of two sectors, Education and Health, where in Greece proportionally more people are employed in high-skilled positions		
	Greece lags behind most Eurozone countries in the proportion of high-skilled j In Greece, 32% of jobs are in high-skilled occupations, while the average of Eurozone countries is 44%. Medium-skilled jobs in Greece constitute 61% of employment, while in the Eurozone 47%.		
	-	or, Greece presents a proportion of high-skill jobs that le in the Eurozone this ratio is 34%.	

Industry		
Country	Greece	
Partner name	CRETHIDEV	
10. Identification of projects and documents at national and regional level with a focus on the advanced materials targeted on green, smart, digital knowledge and impact of COVID 19 on the		

adoption of new working methodologies in industry.

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□ Target application areas of the producers of textile materials in your country

 \square Specific needs at the level of the most emerging skills that result in occupations that will best respond in the short and medium term to the market needs.

□ Areas of knowledge development for new cross-cutting knowledge and business models

□ Proj □ Rep		 Strategy Project Report, study Other (please, specify)
Website, link, contact:	Savvidou Aspasia, "Business Strategies in Clothing And Textile Industry in Greece", master thesis, 2021, University of the Aegean, Greece <u>https://hellanicus.lib.aegean.gr/handle/11610/24316</u>	
Relevant information:	achieved. The study suggests the of textile/clothing indu Promotion of subsidised pro Employment of Training and programs and Strategy for re pioneering wo Use of high tea	modern technologies and innovations through

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4. Impact of the Green, Digital and Smart processes in the industry

• What does innovation relevant to green mean for companies and where is innovation in the processes implemented? What target impacts need to be achieved?

For many companies in the local market, innovation is seen and developed through technologies used for minimising costs. For example, all of the companies that participated in the living labs, mentioned that the digitization of their activities, i.e. the 3D technologies, have decreased waste, time spent in the product development, and have been implemented in most of their stages. Another example given by one company was the laser cutting technology used for minimising the waste of garments.

A very strong variable for green activities is the use of fabrics which are organic, and this is a fact that most of the companies base their identity on. 3quarters, is a sustainable brand that produces accessories (bags and backpacks) using only vegan leather and instead of fabrics, they buy textile remnants from companies that produce balcony tents. Because the production of balcony tents is huge in Greece, the companies that have leftovers, they usually discarded them, and the two founders of 3quarters are now buying these remnants and use them solely in their production.

Essentially companies mentioned that all processes associated with reducing and saving resources are considered essential and sources of innovation. Due to the low production in the textile industry, local brands are trying to save up starting from small sustainable steps. Another important issue that brands raised, was the training of their staff and/or the selection of already aware people in regard to green activities.

• What does innovation relevant to smart mean for companies and where is innovation in the processes implemented? What target impacts need to be achieved?

For most companies there was correlation of the smart and green, mentioning that nowadays being green means also being smart in their product development.

For example, one company mentioned that their laser cutting method, which is initially meant for decreasing the waste, therefore being green, has led to faster production processes, which means being smart.

• What does innovation relevant to digital mean for companies and where is innovation in the processes implemented? What target impacts need to be achieved?

The turn to digital means for most companies, the technological growth and innovation in their activities. From 2D patterns to 3D patterns, 3D cutting and 3D printing, to digital advertisement and e-shops, were the things that were mentioned from companies as digital transformation and innovation. Another important factor of turning digital, was the choice given to consumers, into customisable products, which was also mentioned as being green as well.

Another company presented a point of turning digital, the fact of 3D presentation of its products in its homepage.

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4.1.1 Green

Table 4. Green

Technology/innovation/changes	Level of importance	State of art of the innovation/technology/changes	Processes impacted by the technology and how	Solutions adopted or planned to face the changes
Urban textile remnants repurposing	High	3QUARTERS is an innovative circular brand from Athens, Greece. The company addresses the textile waste problem by creating one-of-a- kind products from waste or deadstock urban fabrics. They employ a fully circular and zero-waste policy throughout its business model.	The company works only with local leftover, deadstock or waste textiles, focusing on synthetic fabrics. More specifically, the company works with synthetic fabrics from Athens, calculating more than 300 tonnes annually of these fabrics' remnants and having already processed more than 3 tonnes keeping a fast growing capacity. The production is kept in house and applied 100% zero waste policy. The company also keeps and repurposes its products without throwing any waste including offcuts, spent threads and other waste. The trims of the products are of no virgin plastic, the accessories are from recycled	The people working in the company follow individually and as a team a sustainable based thinking, focusing on the LCA of their products. By trying to follow the products even after the purchase, the company has managed to create a zero waste policy and expands into bringing awareness to the market from advertisements to participating in conferences regarding leading sustainable oaths in the local production and market. The company has already managed to process and repurpose more than 3 tonnes of urban textile waste and aims to lead the path into

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				dTex
			the raw	ideas of further
			materials follow	repurposing of
			strictly the	the remnants.
			higher	Also the
			standards of	company
			sustainability.	participates in
				collaborations
				and aims to
				create more,
				with various
				industries and
				elite
				institutions in
				creating value
				from waste.
Sustainable and zero waste	High	Most of the companies	The companies	By supporting
production		addressed this as a major issue	use organic	only local
		and the set of their basis for	products.	products, to
		their activities in order to follow	Support local	ensuring that
		respective strategies. A	communities	the product
		sustainable growth is depicted	and production.	they are using
		on product development	They have	follow the
		processes, raw materials to be	, digitised many	regulations of
		organic, supporting local	steps of the	a sustainable
		communities and minorities as	product	based thinking,
		well as maintaining a	development	the local
		transparent activity.	for faster and	companies
			less wasteful	struggle and
			production.	have large
				costs to cover.
New technologies	High	An innovative technology used	The company	The knowledge
		by company Cutcutuur, is that of	base its	around the
		laser cut garments, aiming to	production on	processes of
		minimise waste.	laser cutting	laser cutting is
			patterns, but	low in the local
			also for making	market and it
			designs that	is difficult to
			would be	find people
			difficult to make	who
			by hand and	understand
			would bring	and are able to
			more waste to	work in this
			the production.	sector, while
			With this way,	having a
			the process also	background in
			requires lesser	garment
			amounts of	making.
			sewing.	
International and national	High	During the CLEANTEX project,	During the	All companies
projects participation		which focuses on circular	research stage	mentioned the
		economy in the textile industry,	of the project,	lack of
		the company of 3quarters	the company	resources as
		participated in the main	participated and	main cause of
		research regarding the local	had a main part	the faded

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I.

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 	 Add	dTex
	installations	production
	with a total	companies are
	capacity of 2.1	already finding
	MW. Therefore,	ways and
	the annual	invest in
	consumption of	greener
	their energy is	processes.
	less than 0.5M	
	KWh and the	
	green activity is	
	equivalent to	
	3.6M m ² of	
	forest. The	
	total operation	
	of the solar	
	panel system	

4.1.2 Digital

Table 5. Digital

Technol	ogy/innovation/ch	anges	Level of importance	State of art of the innovation/technology/changes	Processes impacted by the technology and how	Solutions adopted or planned to face the changes
Digital eshops	advertisements	and	High	All have stated that funding digital advertisements and holding an e-shop can be more profitable than the physical store.	A very specific comment was that e-shops have been more and profitable, and especially during sale seasons. Moreover, the distribution of the companies' identity and products through online platforms of sustainable based content, bring awareness to the market.	Had to train staff or hire younger people for specific positions, who would know useful channels and tools.

WP2. [Greek National Report]



			Ad	dTex
3D design and pattern	High	All companies use the method of	Faster	Creating new
		digital design and pattern	processes and	channels and
		creation in the supply chains.	lesser time.	finding new
			Also, the	collaborators
			digital	who can
			methods have	support the
			reduced	new processes.
			drastically the	
			waste from	
			several stages	
			of the supply	
			chain. A barrier	
			that is soon to	
			be overcome is	
			the lack of	
			knowledge or	
			the limited	
			amount of it.	

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4.1.3 Smart

Throughout the meet ups, all companies correlated the digital and green transmissions into being smart and there was no significant deviation between those three.

5. Initial and further education on advanced textiles

• Identification of strategies, documents, programmes, tools (i.e. systems of qualification, educational platforms, ...), projects at EU, national and regional level with a focus on the advanced materials targeted on green, smart, digital knowledge and impact of COVID 19 in the area of education in VET and HEI

The pandemic of COVID-19 and later on the war in Ukraine, have affected Greece and it resources of energy and electricity, by bringing high rise in prices making most of the SMEs in the market to turn their focus on cost-effective activities. However most notable work and projects performed are:

1. YFATRONIC – Development of Integrated Flexible Textile & Electronic Products (National funding)

Project Duration: December 2010 - December 2013

The main idea of YFATRONIC was the technology development for the integration of flexible organic photovoltaic devices onto textile products (e.g. textiles for tents, clothing etc.) and the design of the appropriate electronic circuits which will support OPVs for the charging of external portable electronics devices. The know-how acquired from this project will be the base for the integration of other kind flexible electronic devices onto textile products, like sensors, displays, antennas, etc. For the achievement of the above goals YFATRONIC combined all the Greek excellence and know-how in this field.

The goals of YFATRONIC were:

1. The development of organic photovoltaic devices (OPVs) onto flexible substrates (polyester films, polyester textiles) by printing techniques which will be characterized by significant operational stability, long lifetime (1-2 years), high efficiency (4-5%) and the their flexible use on textile products (e.g. clothes). WP2. [Greek National Report]

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2. The development of electronic circuits which will drive the OPV devices for the utilization of the energy produced to charge external portable electronic devices.

3. The integration of OPVs and electrical circuits onto textile products (e.g. clothes, jackets, tents) for the passive production of electric energy from the functional textile and its use for charging portable electronic devices (mobile phones, MP3 players, electronic book, etc).

4. The exploitation and transfer of the results for further research on the field for the integration of other flexible electronic devices onto textiles, such as sensors, biosensors, flexible displays, antennas, etc.

2. Greece 2.0: Greece's Recovery and Resilience Plan contains a comprehensive and coherent set of reforms and investments, structured into four (4) pillars: a) Green transitions, b) Digital transformation, c) Employment, skills, and social cohesion and d) Private investment and transformation of the economy

The investements and reforms include among others:

for Digital transformation

• The digital transformation of small and medium enterprises via procurement of equipment, cloud services and on-line services, such as modern technologies of electronic payment, work from home, digital office etc.

for Employment, skills and social cohesion

- Additional skilling, up-skilling and reskilling programmes boosting employment, with an emphasis on green and digital skills
- Reform of the Vocational Education Training and Apprenticeship system
- Reforms and investments promoting the performance of Greek Universities in research and innovation, private sector sponsored research programmes, and the quality of education offered to students, in terms of skills and relevance to the labour market
- The digital transformation of education in terms of curriculum, infrastructure and services

Private investment and transformation of the economy

Establishment of new, next-generation industrial parks and acceleration of smart manufacturing

3. NanOrganic – Development of Nonostructured Organic & Inorganic materials and Thin Films for the Production of Organic Electronic Devices

The main idea of NanOrganic project was to create a full organic electronic technology which includes:

a) the development of advanced organic semiconductors (polymers and small molecules), transparent electrodes and nano-structural barrier materials with printing techniques and vacuum, characterized by improved properties (optical, electrical, structural) and morphology, by determining the chemical microstructure,

b) the combination of printing technologies and vacuum for the development of organic electronic devices such as a hard and flexible substrates such as organic photovoltaics (OPVs) and organic circuits (Organic Thin Film Transistor-OTFT) under NanOrganic

c) the compatibility of materials and technical development processes scale and low cost (large-scale, low-cost) for direct application in industrial scale to manufacture electronic devices on polymeric substrates. To achieve these objectives, the NanOrganic combines all the Greek excellence and expertise in this area.

The technology developed in NanOrganic can be used beyond the scope of the project, to produce a variety of other organic electronic devices such as sensors, OLEDs, RFIDs, etc., or more complex electronic devices and systems.

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Duration: December 2010 – December 2013

<u>Funding</u>: NanOrganic was funded by the NATIONAL ACTION: COOPERATION» SUB-ACTION I:«Small Scale Cooperative Projects».

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6. Conclusions

Research showed that the Greek textile industry and especially the advanced textiles sector is very scarce and quite unknown to the audience. Because there not many enterprises that produce locally, there is a very vague amount of information regarding specialisations. Subjects as Artificial intelligence, Advanced textiles, Robotics, Augmented Reality, Metaverse, Internet of Things, etc. do not own grounds in the local industry, and if they do, they are small. However, aside from the digital and smart transitions, the Greek industry is trying to reach out to new ideas and developments, innovations and technologies for holding more sustainable productions, manage their waste accordingly and with the lesser possible impact. On the other hand, SMEs are trying through their resources to and processes to maintain a sustainable future, identity and bring awareness to the market. Some companies focus on their production, other on their customer experience, others on their materials, and others try to combine all and disseminate their actions. However, all companies agreed that a major issue that concerns them all is that of raw materials and to what extent they follow the regulations and ISO standards. In all cases, all companies focus a lot on their transparency.

In the field of digital, there is a lot of input coming from many companies, but they lack in human resources and specialists. 3D design and pattern, digital marketing and CAD software hold major roles in the production, even though there is still lack of human resources who know and are ready for the field.

Another major issue that was addressed in all sessions, is the poor connection between the education and the industry. One is hard to reach the other even if education provides specialties and knowledge on several green, digital and smart subjects. All education institutes insisted that the textile sector is very low in production compared to other EU countries. Even though the institutes educate and research on specific input such as chemical engineering or CAD systems, it is the textile sector that is nowhere near connected to those departments, because of its scarce activity in Greece. One more topic addressed is the general textile education in Greece. The only department in HEI that worked solely on textile, used to be a department itself, but due to political reasons it was submerged under a different department, losing its name, and therefore its communication to future students. Another fact, also in HEIs, is the lack of 3D, AI, education in textile and fashion specifically. There is one department which is slowly trying to grow. On the other hand, VET providers are still learning and trying to keep up with recent technological growth in the sector, but have already started focusing their activities in sustainability, recycling, smart and sustainable based thinking, etc.

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