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EMPOWERING CONSUMER FOR THE GREEN TRANSITION WHILE SHOPPING FOR CUSTOMIZED PRODUCTS

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Abstract. *The European Union (EU) action plan, stated in Agenda 2050, provides directions for empowering consumers as active participants of sustainable transition. Accordingly, companies are called to support consumers in making sustainable choices by providing them with full access to reliable information on the sustainability value of their products or services. On the consumers' side, a growing number of them are willing to pay premium prices for products with high sustainability value. This paper addresses the EU action plan for empowering customers while shopping for customized products via online sales configurators (OSCs). OSCs are end users' tools designed with the purpose of proactively guiding consumers toward configuration solutions that best fulfill their idiosyncratic needs. The present study empirically examines a sample of active OSCs to assess whether and to what extent they support customers in making sustainable choices while shopping for configurable products. Findings from this study detect what functionalities should be implemented in OSCs to guide customers' towards "sustainable configuration". Regarding managerial implications rely on insights for mass customizers on what action can be adopted to empower consumers' awareness on sustainability value of product configuration while shopping for personalized products.*

Keywords: product configuration, sustainability value, user experience, customer behavior, customer engagement

1. INTRODUCTION

Consumers play a key role in the transition from a linear model of production and consumption to a circular model since they are increasingly willing to reduce adverse environmental impacts and enhance sustainability through circular economy (CE) initiatives (Gomes et al., 2022) Recent research has shown that a growing number of consumers are more willing to pay premium prices for products with high sustainability value (Khan et al., 2024). To respond to this slow but growing trend in consumers' behavior, it is crucial for companies delving into customers' specific requirements including purchasing for products with different degrees of sustainability value (e.g. green, sustainable and circular products).

In Mass customization domain designing gratifying product customization experiences triggers positive responses among potential customers, which are carried over the assessment of product value (Babin, et al.,1994; Trentin et al., 2014; Sandrin, et al, 2017; Turner, et al., 2020). The domain of product customization has been selected because of the specificity of its product co-design process in terms of customers' decision-making and involvement in product value creation. To enable a rewarding customization experience is therefore one way to increase customers' willingness to pay for customized products (Franke et al., 2010; Turner, et al., 2020) which may increase repurchase as rewarding shopping experiences lead to higher repurchase intentions (Aichner, & Coletti, 2013). Subsequently, to enrich customer experience of product customization with company offering of product with sustainable value could match customers' aim at having an active role in transition to a more sustainable model while benefiting companies with a (potential) increase of their sales volume.

In the domain of product customization, Online sales configurators (OSC) play a key role as tools that provide customers with highly engaging shopping experiences (Franke et al., 2010; Trentin et al., 2014; Sandrin, et al, 2017). Online sales configurators (OSCs) are knowledge management software programmed to support product design, development, and delivery processes (Forza & Salvador 2002; Heiskala,(2007), Antonelli, & Bruno, 2017; Trentin, et al., 2012).

The potential key role of product configurator systems calls for research on how to design them accordingly to incorporate functionalities linked to sustainable drivers. The present study explores the potential role of OSCs in guiding customers toward sustainable customization, as the customization of products with sustainable value. The aim is to detect what functionalities a configurator has to deploy to act as a tool to help in empowering customers' awareness of product sustainability value while shopping for customized products.

The present study is part of an ongoing research project that aims to conceptualize and test a configurator ability, namely *user empower capability (UEC)*, to pursues the following. Objectives.

With reference to users' perspective, the user empower capability is meant to support customers in identifying their

preferred configuration solution according to their needs for products with sustainability value. With reference to company perspective the UEC is meant to support companies in identifying a solution space considering the product attributes to be included within that space (or not) considering the degree of customers' needs for products with sustainability value.

At its early stage, the study has focused on detecting whether and to what extent active configurators are currently guiding users toward sustainable configuration. The present study specifically (a) explores customers' requirements regarding configurators' characteristics that are intended to empower consumers' awareness of products' sustainability value so they can make purchase decisions accordingly and

(b) maps whether and to what extent currently active business-to-customer (B2C) configurators are supporting customers toward sustainable configuration.

At the empirical level, a pretest on active configurators considers 30 configuration experiences involving a sample of B2C product configurators selected from the footwear industry. The preliminary findings provide companies with an overview of consumers' perspectives to learn about markets and their fast-evolving dynamics toward more sustainable models. The potential key role of product configurator systems calls for research on how to design them accordingly. The finding also offers insights into the delivery of technology-assisted experiences to empower customer awareness of the sustainable impacts of their choices while shopping via OSCs.

2. THEORETICAL BACKGROUND

1.1. Agenda 2050 customer empowerment

"*European consumers are at the core of a global change. Their actions can make a significant difference. Consumers need to be empowered to make sustainable choices and be reassured that their rights will be protected in all circumstances*" (Didier Reynders, 2020).

The European Commission launched the New Consumer Agenda1 to empower European consumers to play an active role in green and digital transitions. The New Consumer Agenda presents a vision for European Union (EU) consumer policy from 2020 to 2025, focusing on five key priority areas. The present study addresses two of them, as follows:

Green transition includes practices that ensure that sustainable products are available to consumers on the EU market and that they have better information to be able to make informed choices regarding the sustainability of products (e.g. negative/positive sustainable impact, early obsolescence). As well as to fight practices of mystification for example: greenwashing.

Digital transformation includes practice to tackle online commercial practices that disregard consumers' right to make informed choices. As well as to favor those commercial practices that aim at boosting CE engagement by strengthening pro-environmental attitudes and awareness. Thus, companies are called to support consumers in making sustainable choices by providing them with full access to reliable information on the sustainability value of their products or services.

More concretely, from the company perspective, starting in July 2024, all EU-member countries should be aware of the new EU directive on Corporate Sustainability Reporting (CSR) that will take effect in January 2025 for all companies in the EU. Consequently, companies are required to rapidly revise their CSR to meet the EU standard

2.2 Consumers' awareness of sustainability

Consumers' environmental awareness and attitudes toward environmental practices are among the key determinants of sustainable consumer choices. Understanding the nuances of consumer purchasing behavior is critical for businesses aiming to remain relevant and competitive. A key aspect with a significant impact on purchasing preferences and decisions is represented by generational differences that play a role in defining consumer purchasing behavior. Millennials and Generation Z, two generations of consumers who were raised in an era of greater environmental and social awareness, show greater sensitivity to these issues (Rank, & Contreras, 2021). Although both generations share a growing awareness, their consumer preferences and habits show significant distinctions. Both are exposed to the temptations of the trend so-called: fast fashion, which refers to rapid-trend turnovers through obsolescence and early disposal, resulting in quick profits and generating large amounts of waste (Alptekinoglu et al., 2023). Approaching fast fashion, while Millennials tend to be more critical and look for more sustainable and ethical alternatives, Generation Z members are often influenced by social and digital pressure to follow trends and more inclined toward fast and impulsive consumption (Rank, & Contreras, 2021). Especially on fashion-related issues, millennials show a preference for brands that demonstrate a genuine commitment to sustainability and business transparency. They are willing to pay a premium for ethically and sustainably made clothing and eager to learn about the entire product lifecycle, from design to production and shipping. Millennials also tend to actively participate in the sharing economy, embracing clothing rental and secondhand consumption as alternatives to the traditional shopping mode (Chatzopoulou, & de Kiewiet,2021). In contrast, Generation Z members have grown up in the digital age and show a predilection for the online shopping experience and flexibility in product choice. Among the Generation Z population, a relevant phenomenon is eco-anxiety described as an emotional state characterized by their constant concern for the degradation of the environment, highlighting not only their fear of environmental dangers but also feelings of guilt and impotence due to their lack of control over nature (Baudon & Jachens, 2021; Tsevreni et al., 2023). Eco-anxiety influences consumers' purchasing decisions, pushing them to pay greater attention to sustainability and ethics in the fashion industry, emphasizing a significant change in their perceptions of brands and the environmental impacts that their purchasing choice could generate Tsevreni et al., 2023.

2.3 Nudging customers

Introduced by Sudgen in 2009, nudge theory proposes non-coercive behavioral tools designed to positively influence consumers' purchasing decisions. As a result, non- invasive cues are used to guide customers' choices toward desired behaviors, such as purchasing sustainable products or preferring high-quality materials. The strategic use of nudges is based on the idea of improving the customer experience and encouraging informed decisions, without limiting people's freedom of choice but guiding them toward decisions that they would probably have made anyway with more time and reflection. Nudges can play a crucial role in promoting more ethical and environment-friendly consumption practices (Cossatin et al., 2024). Particularly in industry sectors with high impact and where sustainability and social responsibility are increasingly important. The ability to positively influence consumers' choices without forcing them represents an opportunity for companies to empower their customers and motivate them to take on a more active role in sustainable transition.

Delving into the function of nudges in the digital context of e-commerce, Cossatin et al., (2024) underline the importance of integrating informative and visual nudges into recommendation systems to positively influence consumer choices. Further examining the role of nudges in guiding consumers toward sustainable choices reveals that processes of product personalization can play a key part in offering targeted solutions and customized incentives to promote responsible behavior based on consumers' individual needs and preferences.

According to Hankammer et al., (2021) exposing consumers to sustainability information can have a significant impact on their purchasing choices when shopping for electronic goods via web-based configurators. Previous research on product personalization addressed how sustainability factors could be applied in choice navigation to teach customers the potential benefits of their specific choices as part of the product selection phase (Bakås, et al.2018)

2.4 Web-based sales configurators

Mass customization capabilities (MCC) evolved across decades, starting from the capabilities identified as: elicitation, process flexibility and logistics (Zipkin, 2001) to their reformulation into the three capabilities that support the toward MC strategies, namely: solution space development, choice navigation and robust process design (Salvador et al., 2009). Within the tools to enable MCC capabilities, Web-based sales configurators enable choice navigation to support customers in identifying their own solutions while minimizing complexity and the burden of choice. Moreover, depending on the various capabilities could enhance customer perceived benefit at product level and configuration experience level and product level. Consistent with previous research (Heiskala, 2007; Forza, & Salvador 2008; Felfernig et al., 2014), web-based sales configurators are knowledge-based software applications that support a potential customer, or a sales-person interacting with the customer, in completely and correctly specifying a product solution within a company's product offer. The benefits and challenges of implementing and using a configurator have been widely researched (Heiskala, 2007; Forza, & Salvador 2008; Felfernig et al., 2014; Suzić et al., 2018; Kristjansdottir et al., 2018; Sandrin et al. 2017, Trentin et al.,2020;). The adoption of product configurators provides companies with several advantages, including but not limited to shorter lead time, fewer errors, an increased ability to meet customer requirements regarding product functionality, the use of fewer resources, optimized product designs, improved on-time delivery, enhancing human-centric applications and adding value for customers.

The distinctive goal of B2C product customization strategy is to involve customers in the design of the product to meet their individual idiosyncratic needs without a significant increase in production or distribution costs nor substantial trade-offs in quality and time performance. Due to the specific characteristics of this strategy, customer decision-making when shopping for a self-designed product is remarkably different from shopping for take-it-or-leave-it products. This is because, at each step of the co-design process, customers have to choose the solution that best matches their needs, and whenever they have no precise knowledge of what solutions might correspond to their needs, choosing among a variety of product solutions can be overwhelming (Forza, & Salvador 2008; Valenzuala et al., 2009; Trentin et al., 2013). Trentin et al. (2014) have conceptualized five sales-configurator capabilities reported in Table 1

Tab.1 Configurator capabilities

Capability	Definition
Benefit-cost communication	The ability to effectively communicate the consequences of the configuration choices made by a potential customer both in terms of what he/she would get and in terms of what he/she would give
User-friendly product-space description	The ability to adapt the description of a company's product space to the individual characteristics of a potential customer as well as to the situational characteristics of his/her using of a sales configurator
Easy comparison	The ability to support sales-configurator users in comparing product configurations they have previously created
Flexible navigation	The ability to let sales-configurator users easily and quickly modify a product configuration they have previously created or are currently creating
Focused navigation	The ability to quickly focus a potential customer's search on those solutions of a company's product space that are most relevant to the customer himself/herself

Source: Trentin et al., 2014

3 METHOD

3.1 Research design

In its early stage 30 configuration experiences were tested on active B2C configurators from the footwear sector. The choice of configurators in the footwear sector and in particular the type of product sports shoes: sneakers - responds to several factors. (i) Firstly, sneakers have acquired an iconic role in contemporary culture and the fashion industry, becoming a symbol of style that is widely recognized and appreciated throughout the world (Slaton & Pookulangara, 2022). Their ubiquity and popularity make them an ideal product for exploring the potential of online configurators. (ii) Additionally, younger generations, such as Millennials and Generation Z, play a significant role in shaping consumer trends and define the future of the fashion industry, as previously discussed and the choice of participants in the configuration experience fell precisely between consumers of these two generations (Slaton & Pookulangara, 2022).

The growing use of sneakers, especially among the generations considered, has significantly contributed in making the sneaker sector an intriguing field of study for exploring the dynamics of contemporary consumption and the evolution of fashion in contemporary society. Finally, the ever-evolving nature of the sneaker industry, with the regular introduction of new models and collaborations, offers fertile ground for analyzing the latest market trends and customization strategies adopted by companies to meet changing consumer needs. The study of specific configurators for sneakers can therefore provide precious observations to understand market dynamics and consumer preferences in the context of current fashion trends.

3.2 Data collection

Sample of participant to configuration experience

The sample of 10 respondents was selected within a sample of 105 respondents' who took part in a questionnaire on fashion related issues. The number of people considered in the sample follows previous research (Hankammer, et al, 2021) and was propaedeutic to perform the initial step of the pre-testing. Respondents were six women and four men, seven respondents from generation Z and 3 Millennials that on a voluntary basis took part in the configuration experience. Each of the 10 respondents performed three product configurators on three different configurations of sneakers. Six experiences of co-design were performed on each configurator (A CREIGHTIVIST SHOES; B VANS; C CONVERSE, D NIKE; E ADIDAS). A total of 30 product configuration experiences were collected. All the configuration experiences ended after a complete product configuration was ultimate and put in the chart but no one of the configured products was bought.

At the end of the configuration experience each participant fulfilled a form structured in the following sets of questions. In detail:

(a) a set of questions to profile respondents by gender, age;

(b) a set of questions on respondents' online shopping behavior;

(c) a set of questions on respondents' knowledge with the configured product and knowledge of online configuration processes.

(d) a set of questions to detect the presence (or not) of any certification of sustainability principles; answer options: yes/no, with the option to specify whether respondents encounter any certification different from those proposed to them.

(e) a set of questions to detect whether and to what extent the selected configurators provide its users with any guidance towards sustainable choice and or any information on sustainability drivers (environmental and social once) along their configuration. To this former goal were considered the capabilities that a configurator can deploy to guide its users during configuration experience (Sandrin et al., 2017; Trentin et al., 2013; Trentin et al., 2014). To the scope of the pretest were considered the two capabilities, known in literature as: focused navigation (FocN) and benefit cost communication (BCC). Table 3 reports the statements formulate to detect configurators' ability to focus the navigation on sustainable offerings.

Table 3. Statements on focus the navigation and sustainable offerings

FocN_S1	*The system made me immediately understand which way to go to take to find the environmental sustainability characteristics I needed*
FocN_S2	*The system made me immediately understand which way to go to find sustainability characteristics I needed in terms of individual health*
FocN_S3	*The system immediately led me to the social sustainable options that were most interesting to me for my health*
FocN_S4	*The system immediately led me to environmentally sustainable options that were most interesting to me*
FocN_S5	*This system quickly guides the user towards the solutions that best satisfy his/her requirements on environmental sustainability*
FocN_S6	*This system quickly guides the user towards the solutions that best meet his/her requirements on sustainability in terms of individual health*
FocN_S1-6= acronyms of focus navigation on sustainability options/choice/configuration/	

The items of each capability were formulated accordingly to incorporate environmental and social dimensions of sustainability within a sustainable configuration framework (Hora et al., 2016; Badurdeen, & Liyanage, 2011). Respondents had to indicate their level of dis/accordance in a Likert scale from 1 to 5 (where 1 refers to totally disagree and 5 completely agree). Table 4 reports the statements formulate to detect configurators' ability to communicate benefits and costs on sustainability.

Table 4. Statements on communication of benefits and costs on sustainability

BCC-S1	*This system allowed me to understand how the various choice options influence the environmental sustainability*
BCC-S2	*This system allowed me to understand how the various choice options influence social sustainability in terms of individual health*
BCC-S3	*This system allowed me to understand how the various choice options influence social sustainability in terms of workers well-being*
BCC-S4	*This system allowed me to understand the benefits of the various choice options to make environmentally sustainable choices*
BCC-S5	*This system allowed me to understand the benefits of the various choice options to make sustainable choices for my health*
BCC-S6	*This system allowed me to understand the negative impact of each othe various choice options to make sustainable choice for environment and/or individual health and/or workers well-being*
BCC S 1-6 = acronyms of benefit cost communication on sustainability	

Sample of web-based sales configurators

The sample of online sale configurators was selected from the Cyledge database. The database is the only publicly available list of online sales configurators, and it has been used in several research on OSCs. Among the 1.471 entries in the database, an initial selection was made according to English as the de facto lingua franca for business and a second selection by product type: "footwear" which returned 35 configurators (details in appendix). Within the 35 only of 5 configurators of sneakers were founded active at the time of the present study, specifically: A CREIGHTIVIST SHOES; B VAN; C CONVERSE, D NIKE; E ADIDAS

Table 2. Configurators of sneakers

BRAND	Link
TOESMITH	*https://www.toesmith.com/customize/uvmEbfmCs6yJC3m2JPC8z5*
FREAKY SHOES	*https://freakyshoes.com/it*
CREIGHTIVIST SHOES	*https://creightivist.com/shop/gestalten/sneaker/1/black-high*
NOTLIKEYOU	*https://www.configurator-database.com/configurator/footwear/notlik eyou*
SPREADSHOES	*https://spreadshoes.com/pages/custom-printed-shoes*
SPERRY	*https://www.sperry.com/en/home*
ITAILORSHOES	*https://www.itailorshoes.com*
BRAND YOUR SHOES	*https://brandyourshoes.com/how-it-works/#you-design*
ADIDAS	*https://www.adidas.com/us/personalizable-shoes*
VANS	*https://www.vans.com/en-us/customs?icn=topnav*
CONVERSE	*https://www.converse.com/uk/en/country-language-selector*
NIKE	*https://www.nike.com/nike-by-you*
REEBOK	*https://www.configurator-database.com/configurator/footwear/reebo k*
MUNICH MYWAY	*https://www.munichsports.com/it/*

4 FINDINGS

Findings on respondents' profiles

The findings from this section indicate users' good knowledge of the products they have configured and moderate knowledge of product configurators. The respondents showed a high degree of confidence in online shopping, with the majority mainly making online purchases

Findings on customers' requirement to be informed on sustainability-related issues

By considering a parallel between the configuration process and the customer/user journey, the configuration experience can be regarded as structured in five steps: development of an initial idea, generation of an intermediate configuration, final configuration, pre-purchase, and purchase (Franke et al., 2008). The majority of the respondents (60%) would have liked to receive information about sustainability-related issues at the early stage of the initial idea development. However, 30% would have liked to receive information on sustainability in the generation of initial configuration, while they were chosen options to configure their products. Only 3% would have liked to receive that information once the final configuration was concluded, and 7% after putting the configured product into the basket just before proceeding with purchasing it.

Findings on configurators' ability to drive customers towards sustainable configuration. All 30 configuration experiences provided values that pointed out the respondents' unanimity on the absence of any functionality that would drive them directly to a product space that included sustainable options. Any relevant differences were detected across the experiences on different configurators. The respondents expressed their strong disagreement with the statements on configurator capability to focus the navigation on sustainable configuration (FoCN_S) and with the statements on configurator capability to communicate benefits/costs on sustainable configuration (BCC_S).

The respondents did not feel guided toward sustainable choice navigation. The system did not direct them to a set of choices that listed sustainable attributes/options/solutions to be included in their product configuration. Additionally, the majority of the configurators did not provide their users with information on any impact of social or environmental sustainability drivers.

Findings on certifications of sustainability

The respondents were asked about what kinds of certification they considered relevant for creating a positive impact on their decision-making while purchasing a product. The three certifications reported in table 5 were considered highly relevant among the twelve certifications presented to them (i.e. OEKO-TEX STANDARD 100, OEKO-TEX MADE IN GREEN, EWG Verified, more details in Appendix).

The respondents' answers pointed out their strong concern for individuals' health and safety, as witnessed by these certifications' types that were considered the most relevant. The certification and information that clearly stated the product safety of chemical substances were judged as relevant. Surprisingly, any certification on social

sustainability related to workers' wellbeing was deemed relevant by the respondents.

Table 5. Certifications relevant for the respondents

The certification guarantees that textile-based products are tested against a list of over 1,000 chemicals substances, to limit those that may be harmful to human health.	CONFIDENCE IN TEXTILES Tested for harmful substances according to Oeko-Tex Standard 100
The OEKO- TEX MADE IN GREEN certification guarantees that products do not contain any harmful substances and are made in safer working environments with reduced environmental impacts.	OEKO TEX® MADE IN GREEN
The EWG Verified certification guarantees that products are free of known chemicals and meet rigorous health standards.	ewg

5 DISCUSSION

Based on the preliminary results of this study, the first step to implement a configurator with functionalities to empower users' awareness requires companies to obtain and make visible sustainability certifications, with special attention to those guaranteeing that the items proposed in the product space are free from toxic chemical substances that are harmful to individuals' health. Another action to implement configurators with functionalities to empower users' awareness requires to program configurators so as to redirect customers to a product space that includes sustainable product attributes/options/solution, with clear statements and claims on the benefits and implications of customers' choices regarding sustainability drivers (environmental and social). Findings from previous research show that to guide customers in making sustainable choices while shopping online, a nudging strategy could be to make visible some examples of the benefits of their choices (in terms of minimizing the carbon footprint and saving resources, energy, and water). Findings of the present study detected that to guide customers toward a sustainable configuration experience the nudging strategy should be considered mainly at the initial stage of the configuration process. More concretely, by making visible and accessible the information that could support users in generating their initial idea of the product to be configured. The same implementation should be applied again at the end of the configuration process once users have completed their configuration solutions.

Since "*the end-consumer should be the focus of the entire supply chain*" (Svensson,2002, p.746) It is crucial delving into their specific requirements including purchasing products with sustainability value.

Another action to implement a configurator with functionalities to empower users' awareness requires mass customizers to scan customers' requirements in terms of their need for sustainability based on generational specificities (Fabbe-Costes et al., 2011). The above-mentioned actions can concur in implementing a configurator with ability to guide customers toward sustainable product configuration. This configurator ability is conceptualized and named *empower user empower capability*. It refers to a configurator system's ability to enhance users' awareness of the impacts of their choices on sustainability drivers as well as the sustainability value of the products that they have configured, which include knowledge of the impacts of their choices on sustainability drivers (i.e., environmental, social, economic, and circular principles).

6 CONCLUSIONS

To manage sustainability drivers (i.e., environmental, social, economic, and circular principles) requires companies to deploy several capabilities (e.g. green management capabilities) including to empower customers for green transition (EU Agenda 2050). To achieve this goal, it is crucial for companies delving into customers' specific requirements including purchasing fore products with sustainability value. Online sales configurators play a key role as tools that provide customers with highly engaging shopping experiences. The potential key role of product configurator systems calls for research on how to design them accordingly to incorporate environmental and social dimensions of sustainability within a sustainable configuration framework. Programming an appropriate design for sustainable configuration via OSCs, requires companies to rethink, select, adapt knowledge information, product offerings, and choice navigation, with particular attention to sustainability drivers, and scan customers' requirements. Findings from the present study offer insights into the delivery of technology-assisted experiences to empower customer awareness of the sustainable impacts of their choices while shopping via OSCs to find product configuration with the degree of sustainability value they were looking for. Creating a sustainable configuration experience towards OCSs requires companies to rethink, select, and adapt knowledge information, product offerings, and choice navigation, with particular attention to sustainability drivers, while matching customers' requirements for products with sustainability value.

The present study (a) explores customers' requirements regarding configurators' characteristics that are intended to empower consumers' awareness of products' sustainability value so they can make purchase decisions accordingly and

(b) maps whether and to what extent currently active business-to-customer (B2C) configurators are supporting customers toward sustainable configuration. Preliminary findings, from the present study, confirm findings from previous research (Bakås, 2018; Hankammer et al., 2021; Cossatin et al., 2024) and move a step forward by adding customers' perspectives on how to implement them at present. Customers prefer to be guided and informed on sustainability-related issues while they start developing their configuration ideas. Regarding transparency, users expect to be reassured by official certifications, especially those that guarantee the safety of their products, free of toxic or harmful chemical substances. From the corporate perspective, the preliminary findings indicate that the level

of sustainable product configuration deployed by the selected configurator is practically null and/or not perceivable by customers. In particular, the findings on footwear customers point out their increasing consciousness about and sensitivity to taking on an active role in sustainable transition. Consumer attitudes can be exploited with the proper nudging strategy implemented at specific stages of the user/customer journey during a shopping experience via an OSC.

The present study is just the early stage of ongoing research. Major limitations are going to be addressed in its future development. In the next steps, this study continues in expanding the range of customers' generations (e.g., Alpha generation) to scan customer-specific requirements as well as to consider the customers 'requirements on green, sustainable, and circular specific product types. At the technical level, the study would delve into appropriate algorithms to be adopted to make the user empower capability feasible. From the company standpoint, further studies could focus on mass customizers' perspective to detect their configurators' readiness in terms of sustainable product configuration and degree of user empower capability (UEC).

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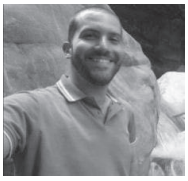

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APPENDIX

Table 6. Certifications proposed to potential customers

The Blue Angel certification guarantees that products meets high environmental standards, including the protection of consumer health.
The Bludesign certification guarantees that products are manufactured responsibly, using safer chemicals and fewer resources in the production phase, for greater energy savings.
The Cradle to Cradle certification guarantees that products are made with safer materials and responsible processes to have a positive impact on people and our planet.
The EU Ecolabel certification guarantees that products have a lower environmental impact at multiple stages of their life cycle.
The EWG verified certification guarantees that products are free of known chemicals and meet rigorous health standards.
The Fair for Life certification guarantees that products are realized in a fair trade and more socially and environmentally responsible supply chains.
The Fair Rubber certification guarantees that products contain natural rubber certified by fair trade according to social and environmental criteria.
Global Organic Textile Standard certification guarantees that each step of the organic textile supply chain based on rigorous ecological and social standards.
Global Recycled Standard certification verifies the percentage of recycled content and traces it from origin to the final product.
The Recycled Claim Standard Blended certification guarantees that products contain between 50% and 94% certified recycled content
The Organic Content Standard Blended certification guarantees that products contain between 50% and 94% of certified organic materials.
The OEKO-TEX STANDARD 100 certification guarantees that textile-based products are tested against a list of over 1,000 chemicals, to limit those that may be harmful to human health
The OEKO-TEX MADE IN GREEN certification guarantees that products are tested for the presence of harmful substances and made in safer working environments with reduced environmental impacts