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First Edition

DESIGN FOR SUSTAINABLE FASHION: A SUSTAINABILITY DESIGN-ORIENTING TOOL FOR FASHION

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ABSTRACT

Fashion is recognised as one of the most unsustainable systems, being characterized by both severe environmental impacts and unfair working conditions. In this framework, the article describes the design support tool called Sustainability design-orienting scenario for fashion and its development process. The tool has the purpose to inspire designers during the creation of sustainable concepts for Fashion/clothing and to orientate companies in fashion towards a more sustainable path. It describes a sustainable design-orienting scenario for fashion, made by 4 different visions. For each of the visions, a short video (animatic) tells a representative story, i.e. 4 in total, one for each vision(Do-it-yourself home clothing care; Community clothing hub; Shared wardrobe centre; Full service for home clothing care)and 3 videos that explain further visions' potential in terms of possible applications and opportunities. The tool has been developed with the following process: a) Strategic Analysis: desk research on "clothing care" system's environmental impacts; definition of environmental design priorities; and S.PSS "clothing care" best practices analysis. b) Scenario design: S.PSS ideas generation applied to clothing care; promising S.PSS ideas clustering aiming at identifying the most effective polarity diagram; design and formulation of the scenario's 4 promising visions. c) Tool development: design and implementation of the scenario tool.

Key Words: Fashion/clothing, sustainability, design-orienting tool, product-service system.

1. INTRODUCTION

In the present context of growing debate on the problems of global climate and environment, lack of energy and resources and ethical production, there is a new sensitivity according to which this unbridled consumption of faster fashion must slow down. It is widely recognized that fashion system is un-sustainable, even though it is popular, among non-experts to refer unsustainability mostly to fibers and materials. The clothing fabric sector is a highly significant economic player; as far as earnings are concerned, clothes are much cheaper now than they were a few decades ago. Cheap fashion means accessible fashion and encourages greater consumption, creating a vicious circle. More important, fast fashion puts pressure on the textile industries and their suppliers to raise their output, impacting on those at the bottom of the production chain and those who actually make the clothes. In this context, many are the questions raised about the possibility of a sustainable fashion, since many are the elements involved and complex the sequence of events inherent in the production of our clothes and the fabrics that go to make them (Conti, 2011).

The Sustainability design-orienting scenario for fashion has the purpose to inspire designers and businesses for future Sustainable Product-Service Systems (S.PSS) applied to fashion/clothing. The tool is developed in the framework of the LeNSin Project: the Learning Network on Sustainability (LeNS), with the aim to form a new generation of designers with the right conceptual and operative tools to be able to contribute to the transition towards a sustainable society. The paper describes the development and possible applications of the tool, which is based on a sustainable fashion scenario composed by a polarity diagram and 4 different visions. The scenario is found on Sustainable Product-Service System (S.PSS) models described as "an offer model providing an integrated mix of products and services that are together able to fulfil a particular customer demand (to deliver a "unit of satisfaction"), based on innovative interactions between the stakeholders of the value production system (satisfaction system), where the ownership of the product/s and/or its life cycle responsibilities remain by the provider/s, so that the economic interest of the providers continuously seeks environmentally and/or socio-ethically beneficial new solutions" (Vezzoli et al.,2014 and Vezzoli et al.,2018). Firstly, the paper describes the tool, its possible application and use, as well as the tool design process. Then, it pictures the Sustainability design-orienting fashion scenario on which the tool is based and the sustainable win-win potentials enclosed in the S.PSS models.

2. SUSTAINABILITY DESIGN-ORIENTING TOOL FOR FASHION

2.1 Aims

Design-Orienting Scenario, a tool to inspire and inform designers towards possible futures on specific topics, has been adapted to Sustainable Product-Service System (S.PSS) applied to fashion/clothing system. The tool, (from now on) Scenario presents four visions narrated as interactive videos accessible through a navigator file. The Scenario is a tool to inspire designers and stakeholders to design radically new social, economic and technical solutions and as co-design strategic conversations and facilitating creative processes among different actors.

2.2 What it consists of

The tool allows to watch the videos to inspire towards Sustainable Product-Service System (S.PSS) applied to Fashion/clothing. The tool presents four visions within a polarity diagram of two axes. The horizontal axis defines the sharing level: individual or collective. The vertical one defines the service type: do-it-your-self or full service. Each vision is presented through one short video (around 90 s) that shows peculiar narration, highlighting the key points of the vision (e.g. stakeholder interactions, ownership. Three sub-videos (around 30 s each) help to achieve the understanding of a wider range of opportunities than presented in the video of the vision; these three sub-video show: all the possible offer and the related payment modality; all the possible stakeholders that can be involved and their possible interactions; all possible sustainability benefits (environmental, socio-ethical and economic).

2.3 How to use the tool

The Scenario requires the use of a slideshow software (e.g. Open Office PowerPoint). Each video and sub-video can be watched separately or a central button is available to run the whole videos as one. The suggestion is to watch a main video first and after the related sub-videos, then, the second main video and so on.

2.4 Integrating the tool into the design process

The Scenario can be used during the Exploring Opportunities. It can be used to inspire and inform designers and actors involved towards possible visions of Sustainable Product-Service System (S.PSS) applied to and to get new inspirations during the process.

2.5 Results

The result is a set of ideas favoring creative processes and co-design activities towards concepts of Sustainable Product-Service System (S.PSS) applied to Fashion/ clothing.

2.6 Tool availability and required resources

The tool is available for free download at www.lenses.polimi.it. The tool has been designed to be used in workshops and co-design sessions, therefore a projector is preferable. The time required to visualise all videos is approximately

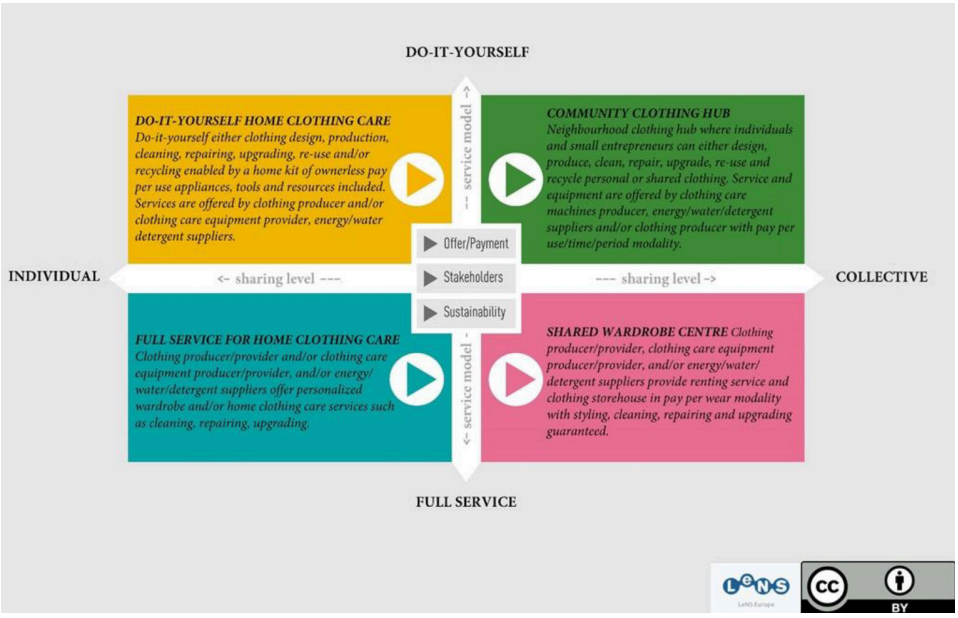
15 min (Vezzoli etal., 2018).

3. THE TOOL DESIGN PROCESS

The tool has the purpose to inspire and inform designers towards possible futures specific topics and it is in this case adapted to Sustainable Product-Service System (S.PSS) applied to fashion/clothing. The toolis also a source of inspiration for possible stakeholders' interaction to design radically new social, economic and technical solutions and as co-design strategic conversations and facilitating creative processes among different actors (Vezzoli et al., 2016 and Emili et al., 2016). The development process (part of the MSDS method) consist of: a) Strategic Analysis: desk research on "clothing care" system's environmental impacts; definition of environmental design priorities; and S.PSS "clothing care" best practices analysis. b) Scenario design: S.PSS ideas generation applied to clothing care; promising S.PSS ideas clustering aiming at identifying the most effective polarity diagram; design and formulation of the scenario 4 promising visions. c) Tool development: design and implementation of the scenario tool. The Strategic analysis phase is followed by the Scenario Design, which involves ideas generation. Ideas generated are also supported by the outcomes of the previous phase. The idea generation process comprehended a workshop that involved several experts in fashion/clothing and sustainable design; it also consisted of the use of the software Sustainability Design-Orienting Toolkit (SDO) (Vezzoli, 2014and Vezzoli et al., 2016) which is based on six "eco-efficient idea generation tables", each of those related to the defined set of sustainability design priorities. The idea generation process also referred to the clothing care S.PSS best practice examples. In fact, S.PSS clothing care ideas together with the best practice examples are the building blocks upon which the scenario's two polarities are designed and defined, i.e. the polarity framing the same scenario. The tool is based on the Sustainability Design-Orienting Scenario (SDOS) which is composed by a polarity diagram with 4visions (for each of the four quadrants drawn by the same polarity diagram). Each vision represents a sustainable win-win configuration; combines socio-cultural, organizational and technological factors, fosters solutions with a low environmental impact, a high socio ethical quality and a high economic and competitive value for both businesses and consumers.

4. THE SUSTAINABLE FASHION SCENARIO

The Sustainability Design-Orienting Scenario (SDOS) was developed following several projects such as SusHouse, EU project, 1998-2000; MEPSS, EU project 2005; Design 4 Sustainability, UNEP 2008-2009; LeNS, EU project, 2007-2010; LeNSes EU project, 2013-2016; LeNSin, EU project, 2016-2019. "A Design orienting Scenario is a scenario specifically built to favour sustainable stakeholder innovation; it is a synthetic proposition made of a general vision (a picture of a possible configuration of the system in which socio-cultural and technological factors are combined to produce possible state of being of the system) with some articulated proposals (a defined mix of product and services) positioned in global context" (Vezzoli, 2000). The sustainable fashion scenario developed is the one described as follows. On the vertical



axis, the scenario is polarised by the type of S.PSS: do-it-yourself (use-oriented) or full service (result-oriented). On the horizontal axis, the scenario is polarised by the sharing level: individual and/or collective. The crossing of those polarities produced the following four visions, relative to the four quadrants (Fig. 1).

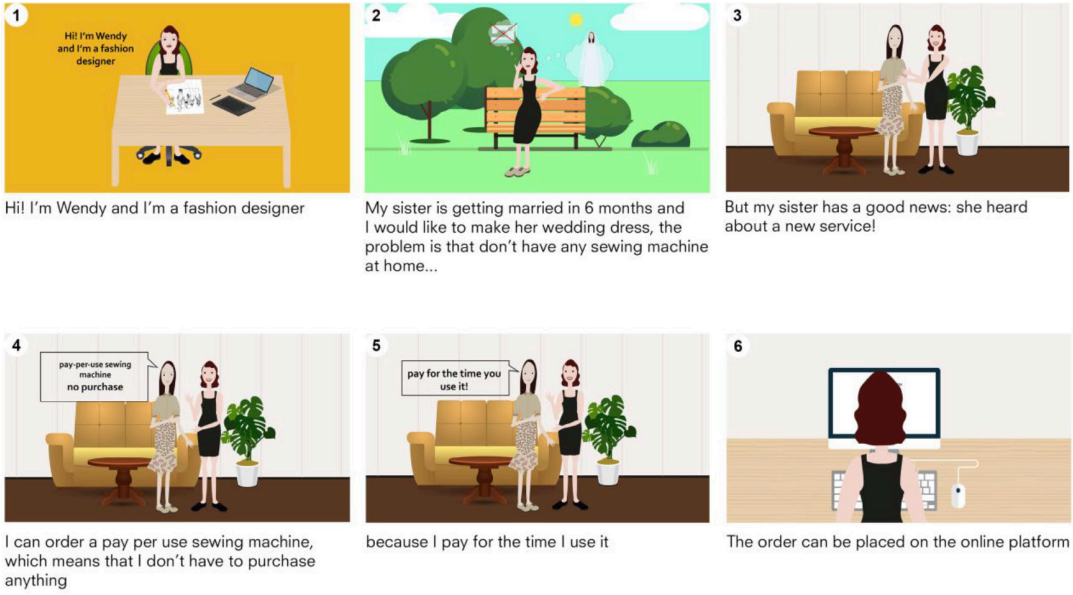
[Figure 1]Sustainability design-orienting tool for fashion

Vision 1. Do-it-yourself home clothing care

Do-it-yourself either clothing design, production, cleaning, repairing, upgrading, re-use and/or recycling enabled by

a home kit of ownerless pay per use appliances, tools and resources included. Services are offered by clothing producer and/or clothing care equipment provider, energy/water detergent suppliers.

Vision 2. Community clothing hub



Neighborhood clothing hub where individuals and small entrepreneurs can either design, produce, clean, repair, upgrade, re-use and recycle personal or shared clothing. Service and equipment are offered by clothing care machines producer, energy/water/detergent suppliers and/or clothing producer with pay per use/time/period modality.

[Figure 2]Sustainability design-orienting tool for fashion-Vision 1 storyboard abstract

Vision 3. Shared wardrobe centre

Clothing producer/provider, clothing care equipment producer/provider, and/or energy/water/detergent suppliers provide renting service and clothing storehouse in pay per wear modality with styling, cleaning, repairing and upgrading guaranteed.

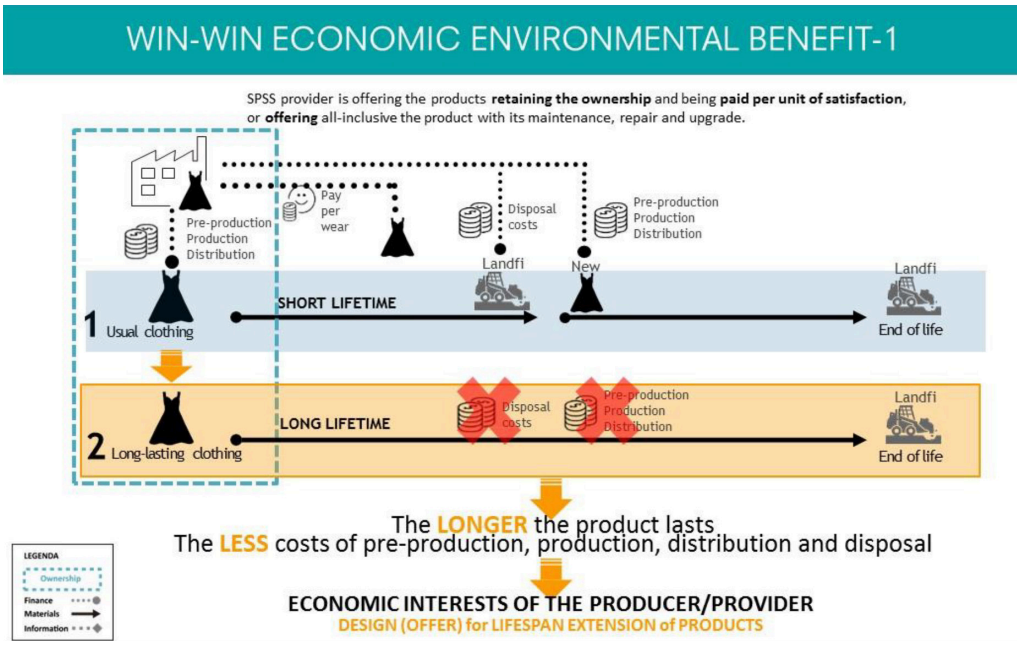
Vision 4. Full service for home clothing care

Clothing producer/provider and/or clothing care equipment producer/provider, and/or energy/water/detergent suppliers offer personalized wardrobe and/or home clothing care services such as cleaning, repairing, upgrading.

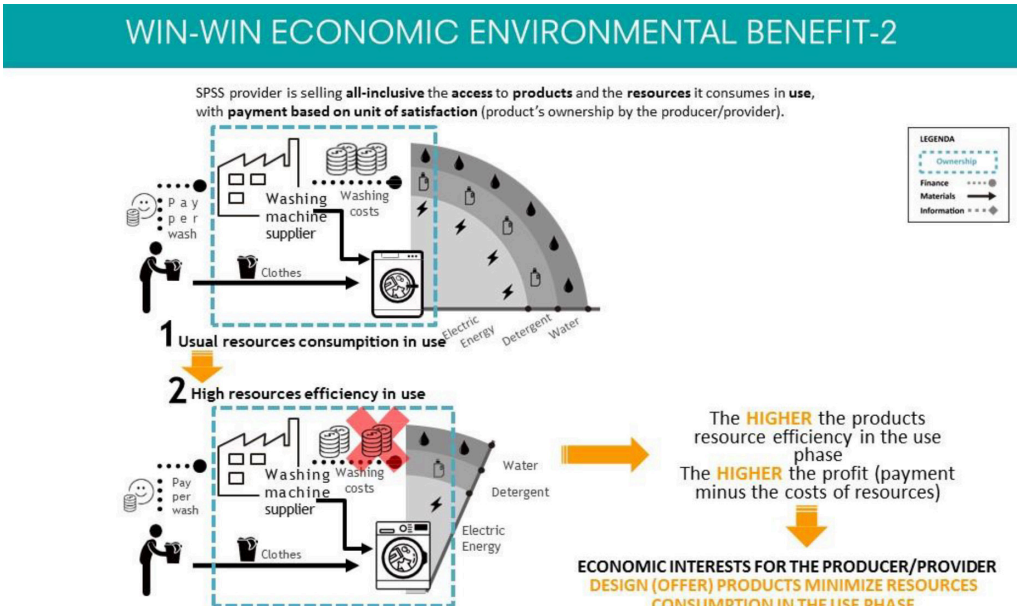
Visions are a starting point for several possible product-service system solutions, where different stakeholders are involved. A S.PSS is a win-win strategy because engages with different stakeholders and create a relationship between them with the intent of satisfying each interest. It is also an attempt to create designs that are sustainable in terms of environmental and social burden, developing both products and services to satisfy essential needs.

5. S.PSS WIN-WIN POTENTIALS

The scenario design is based on Sustainable Product-Service System models described as "an offer model providing an integrated mix of products and services that are together able to fulfil a particular customer demand (to deliver a "unit of satisfaction"), based on innovative interactions between the stakeholders of the value production system (satisfaction system), where the ownership of the product/s and/or its life cycle responsibilities remain by the provider/s, so that the economic interest of the providers continuously seeks environmentally and/or socio-ethically beneficial new solutions" (Vezzoli et al.,2014 and Vezzoli et al.,2018). S.PSS is based on new stakeholders interactions and is advantageous for all involved partners. Convergence of interest in the sense of interactions and partnership between stakeholders to achieve a common result(Manzini, 1999). In the long period, the S.PSS requires a shift of the stakeholders' attitude towards the productive chain as well as it requires that all the stakeholders receive evident profit from the service-system approach. The potential eco-efficiency of the system innovation therefore depends on those economic interests of the stakeholder that favour product life cycle optimisation, materials' life extension and intensifying usage. This means to design in order to valorise materials and to extend products' life. Because the S.PSS provider retains the ownership of a product and sell a unit of satisfaction to the customer, the product is more likely to be long lasting and when it is possible, resources consumption is reduced. This is because the production of new products and consumption of unnecessary resources are additional costs for the S.PSS provider. When a product is used more intensely than others are and for a longer time, we have a reduction in the quantity (of this product) necessary to satisfy a given demand for a function; which would determine a reduction in environmental impact. Furthermore, the S.PSS benefits for companies is tied to the potential benefit perceived by



clients. By focusing on product-service combination, the company discharges the client from the costs and problems associated to the acquisition, use, maintenance and disposal of equipment and products. Following tables sum-



marize S.PSS environmental benefits that are consequences of the convergence between different parties' interests.

[Figure 3]Win-win economic environmental benefit-1
[Figure 4]Win-win economic environmental benefit-2

It can be argued that within a S.PSS business model, there is an economic incentive for suppliers to reduce their environmental impact, for the following reasons (Vezzoli et al., 2018 and Azzi, 2018):

a). As far as the S.PSS provider is offering either the garments and/or clothing care equipment, retaining the ownership and being paid per unit of satisfaction, or offering all-inclusive the product with its maintenance, repair and substitution, the LONGER the product/s or its components last (environmental benefits), the MORE the producer/provider avoids/postpone the disposal costs plus the costs of pre-production, production and distribution of a new product substituting the one disposed of (economic benefits). Hence the producer/provider is driven by economic interests to design (offer) for lifespan extension of either the garments and/or clothing care equipment(eco-efficient product LCD implications).

b). As far as the S.PSS provider is selling a shared use of clothing and/or clothing care equipment to various users, the MORE intensively the product/s are used, i.e. most of the time (environmental benefits), the HIGHER the profit, i.e. proportionally to the overall use time (economic benefits). Hence, the producer/provider is driven by economic interests to design for intensive use of clothing and/or clothing care equipment(eco-efficient product LCD implications).

c). As far as the S.PSS provider is selling all-inclusive the access to clothing care equipment and

there-sources it consumes in use, with payment based on unit of satisfaction (product's ownership by the producer/provider), the HIGHER is the product/s re-source efficiency in use (environmental benefits), the HIGHER is the profit, i.e. the payment minus (among others) the costs of resources in use (economic benefits). Hence, the producer/provider is driven by economic interests to design/offer clothing care equipment minimizing resources consumption in use(eco-efficient product LCD implications).

d). As far as the S.PSS provider is selling energy as all-inclusive access to the energy production unit and the source for energy generation to any of the clothing care system stakeholder, with pay per period/time/satisfaction (energy production unit owner-ship by the producer/supplier), the HIGHER is the use of passive/renewable sources of energy (environmental benefits), the HIGHER is the profit, i.e. the payment minus (among others) the costs of non-passive/renewable sources of energy supplied (economic benefits). Hence, the producer/provider is driven by economic interests to design (offer) for passive/renewable re-sources optimization(eco-efficient product LCD implications).

e). As far as the S.PSS provider is selling all-inclusive the garments and/or clothing care equipment with its end-of-life treatment/s, the MORE the materials are either recycled, incinerated with energy recovery, or composted (environmental benefits), the MORE are the avoided costs of both the landfilling and either the new primary material, energy, or compost (economic benefits). Hence, the producer/providers is driven by economic interests to design for materials life extensions of either garments and clothing care equipment(recycling, energy recovery or com-posting) (eco-efficient product LCD implications).

f). As far as the S.PSS provider is selling all-inclusive the detergents, dyes and other toxic or harmful product/s, with use and/or end-of-life toxicity/harmfulness management services, the LOWER are the potential toxic or harmful emissions in use and/or at the end-of-life (environmental benefits), the MORE are the avoided costs of both toxic/harmful treatments in use and/or at the end-of-life. Hence, the producer/providers is driven by economic interests to design (offer) for toxicity/harmfulness minimization of detergents, dyes and other toxic or harmful product/s(eco-efficient product LCD implications)."

Finally, the clothing care products and processes are framed under the S.PSS approach that, for economic reasons, adopts a product Life Cycle Design i.e. that follow the LCD design strategies we have mentioned in the previous chapter 3: material and energy minimization, toxicity minimization, conservation/renewability/biocompatibility, material recycling, composting energy recovery, product lifespan extension/use intensification (Vezzoli, 2018).

6. CONCLUSIONS

Fashion/clothing is one of the most polluting industry in the world. Together with environmental concerns, social iniquity in the clothing production has been in the spotlight during recent years. Disapproval towards the fashion system is also connected to nature of the industry itself; in fact, it encourages a consumerist relation with products due to its temporary trend correlation, which, for most of the brands, is also the foundation of their marketing promotion. Consumers' awareness is rising and more than the past, the society asks for more transparency about the production chain and further responsibility towards people and the environment. Experts in sustainability and fashion/clothing are collaborating with companies and young designers to raise people's consciousness so that sustainability does not only represent a trend but a real design behaviour. Today, some companies are building their own brand identity basing on social and environmental sustain-ability values, but this is still only a tiny part of the market. The research presented in this document adds a design-oriented point of view within the debate related to possible future business models, in a product saturated market, so much damaging the environment. The Sustainability design-orienting scenario for fashionable discussed and redefined in relation to various specific contexts and type of garment use. As since now the ambition is to orientate designers, producers, suppliers, governments, local institutes, district municipalities, organizations, customers and in general, all participants involved in the fashion system, to radically rethink the way into which the fashion production and consumption system is nowadays organised and structured. We can recognize that sustainability recently became a new trend and several brands are nowadays much more interested in alternative approaches to clothing production than the past.

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