



A DIGITAL PRODUCT PASSPORT TO SUPPORT PRODUCT TRANSPARENCY AND CIRCULARITY

Pantxika Ospital, Dimitri H. Masson, Cédric Beler, Jérémy Legardeur

► To cite this version:

Pantxika Ospital, Dimitri H. Masson, Cédric Beler, Jérémy Legardeur. A DIGITAL PRODUCT PASSPORT TO SUPPORT PRODUCT TRANSPARENCY AND CIRCULARITY. Global Fashion Conference 2022, Nov 2022, Berlin, Germany. 11 p. hal-04082837

HAL Id: hal-04082837

<https://hal.science/hal-04082837>

Submitted on 26 Apr 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

A DIGITAL PRODUCT PASSPORT TO SUPPORT PRODUCT TRANSPARENCY AND CIRCULARITY

Pantxika Ospital^{a*}, Dimitri H. Masson^a, Cédric Beler^b, Jérémy Legardeur^a

^a Université de Bordeaux ESTIA Institute of Technology, Bidart, France; ^b École Nationale d'Ingénieurs de Tarbes ENIT, Tarbes, France

*Belharra Numérique 155, impasse Oihana, 64200 Bassussarry, France; pantxika.ospital@belharra.fr;
<https://orcid.org/0000-0001-7850-6771>

Abstract

In the textile industry, corporate transparency, as the disclosure of firm information, does not provide information about products that would allow the customer to make informed purchases. Product transparency as defined by the disclosure of information concerning a specific product is necessary to support distrustful consumer. Among the key actions, setting up a digital product passport (DPP) for textile products is an opportunity to inform consumers. The aim of this paper is to explore the current situation of the industry and the new regulations to develop a DPP data model. We studied the evolution of current fashion landscape, evaluated the situation of actual practices concerning transparency and compared information available online and in-store regarding both product transparency and corporate transparency. We then propose a model of DPP.

Keywords: Product transparency, traceability, digital product passport, The European Green Deal, Fashion industry, textile supply chain

Introduction

The textile and clothing industry, like many other sectors, is facing a triple crisis:

An ecological crisis: the industry is known to be wasteful and polluting using non-renewable resources, chemicals to produce and transform fibers, intense water, and land use, and the release of microplastics and hazardous substances into the water that degrades the natural environment and its ecosystems (Ellen MacArthur Foundation, 2017)

An economic crisis: according to Pulse of the Fashion Industry 2017, the projections for the industry with business as usual was a decline due to raw material shortage, energy, water prices, and labor costs grow

(Global Fashion Agenda and Boston Consulting Group, 2017) This tendency has been accelerated drastically with the Covid 19 supply and retail interruptions (Anner, 2020)

A social crisis: numerous scandals have highlighted the operators' working conditions throughout the textile production chain. The UN Guiding Principles on Business and Human Rights to respect human rights, including paying a living wage, to workers in supply chains, are not the norms according to the organization Labour behind the label.

The knowledge of these risks among the general public and the economic crisis is leading to **changes in behavior** (Graffi-Smith, 2021), consumers want to make informed purchases and **demand more transparency from fashion companies**. For this purpose, **regulations are evolving** in Europe at both the national and European levels for more information disclosure and to provide a framework for the textile industry (European Commission, 2022). Among the key actions, setting up a **digital product passport (DPP)** for textile products is an opportunity to inform consumers but also to improve communication between all actors along with the value chains including after purchase, to support more circularity (Adisorn et al., 2021).

A digital product passport as explained in The European Green Deal (European Commission, 2019) is an «electronic product passport [providing] information on a product's origin, composition, repair and dismantling possibilities, and end of life handling.»

The aim of this paper is to explore the current situation of the industry and the new regulations to develop a DPP data model. We propose a methodology to build a DPP data model divided into 3 steps :

The first step establishes the current state of the industry through a field assessment of the already present information on textile products both online and in-store. **This field assessment** addresses the information present on products at the time of purchase on product labeling, displays, and digital product passport when available for a representative sample of the industry.

The second step establishes a baseline of requirement for future transparency at a legal level through exploring the different **bills and laws in progress** at both national and European levels concerning the transparency and traceability required in the textile industry.

Finally, we derive recommendation for a data model **for a digital product passport** that would embrace all future legislation and would enable a circular economic model for fashion.

Evolution of transparency in the Fashion Industry

Fashion customer behavior is evolving with a need-to-know mentality and the desire to make an educated decision with adequate information but did not seem to “research it all”(Bhaduri & Ha-Brookshire, 2011)

Distrusting consumers expect 'radical transparency' with the disclosure of information about product origins, geographic history, environmental impact of manufacturing, labour and safety conditions of workers, transport, and the cost of materials, duties and mark-up (The Business of Fashion and McKinsey & Company, 2019).

In response to this new consumer behaviour, the industry is moving towards greater transparency. But what can we observe in 2022?

Data from four consecutive Fashion Transparency Indexes (2017–2020) highlighted that brands have become more transparent (Jestratijevic et al., 2021). This study benchmarked sustainability reporting across five areas: policies (social and environmental standards), governance (business executives and their roles), traceability (supplier networks), audits (audits and remediation plans/procedures) and issues (business risks and negative impacts). Fashion transparency index is based on a general brand transparency declaration, we want to define another level of transparency : product transparency.

Research Methodology

Relying on Corporate transparency and product transparency definitions we conducted a study to get an adequate view of current brand practices. This study was carried out from the point of view of the consumer, accessing only information that was attainable by the general public. It concerned a representative segment of the industry : The 54 brands were divided in 4 groups: Luxury (3), Premium (23), Sport(6), Mass market (22) They were distributed and accessible in France online and in-store and were involved in the Fashion Pact.

To evaluate *Corporate Transparency*, we followed this definition « Disclosure of traceability information » as corporate disclosure of supplier names and their sustainability conditions, buying firms' purchasing practices (Egels-Zandén et al., 2015). We searched for the CSR (Corporate Social Responsibility) report of the group (extra-financial performance declaration), the publication of the list of suppliers, environmental and social commitments

To evaluate *Product Transparency*, we searched for product traceability information disclosure related to a specific product including the origin of the raw materials, the country of manufacture, the name of the supplier or factory, material certification, the presence of an environmental impact rating, if technological support was available in the shop (mobile application, blockchain, connected screen, QR code), the existence of a specific range (sustainable, eco-designed, traced) (Ospital et al., 2021).

2021 Findings

Regarding Corporate transparency, the majority of brands produced a CSR report (Extra-Financial Performance Statement) for 45 of them (i.e. 83%) and more generally: 53 of these 54 brands (i.e. 98%) communicated their social and environmental commitments. Also, for 16 of these 54 brands (i.e. 30%), the list of their first-tier suppliers is published, however without linking this information to the products.

Regarding Product transparency, among these 54 brands, we noticed that little traceability information was present for each product both in the shop and on the internet. For 49 brands (i.e. 90%) the "Made in label " in shop was systematically displayed on the articles, only 8 brands (i.e. 15%) published this same information on their website. The origin of the raw materials was rarely displayed, only 3 brands published this information on a very limited selection of articles. Only 4 brands were using Information and communication technologies to display more information: 2 published information about the manufacturing process and 2 made it possible to guarantee the authenticity of products. Only 5 brands displayed information about the environmental impact of their products, such as environmental display for 2 of them. In all cases this related to a limited part of their collection.

We are repeating this study every year until the end of the thesis to see the evolution of the information provided. In 2022, we repeated the same study between April and July 2022.

Evolutions between 2021 and 2022

The evolution of transparency information disclosure between 2021 and 2022 is presented on Figure 1.

Corporate transparency

In 2021, 98% of brands studied (i.e. 54) communicated about social and environmental commitments, 83% of brands (i.e. 45) produce a CSR report (extra financial report) and 30% (i.e. 16 brands) published a list of their first-tier suppliers. In 2022, CSR commitments and Extra financial reporting are similar as 2021, and disclosure of tier 1 lists of manufacturers increased by 11% in 2022 to 41% (i.e. 22 brands).

Product Transparency

In 2021, 91% of the brands studied (i.e. 49 brands) systematically display "Made in" information in stores, whereas on the Internet, only 15% of them (i.e. 8 brands) display this information. These figures have increased slightly to 93% (i.e. 50 brands) and 17% (i.e. 9 brands) in 2022.

In 2021 and 2022, 9% of brands (i.e. 5 brands) studied display information about environmental impact on a selection of products.

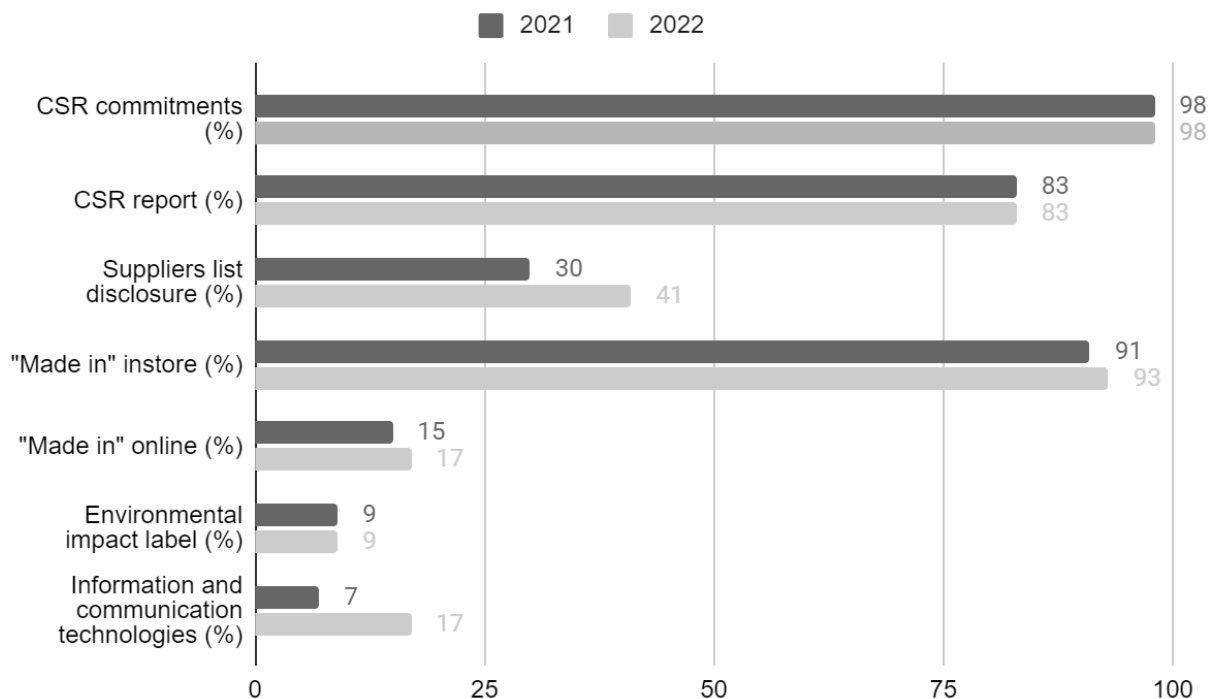


Figure 1 Evolution of transparency information disclosure between 2021 and 2022

In 2021, 7% of brands (i.e. 4) studied use information and communication technologies, in 2022 it was 17% of them (i.e. 9 brands).

Brand strategies

7 out of 54 brands disclosed more information on *corporate transparency*, one brand disclosed less and 46 remained the same as the previous year.

7 out of 54 brands disclosed more information on *product transparency* instore, 5 brands disclosed less and 42 remained the same as the previous year.

8 out of 54 brands disclosed more information on *product transparency* online, 9 brands disclosed less and 37 remained the same as the previous year.

Overall transparency has increased slightly, but the majority of brands did not disclose more information.

We can notice that same type brands have similar behaviors.

Luxury brands didn't disclose suppliers list in both 2021 and 2022.

The number of brands that disclosed list of suppliers was for premium brands 4 in 2021 and 7 in 2022, while mass-market brands increased from 8 to 11. Sport brands remained similar: 4 in 2021 and 2022.

The use of information and communication technology increased by +10%. These applications are for different purposes: authentication for luxury and premium brands and traceability for premium and mass-market brands.

Discussion

We can conclude that the transparency of the studied brands has slightly increased. However, there is still a large disparity between corporate transparency and product transparency. The differences between the information provided about the product in the shop and online are still significant.

Some initiatives of brands that communicate on a limited part of their collection with the help of information and communication technology allow for a greater product transparency. The 4 brands that use these applications for traceability have the best product transparency on the products equipped with this feature. We can conclude that the use of the product passport is useful for improving transparency.

Digital Product Passport

DPP links traceability and transparency using information and communication technology to collect and provide information, this innovation could improve product transparency.

The European Commission (EC) defined the DPP as a product-specific data set, which can be electronically accessed through a data carrier to “electronically register, process and share product-related information amongst supply chain businesses, authorities and consumers”. The DPP would provide information on the origin, composition, and repair and disassembly possibilities of a product, including how the various components can be recycled or disposed of at end of life. (University of Cambridge Institute for Sustainability Leadership (CISL) and the Wuppertal Institute, 2022). This description is general and does not relate to any particular industry.

For the textile industry, the DPP increases the amount of information presented on the product label in a dynamic and complementary way: by 2022 in Europe, the only mandatory information is the composition, care instructions and country of manufacture are not obligatory. DPP could expand information possibilities with access to detailed information on origin, composition, repair and dismantling possibilities, as well as the of products at the end of their life. This information would promote the circularity of products by facilitating maintenance, repair, resale, rental, dismantling and recycling.

To build a DPP model we need to define what information is necessary, required and traceable to enable product transparency for informed purchasing in the context of a transition to circular fashion.

The DPP model developed offers a theoretical and exhaustive view of the data that can be collected. The aim of this research is to propose a model in which companies can select the information to be communicated, according to their strategy and their means.

Legislation is evolving and will make certain information mandatory. In France, the AGECL (Anti waste for a circular economy) law, which will be applied in January 2023, will require brands to communicate a product sheet related to environmental qualities and characteristics that is accessible to the customer at the time of purchase. This contains information about: the countries of manufacture of tiers 1 and 2, the presence of plastic microfibres, hazardous substances, recycled materials and the recyclability of the product.

Collecting and gathering this information is a challenge for several stakeholders. Some product-related information are compiled by manufacturers (Adisorn et al., 2021) and efficient tools should help to make this process more reliable. For a circular economy, the use and end-of-life phase of products must also be considered. Final consumers are expected to participate and add information when using product to cover the whole product lifecycle. Other stakeholders such as retailers or maintenance services could fill information. Such a DPP model implies the participation of many participants and in order to build it is necessary to gather diverse expertise.

The Figure 2 presents the current state of our research and will be expanded following the methodology explained below.

The methodology to build a DPP model is grounded based theory and is developed from 5 different sources :

Literature review. A systematic literature will identify the definitions and categories of information covered, and the industries most advanced in implementing. The term DPP appeared in the scientific literature in 2015 and has been used more frequently since its mention in the European Green Deal in 2019.

Bill and laws in progress. In the textile industry, many topics are subject to new regulations in the area of textile industry transparency at both the national and European levels. Social responsibility: Due diligence, decent work conditions, environmental impact: product environmental footprint, eco-conception, traceability, and transparency: digital product passport, product labelling. (European Commission, 2022).

Existing DPP study: Some fashion companies have voluntary initiatives and are using information and communication technology to inform consumers. The comparison of information model shared allows for the extraction of the themes addressed.

Interviews with experts and future DPP users are gathered to identify the type of information and level of detail that will be relevant to each. Different profiles are involved: within brands (quality, marketing, after sales service), repairers, second hand companies.

Case studies of leading brands concerning product transparency will help to identify complementary themes. Some forward-thinking brands provide access to more detailed information and this has been at the heart of their strategy since their creation.

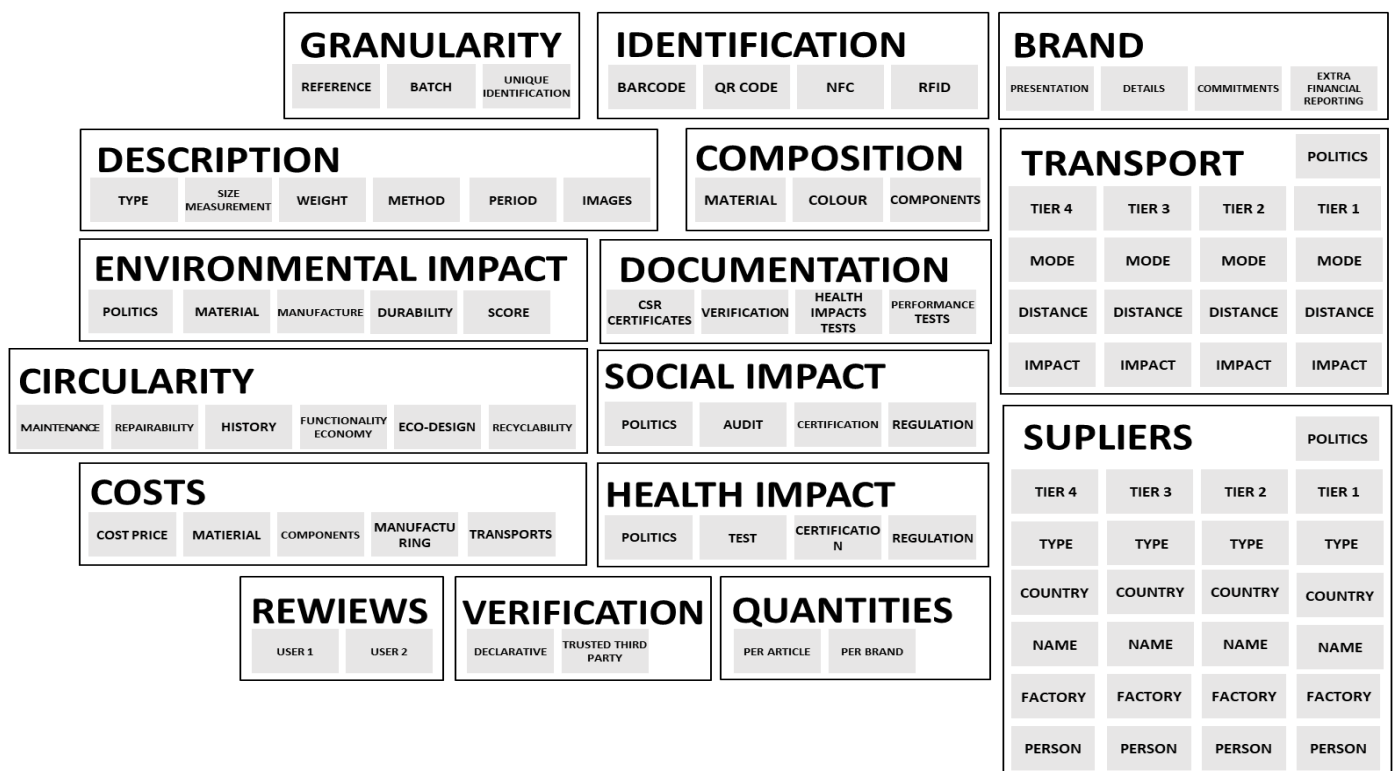


Figure 2 Digital Product Passport data model

Conclusion

The evolution of product transparency is still in its beginning.

The field study conducted in 2021 and 2022 that evaluated product transparency and corporate transparency shows an evolution of the textile industry that is more transparent and that is using the technology of information and communication more frequently. Following the evolution of transparency over 3 years will document an evolution of brand strategies and regulations. Next year we will see new initiatives with more DPP, as some brands have announced projects in this direction.

The implementation of DPP could create a dynamic relationship between brands, manufacturers, consumers, NGOs, regulators and all stakeholders involved in product lifecycle. The use of the DPP by integrating data collected after purchase by the users of the products will enable the optimization of new circular economic models by extending the life of the products through better maintenance and repairs, facilitating resale and rental, and enabling automated recycling, to make sustainable products the norm.

References

- Bhaduri, G., & Ha-Brookshire, J. E. (2011). Do Transparent Business Practices Pay? Exploration of Transparency and Consumer Purchase Intention. *Clothing and Textiles Research Journal*, 29(2), 135–149. <https://doi.org/10.1177/0887302X11407910>
- Jestratijevic, I., Uanhoro, J. O., & Creighton, R. (2021). To disclose or not to disclose? Fashion brands' strategies for transparency in sustainability reporting. *Journal of Fashion Marketing and Management: An International Journal*. <https://doi.org/10.1108/JFMM-09-2020-0182>
- Ospital, P., Masson, D. H., Beler, C., & Legardeur, J. (2021). Traceability information to communicate to the consumer in total transparency. 7.
- University of Cambridge Institute for Sustainability Leadership (CISL) and the Wuppertal Institute. (2022). *Digital Product Passport: The ticket to achieving a climate neutral and circular European economy?* Cambridge, UK: CLG Europe.

Pantxika Ospital is a PhD student at the University of Bordeaux and ESTIA Institute of Technology, France. She has an MA in Textile Design from ENSAD and has been working in the textile industry for ten years. She is researching how full traceability in the Supply chain, from the producer to the informed consumer, could support brands' CSR policies in the textile and fashion industry.

Dimitri Masson holds an engineering degree (BS, MS) in computer science from Grenoble INP Ensimag and a Master's degree from Joseph Fourier University in distributed, integrated, mobile, interactive, and parallel systems. He also has a PhD in computer science from the University of Grenoble, specialising in computer-assisted creativity. Since 2015 he has been a teacher, researcher, and engineer at ESTIA. Since 2018 he has been the head of the Mathematics & Computer Science teaching unit and the pedagogical coordinator of the Bali Chair. His field of research is at the crossroads of artificial intelligence, computational creativity and human-computer interaction. He focuses on the design and development of computer tools designed to support design activities, creativity, innovation, and decision-making. He has contributed to the Incose HSI WG since 2020.

Cédrik Béler is assistant professor at ENIT (Ecole Nationale d'ingénieurs de Tarbes). His research is in the field of Social-Cyber-Physical Systems and Digital Twins, and is related to data science and knowledge management. He is especially interested in the way information is organised in distributed networks of information systems with humans in the loop. Applications are developed in the context of industry 4.0 as well as the public space (local, regional and national authorities).

Jérémy Legardeur is a professor at ESTIA Institute of Technology. He graduated as a Mechanical Engineer from Montpellier University in 1997 and completed his PhD from Grenoble's INP (Institut National Polytechnique) in 2001. He is the founder of 'The 24h of Innovation®' event (www.24h.estia.fr) and the scientific head of the BALI Chair (<https://chaire-bali.fr>), a research programme with companies dedicated to fostering circularity for the textile sector.