

A 2.5 – COMPENDIUM

Final Compendium on the Application and
Impact of AI in the Fashion industry



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SOML - Stichting Onderwijs Midden Limburg (Netherlands)

Effebi - Finance & Banking, Associazione per lo Sviluppo Organizzativo e delle Risorse Umane (Italy)

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CONFAO - Consorzio Nazionale per la Formazione e l'aggiornamento e l'orientamento (Italy)



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1. INTRODUCTION

Globally, the fashion industry stands as the third-largest in terms of economic output, with a value of \$3 trillion USD. It is one of the key value-creating industries for the world economy. If it were ranked alongside individual countries' GDP the global fashion industry would represent the seventh-largest economy in the world.¹

In our current digital era, this industry has undergone a significant transformation driven by technological innovations. This evolution has made the industry more dynamic, sustainable, and accessible than ever before. At the core of this revolution is Artificial intelligence (AI), a driving force that has brought progress to the fashion sector by enhancing creativity, production efficiency and customization.

However, this transformation did not happen without consequences. The fashion industry has become a major contributor to environmental pollution, generating growing concern about its impact on the planet. Unsustainable production practices and the increasingly short life cycle of clothing have raised crucial questions about the need to adopt a more responsible and sustainable approach. In particular, the relentless demand for fast fashion has given rise to significant environmental consequences throughout the production, distribution, and disposal processes.

The [United Nations Environment Programme \(UNEP\)](#) plays a vital role in providing strategic leadership and promoting sector-wide collaboration to accelerate the transition towards a sustainable and circular textile value chain while advocating for responsible chemical management.

A striking statistic reveals the fashion industry's colossal annual water consumption, totaling 93 billion cubic meters, with 20% of global water pollution attributed to fabric coloring and treatment.² Furthermore, this industry is responsible for 10% of annual air pollution from harmful gases, along with the release of around half a million tons of microplastic fibers into the oceans each year. The disposal of 87% of clothing materials in landfills further exacerbates environmental issues.³

The detrimental impact on the environment and society underscores the pressing need to reimagine the fashion business, necessitating substantial changes in practices and the exploration of innovative solutions.

In recent years, this transformative shift has been driven by various factors, including shifting consumer preferences, a focus on eco-sustainability, and the need to remain

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<https://www.mckinsey.com/~/media/McKinsey/Industries/Retail/Our%20Insights/The%20state%20of%20fashion/The-state-of-fashion-2017-McK-BoF-report.pdf>

² <https://www.europarl.europa.eu/news/en/headlines/society/20201208ST093327/the-impact-of-textile-production-and-waste-on-the-environment-infographics>

³ [https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI\(2019\)633143_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI(2019)633143_EN.pdf)



competitive in the global market. European designers and fashion companies have enthusiastically embraced digital innovation, particularly harnessing AI to redefine critical processes such as design, production, inventory management, marketing, and customer experience.

In this context, IG-Fashion project is underway to spearhead these changes, commencing with aspiring fashion professionals. The project also aims to support educators by equipping them with smart AI tools for use in schools. Its primary objective is to educate individuals about the fashion industry's environmental impact at every stage, from material production to distribution, usage, and disposal. The project places particular emphasis on the design phase, which accounts for more than 80% of the industry's overall impact. Students will gain insights into the diverse applications of AI within the fashion business, thereby enhancing their employability and job prospects.

In the ever-evolving realm of fashion, AI has assumed a pivotal role in industry transformation, extending its revolutionary potential to the realm of education. This report delves deeply into AI's application within the fashion industry, with a specific focus on its role in education, where technological innovation is reshaping the learning experience and preparing the next generation for a highly competitive and continually evolving industry.

This paper aims to examine the challenges and opportunities emerging from the intersection of AI, digital tools, and the fashion industry in Europe. Through the voices and perspectives gathered in these interviews, we will try to shed light on how technological innovation can help transform the fashion industry into a positive force for the environment and society as a whole

The following document - "Final Compendium on the Application and Impact of AI in the Fashion industry" - has been developed by the IG-Fashion Consortium, composed by a group of 7 Organizations, coming from 5 different European countries (Romania, Italy, Bulgaria, Greece and Netherlands) within the frame of the "IG-Fashion, Towards an Intelligent and Green approach in VET Fashion Design" project, co-funded by the Erasmus+ Programme of the European Commission. The project has started in November 2022 and will last 30 months in total.



ORGANIZATION	COUNTRY
Asociatia Centrul National pentru Productie si Consum Durable *Coordinator	Romania
Stichting Onderwijs Midden Limburg (SOML)	Netherlands
Finance & Banking, Associazione per lo Sviluppo Organizzativo e delle Risorse Umane (EffeBi)	Italy
Specialized Cluster and Institut for Apparel and Textile - Dunav	Bulgaria
PGO "Nedka Ivan Lazarova"	Bulgaria
Militos Symvouleutiki A.E.	Greece
Consorzio Nazionale per la Formazione e l'aggiornamento e l'orientamento- CONFAO	Italy

Following needs are addressed by IG-Fashion Project:

1. Learn about the difficulties facing the sector, how to approach them from a design perspective, and the tools that may be used to make this process easier;
2. Assist instructors in incorporating cutting-edge teaching methods based on the industry's new green outlooks into their classes;
3. Develop the abilities of instructors and students to use cutting-edge technologies in the design process.

The project will gain its purposes through the implementation of 4 WPs:

WP1. Project management: aimed to monitor the planned activities, comply with deadlines and set schedules and allocate financial resources.

WP2. Compendium on the Application and Impact of AI in the fashion industry: aimed to develop national reports on the real training need to apply AI tools like Chatbots in the learning of fashion-related subjects. The final product will be a Compendium that will filter and include all the data collected from the national reports, covering topics such as sustainable fabrics, zero waste pattern making and cutting, design for decomposing etc. The gathering of the information will be carried out through desk research (collection of green good practices in the fashion Industry) and field research (interviews to VET learners/teachers to investigate their knowledge about AI Chatbot, its application, relevance, usefulness for educational purposes);



WP3. Digital tools for green practices: the objective is to identify digital tools based on AI technology to integrate in VET/upper secondary schools educational programs, with the purpose of spreading and increasing the implementation of green practices in the fashion industry. In particular, an AI Chatbot companion and an online e-platform to host the material will be developed and delivered for VET trainers and learners.

WP4. Communication and Dissemination: aimed to deliver promotional material and tools to wide-spread the work carried out by the Consortium in the scope of the project objectives.



2. METHODOLOGY OF FIELD RESEARCH

The Compendium's development is the last task that WP2 is expected to complete. Using information and data gathered through study, it has the aim to demonstrate the potential of AI technology, particularly AI Chatbots, in directing the Fashion sector toward more sustainable operations.

In particular, it will enable the Consortium to meet the project's requirements by giving a clear understanding of how to create the LMS Platform and the AI Chatbot, both of which are planned by WP3.

Additionally, by including topics like sustainable fabrics, zero waste patterning, and designing for decomposition, the Compendium will give VET trainers the opportunity to incorporate the results of WP2 into their courses, making their lectures more interesting, current, and in line with emerging trends in sustainable fashion.

WP2 is composed by the following 5 Activities:

1. Activity (A2.1): Definition of Methodology;
2. Activity (A2.2): Conduction of the analysis at Partner level (desk research);
3. Activity (A2.3): Conduction of the analysis at Professional level (field research).
4. Activity (A2.4): Conduction of the analysis at School level (field research)
5. Activity (A2.5): Collection of the main findings that will be used for the content of the Compendium

A2.2 Activity consisted in researching what are the critical factors that make fashion unsustainable, considering different stages of the apparel supply chain (production, distribution, use and end-of-life).

The European fashion industry has been making significant strides in promoting sustainability and adopting eco-standards in recent years. This is largely in response to growing consumer awareness of environmental and social issues associated with the fashion industry, as well as increased regulatory and industry pressure to reduce its environmental footprint. Increasing eco-standards in the fashion industry is essential for several compelling reasons: environmental impact, climate change, reducing pollution. These are just some of the reasons why to increase sustainability practices in the fashion industry. Rising these uses is not only a moral imperative but also a practical necessity. It addresses pressing environmental and social challenges while also positioning businesses for long-term success in a world where sustainability considerations are increasingly prominent.

Each Partner investigated habits and attitudes in relation to the fast fashion phenomenon, corporate sustainable policies and practices undertaken by companies to address this issue.



At least [10 Green good practices](#) have been collected at country level taking into consideration green actions undertaken by different professionals working in the field of fashion.

The Final Compendium is intended to integrate and present the results of the A2.3 and A2.4 activities.

A2.3: at least 10 Professionals working in the Fashion industry have been interviewed in each country. The interviews focused on the use of AI Chatbot. The related data and findings have been collected in a national report. The aim was to gather testimonies, opinions and feedback on the challenges and benefits of AI Chatbots used by companies in the fashion industry.

A2.4 foresees a similar modality to A2.3. At least 15 VET learners and teachers from Apparel institutes have been interviewed in each country; the purpose was to investigate the knowledge of VET teachers related to AI Chatbot and its application, relevance and usefulness for educational purposes.

The conduction of interviews related to A2.3 and A2.4 tasks were considered to be very strategic for the achievement of IG-Fashion's first Result. Interviews are key factors for two reasons: in terms of involving field professionals, students and teachers to encourage them in participating in the project and creating a sense of ownership, and in terms of dissemination, impact and sustainability of the Project. On the one hand, conducting interviews gives the Consortium the possibility to collect relevant information regarding the level of knowledge of the arguments. On the other hand, through this activity, the Consortium has the possibility to spread out the Project among professionals and stakeholders, teachers/educators and students who can be interested in being further involved in other activities of the Project.

The first interviews involved professionals from the fashion and textile world, with roles ranging from garments designers to managers of relations with suppliers, local bodies and institutions, e-commerce managers, researchers, market analysts, investments' trends forecasters and sustainability consultants. A preset form to record the answer of the respondents was used through Google Forms. The structure of the interview contains three sections: "Demographic questions" (7 questions), "Use of Artificial Intelligence within companies" (20 questions) and "Overall opinion of AI impact on the fashion industry" (6 questions). The scope of the interviews is to identify how AI is currently being used by fashion and textile companies in the market of today, the level of technological readiness and their overall opinion on how AI can impact the industry.

The information received during the interviews is subject to further coding and analysis, in order to structure and conclude all the information received. The coding is created based on eight of selected relevant indicators: Company activity; Digital solutions currently used in companies (and how they are being used); Reason to use AI in a company; Benefits/Advantages of AI use; Concrete results of AI use; Overall opinion on AI use; Concerns/challenges about using AI; Implementation of sustainability practices in the fashion industry process chain. The questions with a closed character are analyzed based on numerical data processing through the Google Forms software.



The coding indicator list includes the following topics:

- Company activity
- Digital solutions currently used in companies (and how they are being used)
- Reason to use AI in a company
- Benefits/Advantages of AI use
- Concrete results of AI use
- Concerns/challenges about using AI
- Overall opinion on AI use
- Implementation of sustainability practices in the fashion industry process chain.

The A2.4 activity involves studying and comparing the results of interviews with teachers and students. The interviews fall into two distinct categories, enabling a thorough comprehension of the subject from both perspectives.

The project partners collectively developed and specified the interview questions, which were then put to the interview subjects after they filled out the form that was used to collect the data detailed below.

A pre-set form through Google Forms was used to record respondents' answers. The structure of the interview contains 23 questions divided into 3 groups/clusters: "Role and Background" (3 questions), "School and Technological Context" (7 questions) and "Industry and AI" (13 questions). The scope of the interviews is to identify how digital technologies and AI is currently being used by fashion design VET schools of today.



3. ROMANIA

3.1. Introduction and Methodology

In May and June 2023, field research was conducted in Romania within the fashion and textile industry. The study included interviews with a wide range of professionals, such as business owners, managers, product designers, and more. This diverse group of 11 interviewees represented various aspects of the fashion industry, all associated with small and medium-sized enterprises in Romania and abroad.

The second part of the research involved 6 VET students from different educational backgrounds, including universities and online courses. They were at various experience levels, from beginners to Master's degree candidates. Additionally, 9 VET teachers were interviewed, demonstrating their expertise in digital technologies. The study included institutions like West University of Timisoara, Salomeia Truta Fashion Institute, and BiEco digital fashion school, as well as Gheorghe Asachi University in Iasi.

3.2. Insights from the conduction of interviews (A2.3)

The research used qualitative methods like in-depth interviews and structured questionnaires to understand how digital technologies, especially AI, are integrated into the industry. All respondents acknowledged using digital technologies, indicating the industry's readiness for technological advancements.

Concerning AI, 90% of respondents recognized its relevance in fashion, though there's a need for a deeper understanding of its full potential. AI's applications, like chatbots for research, market analysis, and design, demonstrate its versatility. About 36% of respondents reported concrete benefits from AI implementation, including improved communication, content creation, and design. Challenges like cost, legal issues, and data security also emerged. Most respondents (90%) expressed optimism about AI's future impact on the fashion industry, but caution is needed to ensure accuracy and compliance in AI-derived information. Notably, the industry is committed to sustainability, implementing waste reduction, renewable energy use, and eco-friendly materials. Many (63.6%) adopt circular economy practices, showing efforts toward sustainable production.

In summary, the Romanian fashion and textile industry is on the brink of transformation, with digital technologies and AI playing crucial roles. The industry's focus on sustainability and openness to emerging technologies places it as a leader in global fashion innovation.



3.3. Insights from the conduction of interviews (A2.4)

The field research in the Romanian VET school system involved a variety of experiences and skill levels, from college classes to online VET programs, reflecting a range of skills in digital technologies among both students and teachers. The results highlight a variety of technology readiness among institutions, indicating opportunities for growth and development.

The interviews showed varying levels of familiarity with digital technologies among students, ranging from high proficiency to limited exposure. The survey also provided information on the technological landscape in VET fashion education in Romania, with some institutions having robust digital resources, while others desire more advanced equipment. Participants emphasized the importance of integrating digital technologies into fashion education, citing benefits such as improved efficiency, precise design skills, and better preparation for the changing fashion market. Teachers shared this sentiment, highlighting the simplification of processes, improved relationships with students, and the key role of digitization in education.

Regarding the integration of cutting-edge technologies, opinions varied, with some acknowledging ongoing efforts to incorporate modern tools such as Clo3D, while others see potential for further adaptations. The research in Romania also revealed a significant difference in familiarity with AI tools among students and teachers, underscoring the need for comprehensive training programs.



4. ITALY

4.1. Introduction and Methodology

In May 2023, field research in Italy involved professionals from the fashion and textile industry holding diverse positions, such as clothing designers, supplier relationship supervisors, e-commerce managers, researchers, market analysts, investment trend forecasters, and sustainability consultants. The research benefited from the unique perspectives of these professionals, all of whom were employed by small and medium-sized businesses, primarily in northern regions of Italy, showcasing the widespread nature of the fashion industry in the country.

In June 2023, field research in Italy expanded to include VET students, architects, computer scientists, and VET teachers from fashion institutes. The study aimed to evaluate the current applications of AI, particularly Chatbots, in fashion design education. Respondents acknowledged AI's potential to enhance efficiency, streamline information management, reduce errors, and improve product handling and inventory management in VET fashion education.

In Italy, the synergy between fashion and AI is growing, with AI offering opportunities in design, production, distribution, and customer experience. It supports creativity, optimizes manufacturing, enhances product quality, and reduces material waste. AI also improves inventory management, pricing, and personalization in online shopping.

Companies and startups in Italy are increasingly utilizing AI in the fashion industry, while vocational institutes and universities are researching AI integration to enhance the sector and equip students with valuable skills.

4.2. Insights from the conduction of interviews (A2.3)

The general opinion of the Italian interview participants can be considered positive. Thanks to the participants' broad experience and high level of professionalism, it was possible to obtain a comprehensive view of the use of this technology in different areas of the fashion industry, as well as the limitations and merits of its integration.

Although almost all participants use digital tools-some of them AI-based-to speed up production processes, manage warehouses and logistics, assist customers during purchases, track products, and so on, a certain form of skepticism remains. There is a common view among participants that AI and chatbots are technologies that are either too expensive, or whose integration requires considerable adaptation costs for companies, something that small and medium-sized businesses struggle to bear.

Thus, despite the great curiosity and desire for innovation, the general idea is that these are technologies intended to be used only by large companies or luxury brands, as indeed is already happening. Another fear concerns the possible loss of jobs for professionals in



the field. It is true that AI is capable of performing mechanical and repetitive tasks continuously, being more efficient than any human resource performing the same task. However, while this may be considered a strength of the technology, it remains a major deterrent factor. Finally, the local and artisanal size of most Italian SMEs in the sector raises another concern among interview participants, namely the lack of adaptability of these technologies.

4.3. Insights from the conduction of interviews (A2.4)

The use of AI in Italian education system is met with a mix of opinions. While it has the potential to personalize learning, automate administrative tasks, and provide insights into student performance, there are concerns about ethics, data privacy, and the possibility of AI replacing human teachers. Some educators see AI as a valuable tool to enhance learning and ease administrative efforts, while others are cautious about accuracy, biases, and the impact on essential human skills and interactions. Balancing AI adoption requires attention to ethical guidelines, data privacy, and ensuring that AI complements rather than replaces teachers. Proper training and support for educators are crucial. Opinions may evolve with more research and real-world applications.

Professional institutes are incorporating digital tools into education to prepare students for the digital age fashion industry. This comprehensive approach equips students with both traditional and digital design skills, positioning them well for the industry's challenges and opportunities in the digital era. Some educators and institutions in Italy are embracing AI as a valuable tool for improving learning and optimizing educational processes. They see AI as a way to tailor instruction to students' individual needs and preferences, making learning more effective and engaging. In addition, AI-based applications could be used to simplify administrative tasks and reduce teachers' workload, allowing them to focus more on student interaction and instruction.

Students' views on AI in education are diverse and influenced by their experiences, exposure to AI technologies, and personal beliefs. Many students are enthusiastic about the use of AI in education, finding it innovative and fascinating, especially when it enables personalized learning experiences. However, some students express concerns about the impact on employment, data privacy and security in the use of AI-based tools, as well as the ethical implications and possible bias of algorithms. Some worry that over-reliance on AI may hinder critical thinking and social interaction.



5. GREECE

5.1. Introduction and Methodology

In May 2023, primary research was conducted in Greece, identifying and interviewing a diverse group of professionals in the fashion sector, including sales, management, production, design, and fashion blogging. Ten participants, consisting of 7 women and 3 men, were interviewed. Three had less than 5 years of experience in the sector, while the remaining seven had 5-10 years of experience. These professionals worked in Athens but had collaborations at both the national and international levels.

In a separate research phase from June to September 2023, six VET trainers in fashion and design, along with four fashion design and production students, were involved. Many VET and post-secondary schools offer fashion design programs, recognizing the need to adapt to technological advancements, including the use of AI in the fashion industry and education. Teachers indicated that VET schools are moderately prepared for adopting these technologies but stressed the increasing demand for VET trainers with digital skills and expertise in AI within the fashion industry.

Both teachers and students primarily associate "technology" with established digital solutions like software, CAD, Photoshop, ProCreate, and Illustrator, without explicitly considering AI as a rapidly developing field. An important finding of the research is the lack of funding and resources available to VET schools for the adoption of new technologies.

5.2. Insights from the conduction of interviews (A2.3)

The majority of the interviewed professionals in the Athens metropolitan area work for small and medium-sized businesses and possess strong digital skills, with 90% actively using digital technologies. They are familiar with AI in the fashion industry and view its integration positively. While not everyone was initially familiar with chatbots, after learning about them, they were generally supportive of their use in the fashion industry.

These professionals see technological assistance, including chatbots, as adaptable to the fashion industry's needs but highlight challenges such as cost, reliability, the need for monitoring, concerns about dehumanization, data storage and usage issues, bias, and potential job displacement. However, they also recognize benefits such as accurate decision-making, process automation, forecasting, and increased revenue.

In terms of environmental protection, participants adopt eco-friendly practices like recycling, using green materials, practicing circular economy, and reducing waste. They believe AI tools, including chatbots, can bring environmental benefits at various stages, from design to production to retail sales.

It's important to note that this group of fashion professionals in Greece represents a subset of the industry and may not reflect the entire sector in the country. Nonetheless,



their opinions provide valuable insights into the digital literacy and awareness of AI within the industry. While they see the advantages of AI, including chatbots, they also express concerns about potential threats to the human element in the fashion industry, such as creativity and the unique human touch.

5.3. Insights from the conduction of interviews (A2.4)

In Greece, a mixed group of 6 VET teachers, coming from both the fashion design and VET sectors, were involved in research along with 4 students in the fashion design and manufacturing field. The teachers have medium to long experience and often work as freelancers in large cities. The research revealed that teachers primarily use traditional digital technologies in their teaching, with VET schools being moderately equipped in this regard. Students also emphasize the importance of digital tools in design and learning.

Both teachers and students found benefits in using digital technologies in the fashion sector and education, including optimizing design time, promoting learning, developing digital skills, supporting creativity, and achieving faster procedures and precision, as well as environmental sustainability.

Half of the teachers and all students were familiar with AI tools. They acknowledge the usefulness of AI in fashion and education but have a somewhat confused understanding of AI, including non-AI digital tools. The specific AI-powered tools mentioned include AI software, chatbots, speech recognition, biometrics for avatar creation, and translation platforms. Both teachers and students see the potential of AI in personalizing learning, providing intelligent tutoring, enhancing collaboration, analyzing data, and granting access to educational resources. They also mention that AI should enhance, not replace, human-driven learning. Teachers emphasize the coordination of educational programs with industry needs, particularly in eco-friendly practices. Students show some awareness of eco-standards and use eco-friendly materials in their projects, like swimwear from recycled products. They also mention using laser cut to reduce environmental impact.

Overall, there is a recognition of the positive impact of AI and eco-friendly practices in the fashion industry, but the understanding and implementation of these concepts vary among teachers and students.



6. NETHERLANDS

6.1. Introduction and Methodology

In June and July 2023, primary research was conducted in The Netherlands, focusing on the fashion sector and exploring the potential impact of AI. The study involved interviews with a diverse group of professionals from various roles, including sales, government, management, production, design, and fashion blogging.

The participants, consisting of 8 women and 2 men, were actively engaged in the fashion sector and generously contributed their valuable insights, drawing from their 17 to 40 years of experience. The interviews were recorded with their consent and adhered to ethical research practices, including GDPR-related guidelines.

The structured interviews, designed in collaboration with the project partnership, ensured consistency and provided a systematic examination of AI's implications in the Dutch fashion industry. The 10 interviewees shared diverse perspectives on AI's potential applications, benefits, and challenges in their respective domains.

Regarding A2.4 activity, interviews were conducted by students from SOML Connect College in Echt to explore the relationship between AI technologies, the fashion industry, and VET schools.

The interviews were structured to engage both teachers and students, utilizing a well-crafted questionnaire as the data collection tool. The interviewees included a mix of experienced educators with diverse pedagogical backgrounds and students currently enrolled in fashion design courses. These participants were affiliated with two prestigious VET schools, MBO Zadkine Beauty and Fashion in Rotterdam and Summa College Fashion in Eindhoven. These institutions are well-known for their dedication to providing a growing environment for the next generation of fashion designers, offering a combination of theoretical knowledge and practical skills.

6.2. Insights from the conduction of interviews (A2.3)

The fashion industry in the Netherlands is undergoing a significant transformation as companies actively incorporate AI and sustainable practices. Qualitative interviews with fashion businesses provide valuable insights into the industry's current state, the impact of AI, and the adoption of sustainability.

The study found that while participants varied in digital literacy, digital technology significantly influenced their work, with 95% using it in their processes. Most were aware of AI in fashion and viewed its integration positively for operational enhancements. While chatbots were familiar, some weren't aware of their fashion applications. Learning about their potential, participants showed enthusiasm for integrating chatbots due to their adaptability. However, challenges like AI-driven overconsumption, manipulated



behavior, data ethics, plagiarism, sustainable costs, and limited AI knowledge were recognized.

Benefits of AI included precise decision-making, automation, forecasting, and revenue growth. Participants prioritized environmental protection, practicing sustainability via recycling, eco-friendly materials, and circular economy principles. They identified AI, like chatbots, as beneficial for the environment, noting its potential across design, production, sales, and retail.

The interviewed companies represent a diverse array of the fashion sector, ranging from men's fashion boutiques offering customized suits to those specializing in eco-friendly home decor. Each company showcases unique strategies to meet customer needs while advancing sustainability goals.

AI is reshaping fashion operations, improving customer experiences. AI technologies like material analysis and personalized categorization empower data-driven decisions. Chatbots and digital design tools enhance customer support and creativity. Digitization highlights the industry's adeptness at leveraging AI for efficiency.

AI brings benefits like improved design, customer experiences, and sustainability. These include better production efficiency, tailored interactions, and automated recycling. Predictive AI analytics enhance inventory management and customer support. However, challenges like AI-driven overconsumption and ethical data concerns require attention. Plagiarism, sustainable costs, and AI knowledge are additional issues.

Despite challenges, fashion companies view AI positively for enhancing operations and customer experiences. Caution ensures that consumer behavior and sustainability are not damaged. Lack of AI understanding prompts investment in education. Sustainability is key for fashion companies. They prioritize recycling, using AI to cut waste. Collaboration addresses environmental issues. Strategies involve longer clothing lifecycles, sustainable agreements, and renewable energy for industry commitment.

6.3. Insights from the conduction of interviews (A2.4)

The investigation into the integration and impact of AI in learning processes yielded the following key findings:

Educators view AI as a transformative tool that enhances learning experiences and aligns teaching methods with industry requirements. They appreciate AI's ability to provide a deep understanding of complex fashion industry dynamics to students. AI learning tools are seen as a way to create more interactive, personalized, and effective learning experiences. Real-time feedback from AI is seen as beneficial for accelerating learning and reinforcing core concepts. AI exposure is considered instrumental in preparing students for a tech-driven fashion industry, but educators also emphasize the need for a balanced approach that maintains the human-centric nature of education.



Students are enthusiastic about AI and enjoy the interactive and engaging learning environment it fosters. They value the hands-on experience with AI tools, finding it enriching and reflective of real-world industry practices. AI is seen as a means to unravel complex ideas in an engaging and understandable way, promoting innovative learning. AI accelerates feedback and personalizes learning paths to individual strengths and areas of improvement. Exposure to AI is viewed as valuable preparation for future careers in the technology-driven fashion industry.

Both educators and students express a positive inclination towards AI integration in education, recognizing its potential to bridge the gap between theory and industry demands. The combination of enthusiasm and cautious optimism suggests a fertile ground for further exploration and integration of AI in education. Through careful integration, AI has the potential to enhance the learning experience in vocational schools, equipping future professionals for a dynamic and technologically advanced fashion industry.



7. BULGARIA

7.1. Introduction and Methodology

Bulgaria's textile and apparel industry accounts for about 10 percent of total exports, contributing more than EUR 2 billion annually and generating about 12 percent of the sector's value added. Despite its traditional retention, the industry is gradually adopting AI technology in various areas, including e-commerce, 3D modeling, supply chain management, data analysis, and digitization.

A primary research study in May and June 2023 involved 13 leading textile and apparel companies in northern Bulgaria. These companies cover the entire production chain, from weaving to finished products. The participants, with more than a decade of experience, demonstrated medium to high digital competence and were aware of the role of AI in fashion.

None of the respondents reported using chatbots, but all were open to adopting AI tools in their companies, believing that AI can revolutionize the industry, from design to marketing and sales. In addition, participants were sensitive to the concept of circular economy and focused on sustainability practices in their companies.

In July and September 2023, field research was conducted in Bulgaria to gather information on the use of AI technologies in fashion education system. Thirty interviews were conducted with students and teachers in vocational training institutes and schools specializing in textiles and fashion design, as well as in vocational training centers for apparel production and fashion design. All participants showed a good understanding of AI and recognized its potential to improve the efficiency of the educational system in the fashion industry by already integrating AI-based digital tools into their processes.

7.2. Insights from the conduction of interviews (A2.3)

The study involved interviews with 13 textile and apparel companies in Bulgaria, mainly located in Ruse, with additional companies in Varna and Gabrovo, all in Northern Bulgaria. Eight of the participants were women, and five were men. These companies were chosen to represent the entire textile production chain in Bulgaria and all had a track record of over a decade of sustainable development.

The interviewees displayed a commendable level of digital literacy and expressed a strong willingness to integrate AI technologies into their companies, despite none of them currently using chatbots. Approximately 70% of companies with AI experience viewed it as valuable but expressed concerns about the implementation process and required resources.

Most interviewees, primarily owners and managers, were interested in adopting AI for data analysis and predictive capabilities, recognizing its potential to streamline



operations and transform the fashion industry, from supply chain management to design processes.

The research emphasized that while AI has the potential to revolutionize the fashion industry, it presents new challenges that businesses need to address. Companies demonstrated various sustainable practices, investing in green technologies to address environmental issues and economic challenges.

AI and chatbot use are relatively new concepts in the Bulgarian textile industry, but the circular economy is well-established and widely understood. Both the adoption of AI and the commitment to circular economy principles are vital for the development of the textile industry in Bulgaria, shaping its sustainability and innovation efforts in a competitive global landscape.

7.3. Insights from the conduction of interviews (A2.4)

The 15 interviewed teachers are working on the field of fashion designs, construction and modeling of clothes and sewing skills. They all are members of the VET in the fashion industry. The VET teachers/educators had different years of pedagogical experience, from less than 10 to more than 20 of VET expertise, that's why the research aimed to collect different points of view.

The 15 VET students interviewed belong to different Vocational Schools of clothing in North Bulgaria. Respondents are not all in the same academic year (from 8th to 12th grade) and have different years of training experience and knowledge of the topic that this research aims to analyze. All of the interviewed 15 students, being a focus on the green and intelligent approach in VET and AI in the fashion industry have been trained in the field of fashion design, construction and modeling of clothes and sewing. Most of them represent small communities, regarding the economic profile of the region. The aim was to get a general idea of the views of VET fashion students in vocational schools.

In Bulgaria, AI's potential in education is still relatively untapped, but it holds promise for enhancing student engagement and promoting real-world application of knowledge. Many schools in Bulgaria are already adopting innovative learning environments that focus on STEM subjects, boosting digital literacy, creativity, and problem-solving skills.

AI is seen as a tool to support teachers in designing engaging and creative learning experiences, automating administrative tasks, and enabling a more dedicated focus on teaching. AI is seen as a game-changer in the educational landscape, offering improved access and inclusion. It can provide valuable resources for students with disabilities and empower teachers to design creative learning experiences. It also automates administrative tasks, freeing up more teacher time for the classroom. However, there are significant challenges and limitations to AI implementation in Bulgaria, including resistance from some teachers, concerns about job displacement, the need for broad stakeholder support, subject-specific limitations, cost issues, and privacy and cybersecurity risks.



However, there are challenges to implementing AI in Bulgaria:

- Resistance from some teachers.
- Concerns about job displacement.
- The need for broad stakeholder support.
- Limited applicability to certain subjects.
- Cost of implementation.
- Data privacy and cybersecurity risks.

Overall, interviews conducted during the research provided valuable insights for developing high-quality project deliverables.



8. COLLECTING THE RESULTS

What came out?

Level of digitalization in fashion companies in partner countries: Medium-high

- Digital literacy level: 35 % have an average level, 31 % have a good level, 21 % have the highest level, and 13 % have the lowest level.

Use of AI in fashion companies

- On average, 88% of respondents have heard of the use of AI in fashion.
- Familiarity and use of AI-based chatbots in the fashion industry: On average, 68% of respondents are familiar with the use of AI-based chatbots.
- Interest in adapting AI to the needs of fashion companies: On average, interest in adapting AI is high, with an average of 8/10.
- Experience of concrete results via chatbots: On average, 36% of respondents have experience of concrete results via chatbots.

Overall opinion of AI impact on the fashion industry



-  **ITALY:** Positive in terms of efficiency and negative in terms of high costs and job losses.
-  **ROMANIA:** Positive in terms of clearer communication, but with some ethical concerns.
-  **GREECE:** Positive for improved customer service and e-commerce experience, but with concerns about productivity.
-  **NETHERLANDS:** Positive for efficiency and personalization, but with ethical and sustainability concerns.
-  **BULGARIA:** Positive for efficiency, planning, and sustainability, but with concern about legal issue and about finding experts.



What came out?

Level of digitalization in VET Institutes

- AI in Learning Process: Personalization of learning; Intelligent tutoring; Advanced collaboration; Data analysis and obtaining information; Wider access to educational resources.
- Familiarity with AI Learning Tools: 50% of schools are familiar with and use AI tools.

Benefits And Advantages of Using Digital Technologies

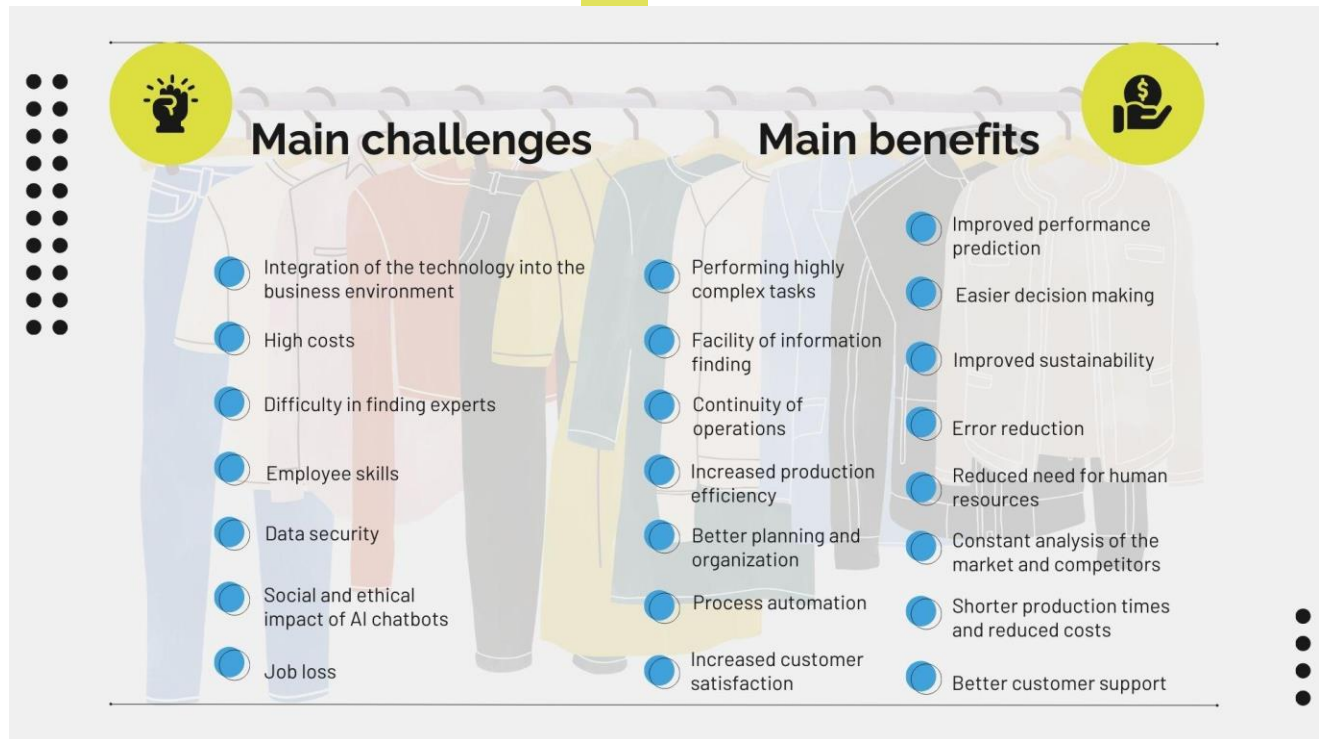
- Faster procedures, less likelihood of errors, and greater accuracy; Environmental Sustainability.
- Experience of concrete results via chatbots: Support for short questions on educational topics; Monitoring and evaluation.

Overall opinion of AI impact on the fashion industry



- Increasing adoption of sustainable technologies.
 - Attention to ecological standards.
 - Production of new products from recycled materials.
 - Reduction of environmental impact through optimization of printing and transportation.
- 
- Preparation for Digital Technologies: Schools' preparation is considered insufficient.
 - Familiarity with AI Tools: Only 50% of schools are familiar with and use AI tools.
 - Use of Chatbots: Limited to short questions on educational topics.
 - AI Support in Learning: Conditional on parallel use with analog learning methods.





8.1. Main Challenges that came out from Interviews with Professionals:

- Integrating technology into the business environment: The introduction of AI requires significant restructuring within companies, which can be difficult to implement. There is a clear need for cultural and organizational change to maximize the benefits of AI.
- High costs: Implementing AI requires significant investment in financial resources, training and infrastructure. This can be a barrier for companies, particularly smaller ones.
- Difficulty in finding experts: The shortage of experienced AI professionals results in fierce competition for talent. Training in-house experts is crucial but requires time and resources.
- Employee skills: AI adoption requires new skills and competencies from employees. This shifts the focus to ongoing training and skill development for staff.
- Data security: The management of sensitive data is an ongoing concern, with the increased risk of security breaches.



- Social and ethical impact of AI chatbots: The implementation of AI-based chatbots raises concerns about human interaction and ethical implications, requiring a balance between automation and human relationships.
- Job Loss: Automation through AI may lead to a reduction in the need for labor in some stages of production, raising concerns about employment in the industry.

8.2. Main Benefits that came out from Interviews with Professionals:

- Performance of highly complex tasks: AI enables highly complex tasks, such as market trend analysis and performance forecasting, to be handled with unprecedented accuracy and speed.
- Ease of information retrieval: AI greatly improves the ability to access and use relevant data to support design decisions, contributing to more informed decision making.
- Continuity of operations: AI provides greater operational stability and reliability, minimizing downtime.
- Increased production efficiency: Process automation through AI enables improved production efficiency, reducing time and costs.
- Improved planning and organization: AI helps designers plan and organize more effectively, enabling optimized resource management.
- Process automation: Reducing the need for human intervention in repetitive processes leads to greater efficiency and accuracy.
- Increased customer satisfaction: AI can improve the customer experience through virtual assistance, personalization, and rapid service.
- Better performance prediction: AI's predictive analytics capability enables designers to anticipate trends and meet customer needs more effectively.
- Ease in decision making: AI-based tools provide support in making complex decisions, reducing uncertainty.
- Improved sustainability: AI can help identify more sustainable design and production options, helping to reduce environmental impact.
- Reduced errors: Automation through AI reduces human errors in manufacturing and design processes.



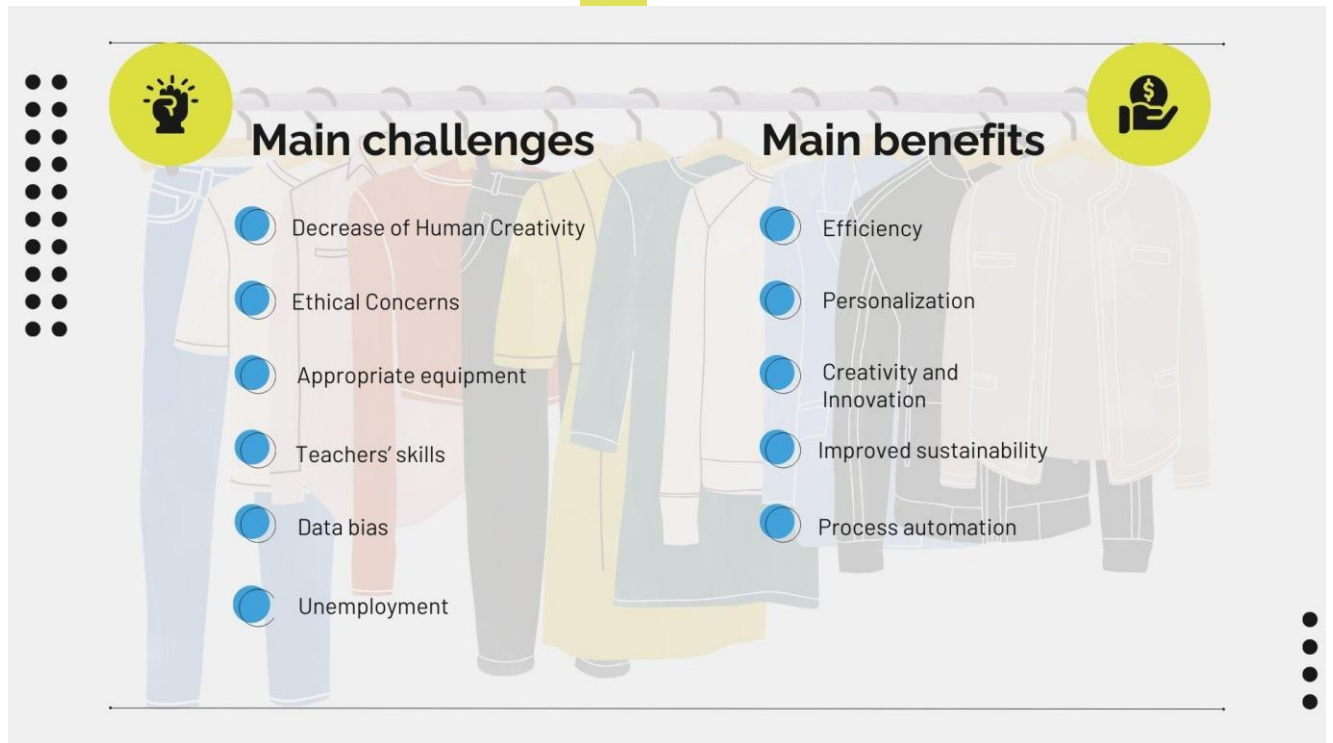
- **Reduced need for human resources:** Although there are concerns about job losses, AI can reduce the need for human resources in repetitive manual processes.
- **Continuous analysis of the market and competitors:** AI enables constant surveillance of the market and competitors' movements, providing a competitive advantage.
- **Shorter production times and reduced costs:** Through automation and process optimization, production times are shorter and costs are reduced.
- **Better customer support:** AI can be used to improve customer support by answering questions quickly and effectively.

The results of interviews with fashion design professionals regarding the use of Artificial Intelligence (AI) raise a number of fascinating considerations.

On the one hand, some significant challenges in the adoption of AI clearly emerge. The integration of this technology requires a profound change in the cultural and organizational dynamics of companies, which can be a complicated process. In addition, the costs associated with AI implementation, including training and infrastructure, can be a barrier for many companies, particularly smaller ones. The shortage of AI experts is another problem, as competition for talent is high and training internal resources takes time and resources.

On the other hand, the benefits are equally clear. AI enables highly complex tasks to be performed with unprecedented accuracy and speed. Reducing the need for human intervention in repetitive processes leads to increased efficiency and accuracy. Customer satisfaction can greatly improve through virtual assistance, personalization and faster service.

Overall, these results clearly indicate that the responsible adoption of AI in the fashion industry brings challenges, but at the same time offers tremendous opportunities. The key is to strike a balance between optimizing operations and addressing ethical and social concerns.



8.3. Main Challenges that came out from Interviews with Teachers and Students:

- Reduction of human creativity: Automation through AI could limit human creativity in the design process, raising concerns about originality.
- Ethical Concerns: Data collection and use in AI raises ethical issues, such as privacy and potential bias in results.
- Teacher skills: Teachers need to be adequately trained to teach students how to work with AI, but this training may be lacking.
- Data bias: AI can inherit bias from the data used to train it, raising concerns about representativeness and fairness.
- Unemployment: Students express concerns about the possibility of future unemployment due to automation.
- Adequate equipment: Lack of access to adequate tools and resources may limit the effectiveness of AI education.



8.4. Main Benefits that came out from Interviews with Teachers and Students:

- Efficiency: AI can simplify the design and production process, increasing efficiency and productivity.
- Customization: AI enables the creation of more personalized and tailored products for customers.
- Creativity and Innovation: Despite concerns, AI can be a tool to stimulate creativity and innovation in the fashion industry.
- Process Automation: AI supports process automation, reducing the burden of repetitive tasks.
- Sustainability improvement: AI can help identify more sustainable design solutions, contributing to the goal of environmental sustainability.

The results of interviews conducted with teachers and students regarding the use of Artificial Intelligence (AI) in the fashion industry raise relevant questions and highlight the delicate balance between challenges and opportunities.

On the one hand, important challenges emerge. The reduction of human creativity is a legitimate concern, as automation through AI could limit originality in design processes. It is clear that faculty need adequate training to teach students how to work with AI, and this training may currently be lacking. Finally, students' concerns about the possibility of future unemployment due to automation is a significant topic, reflecting a growing awareness of the implications of AI in the world of work.

On the other hand, significant benefits also emerge. Despite concerns, AI can actually stimulate creativity and innovation in the fashion industry. In addition, automation of processes through AI reduces the burden of repetitive tasks, freeing up time and resources for more creative activities. The possibility of improving sustainability through AI is particularly relevant, as it contributes to efforts to reduce the fashion industry's environmental impact.

In summary, these results demonstrate that the adoption of AI in the fashion industry presents real challenges, but at the same time offers significant opportunities to improve efficiency, creativity, and sustainability. Collaboration among teachers, students, practitioners, and policy makers will be essential to ensure that AI is a driver of positive innovation in the fashion industry.



Main Sustainability Practices Collected



Renewable Energy Use

raw materials, natural fibers to ensure yarn quality

High-Quality Materials and Products

raw materials, natural fibers to ensure yarn quality

Waste Reduction and Recycling

promoting recycling and using recyclable materials

Sustainable Production Practices

Implementing controlled production practices.
Promoting repair, remaking, and refreshing of clothing items

Collaborations and Dialogue

Promoting collaborations among institutions, businesses, and government for sustainability.

Reducing Toxic Materials

Producing fewer pieces but with multiple combinations to minimize fabric waste

Minimizing Fabric Waste

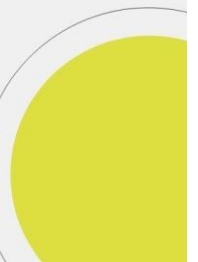
AI Integration and Technology

Integrating AI to optimize processes and reduce waste.

Extended Product Lifecycle

Focusing on extending the lifecycle of clothing items to protect the environment and improve living conditions

Promoting Sustainability Agreements





9. CONCLUSIONS AND CONSIDERATIONS

At the end of this in-depth research, a complex narrative emerges that reflects the deep intersection of human creativity and advanced technology. Fashion has always been an art in flux, marked by the constant emergence of new trends and styles. This dynamism necessitates well-informed, highly competent professionals who can adapt swiftly. AI is revolutionizing the acquisition of knowledge and skills for fashion professionals, offering new avenues for personalized learning, trend analysis, and innovation in design and production. However, alongside the numerous advantages of AI in fashion education, it is crucial to address ethical considerations, ensure data security, and enhance accessibility. In addition to exploring the specific applications of AI in fashion education, this document also examined the ethical dimensions and security measures associated with AI in fashion education. AI is shaping the fashion education sector in unprecedented ways, equipping students to confront the challenges of an ever-changing industry and contribute significantly to the evolution of fashion itself.

The IG-Fashion project enabled an in-depth exploration of the opportunities and challenges associated with AI adoption in an industry steeped in aesthetics, culture and identity. While the prospects are promising, with AI offering tremendous potential to improve productivity, innovation, and sustainability, we cannot ignore the deeper shades of this transformation.

First, human creativity remains indispensable. AI can be an exceptional tool for streamlining processes, suggesting innovative designs, and enhancing the customer experience, but it is the human artist who brings a garment to life through his or her gaze, inspiration, and cultural sensitivity. The integration of AI into fashion design must be guided by a shared vision: that of enriching human work, not replacing it.

Second, ethical concerns emerge. The use of AI in decision-making processes, such as in pattern design, material selection, or marketing strategies, raises important questions about transparency, fairness, and privacy. It is critical that industry organizations, together with legislators, address these concerns and develop ethical guidelines to guide the responsible use of AI in fashion design.

Finally, access and education play a crucial role. The widespread adoption of AI requires that designers and workers in the industry be properly trained and empowered to use these technologies effectively. The IG-Fashion project has demonstrated the importance of promoting AI education and training in fashion design.

In summary, AI has the potential to transform the fashion industry in extraordinary ways, but this requires a holistic and informed approach. Our final work reflects the excitement and challenges of this ongoing transformation. As we look to the future, we can embrace AI as a creative ally, continuing to cultivate the beauty, innovation, and identity that define the fashion world, and doing so in an ethical and sustainable way. This is the challenge and opportunity ahead, guided by the valuable teaching of a project dedicated to exploring the future of fashion design in the age of artificial intelligence.



ANNEXES

- IG-Fashion - A 2.2. Desk Research "[Analysis of good sustainability practices in the fashion industry and green measures undertaken by fashion businesses](#)"
- IG-Fashion - [Methodology](#)
- IG-Fashion [A2.3 Report - Romania](#)
- IG-Fashion [A2.3 Report - Italy](#)
- IG-Fashion [A2.3 Report - Greece](#)
- IG-Fashion [A2.3 Report - Netherlands](#)
- IG-Fashion [A2.3 Report - Bulgaria](#)
- IG-Fashion [A2.4 Report - Romania](#)
- IG-Fashion [A2.4 Report - Italy](#)
- IG-Fashion [A2.4 Report - Greece](#)
- IG-Fashion [A2.4 Report - Netherlands](#)
- IG-Fashion [A2.4 Report - Bulgaria](#)

EXTERNAL SOURCES

Find below some useful sources useful for the Final Compendium:

- EU Parliament, (2019) "Environmental impact of textile and clothing industry" [https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI\(2019\)633143_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI(2019)633143_EN.pdf)
- EU Parliament, (2019) "The impact of textile production and waste on the environment" <https://www.europarl.europa.eu/news/en/headlines/society/20201208ST093327/the-impact-of-textile-production-and-waste-on-the-environmentinfographics>
- Gosselin Victor (2019), "How artificial intelligence can help fashion brands be more sustainable"; <https://www.heuritech.com/articles/fashion-solutions/how-artificial-intelligence-can-help-fashion-brands-be-more-sustainable/>
- Marr.B, (2022) "Three AI And Tech Trends That Will Transform The Fashion Industry" <https://www.forbes.com/sites/bernardmarr/2021/03/26/three-ai-and-tech-trends-that-will-transform-fashion-industry/?sh=65725ae1746c>
- Milton.L (2022), "How AI Is Making The Fashion Industry More Sustainable" - <https://www.sustainably-chic.com/blog/how-ai-is-making-the-fashion-industry-more-sustainable>
- The Business of Fashion and McKinsey & Company, "The State of Fashion 2017" - <https://www.mckinsey.com/~media/McKinsey/Industries/Retail/Our%20Insights/The%20state%20of%20fashion/The-state-of-fashion-2017-McK-BoF-report.pdf>

