

LEARNINGS FROM MONITORING WEB-BASED PRODUCT CONFIGURATOR APPROACHES IN THE WORLD OF CUSTOMIZABLE PRODUCTS

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Abstract: *The appearance and usage of web-based configurators in the past decade was monitored in the Configurator Database Research Project. This paper analyses the available data, focusing on changes in industries and product types and in usage forms as well as on the adaption of selected user interface trends. This high-lighting of various relevant aspects of these online available company-customer interaction tools intend to give insights into the status quo of the customizable product landscape and help to anticipate further developments in this field.*

Key Words: *Product Configurator, Status Quo, Mass Customization, Industry Trends*

1. INTRODUCTION

The interaction with the customers is one of the central activities in mass customization. Interaction processes with customers include both, the incorporation of customer requirements and the specification of product properties by the customer and are realized by using a web-based configurator [1]. A product configurator is a design tool to create an individual product on a base of predefined styles and options. The tool allows the connection of customers' needs and abilities of the company and supports the user in designing an appropriate solution [2]. Simply put, a product configurator is a software application for designing products exactly matching customers' individual needs. It allows customers to choose between product features, options and technically viable combinations and is the crucial tool for company-to-customer interaction and cooperation [3].

Setting up a configuration system in the wrong way is an important cause for failure of mass customization approaches of companies. Immature product configurators, which customers cannot handle, lead to frustration and dissatisfaction. Digital tools have to have a high degree of user friendliness and simultaneously create a certain experience for the customer [4].

2. TASKS AND REQUIREMENTS OF A CONFIGURATOR

“A user who creates his own products expects a graphic design that is easy to interpret and use, and employs a familiar terminology” [5]. Usability and product relevant simplicity in the configuration process are of very high importance for achieving a lasting user attention. This user attention is an important requirement for creating interest and acceptance of the desired objectives of such a toolbox for mass customization. These general tasks include the following aspects [6]:

- Presentation of the company and its capabilities
- Presentation of the offering and the spectrum of customization possibilities
- Consultancy and support to reduce insecurities
- Guidance in the configuration process
- Intermediation of a flow experience to create a purchasing experience for the customer
- Plausibility check of the selection and automatical configuration of missing options
- Providing privacy of personal data

Salvador, de Holan and Piller [7] identified three capabilities that are necessary for the successful implementation of a mass customization strategy: *Solution Space Development*, *Robust Process Design* and *Choice Navigation*. Developing an appropriate solution space is crucial, as mass customization is not about offering unlimited choices. It is important to identify those options that diverse customer needs and make up the individuality of a product. The second condition is a *Robust Process Design*. This is enabled by a modular software system, by running all processes automatically and without human intervention. Also, a flexible production system is necessary, which comprises the reuse and combination of existing corporate resources. Configurators are the core of the third capability, *Choice Navigation*, and need to consider a range of challenges from the minimization of complexity for the user up to the development of a sales-supporting shopping experience during the product configuration.

Supporting customers in identifying their own needs and creating valid solutions while minimizing

complexity and the burden of choice is the utmost challenge for a company that is offering mass customized products and services. When a customer is exposed to a myriad of choices, the cost of evaluating those options can easily outweigh the additional benefit from having so many alternatives. The resulting syndrome has been called the leading “paradox of choice” – an effect that describes that too many options can actually reduce customer value instead of increasing it and can even destroy the perceived attractiveness of the company. Customers postpone their buying decisions and judge about the vendor as difficult and undesirable. To avoid that, companies have to provide means of choice navigation to simplify the ways in which people explore their offerings [8].

Product configurators are categorized in six types, each of it having particular goals and solution spaces. Their range starts with simple Select-to-order (STO) and Pick-to-order (PTO) configuration solutions to Assemble-to-order (ATO) and Configure-to-order (CTO) configuration systems up to complex Make-to-order (MTO) and very complex Engineer-to-order (ETO) software that bridge the field of product configurators with the field of user innovation configurators [9].

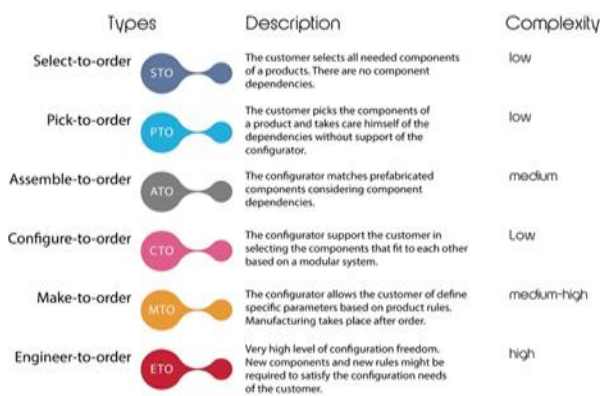


Fig. 1. Types of configurators

After all the user of a configurator has to be capable of performing the intended task.

Some crucial criteria have been identified that foster the user acceptance and that are developing to becoming web-standards [10]:

- Use of a real product-image
- Visual feed-back showing choices and alteration made
- Configuration takes place on a single screen
- Price shown and updated during the configuration process
- Different perspectives and view-points of the product image

Especially the product visualization plays in important role. Rogoll and Piller already state that “visualization is one of the strongest instruments to create trust and reduce the risk perceived of the user and increase the willingness to purchase” [6]. In contrast to the conventional buying process in shops, where customers can see or even test the product before they decide to buy it, judgment in the virtual world is much more difficult. The quality and the characteristics of the

product are not feasible. To overcome these difficulties, the visualization of the customized product is vital and one of the most important user interface elements of a configurator [6].

3. STATE OF DEVELOPMENT OF CONFIGURATORS

The status quo of online product configurators is documented in the Configurator Database Research Project (www.configurator-database.com). Started in 2007 with the aim to give a continuously updated overview of the web-based product. But also a significant number of product configurators vanished every year and thus needed to be removed from the database. In 2007 600 configurators that were accessible online could be identified by the project team, till 2013 this number jumped to 900 configurators, expanded to 970 configurators the year later and in 2015 even passed the milestone of 1000 in growing to 1050 configurators. At the end of 2016 this number developed to 1200 and in 2017/18 reached 1250 online configurators [11].

The configurator database shows a diverse cosmos of customizable products they were categorized in 17 industries for orientation. The highest number of configurators can be found currently in the category *House & Garden* with 198 listed entries, followed by *Accessories* and *Apparel* with each 152 listed entries [11].

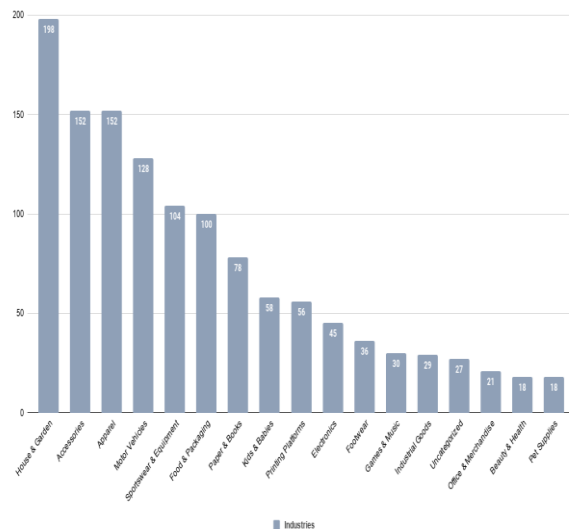


Fig. 2. Industry ranking in the Configurator Database 2017/18 (n=1250)

Most companies offer a single product which can be modified according to the exact needs of the customer. If a company offers several customizable products, these are aggregated into product groups like *giftware* or *photo products*.

Figure 3 shows the most popular products for mass customization that are analyzed in the configurator database: *cars*, *t-shirts*, *shirts* and *rings*. But the range of customizable products also stretches to maybe unexpected products like *chimneys* or *aquariums*; these unusual products often occur only once in the database, indicating that innovative companies are testing the market and the main stream wasn’t willing to enter a mass customization approach [11].

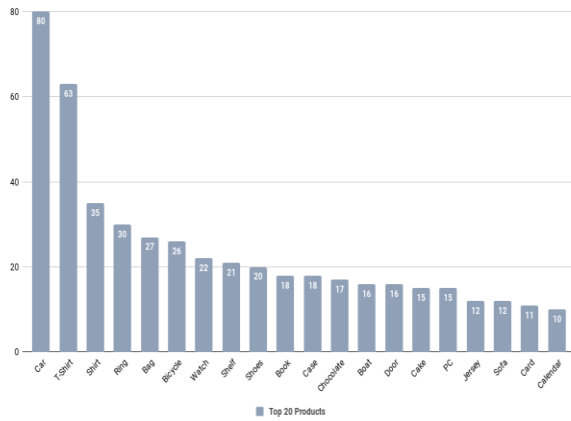


Fig. 3. Top 20 of the most popular products in the Configurator Database 2017/18 (n=1250)

Mass customization is still evolving strongly, which is documented when analyzing and updating the Configurator Database. Product configurators disappear and new ones come up [11].

The biggest change can be found in the industries *House & Garden*, *Motor Vehicles* and *Accessories*, as the numbers of configurators has there has strongly expanded. On the contrary, the numbers of configurators in the industries *Apparel* and *Printing Platforms* are declining (fig. 4).

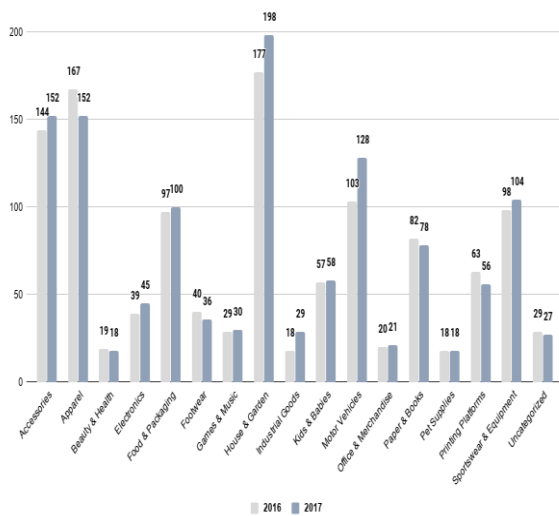


Fig. 4. Number of product configurators per industry in the Configurator Database in 2016 and in 2017/18 (n=1250)

During the last year 146 (12%) of the 1200 listed product configurators in the Configurator Database Report 2016 disappeared. On the other hand, 196 (16%) new product configurators were introduced to the online market, which indicates that mass customization approaches are still in the flow.

The biggest change was detected in the industry *Industrial Goods*, 67% of the configurators were added and only 6% were removed.

Apparel (28%) and *Motor Vehicles* (27%) are the second and the third growing industries concerning the total number of added configurators [11].

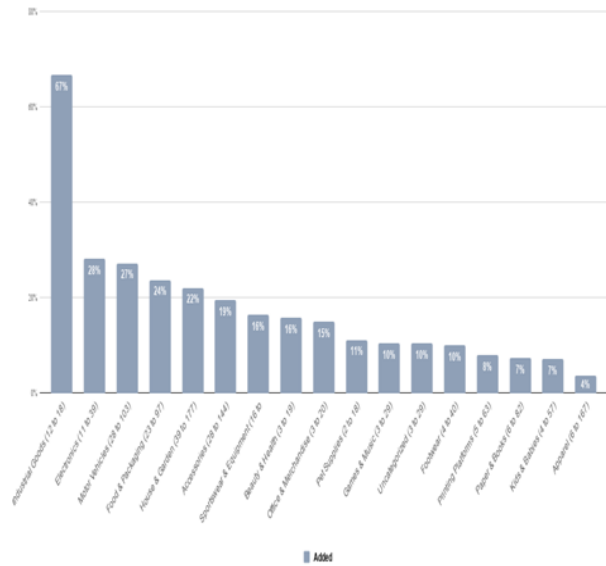


Fig. 5. Added configurators 2017/18 compared to 2016

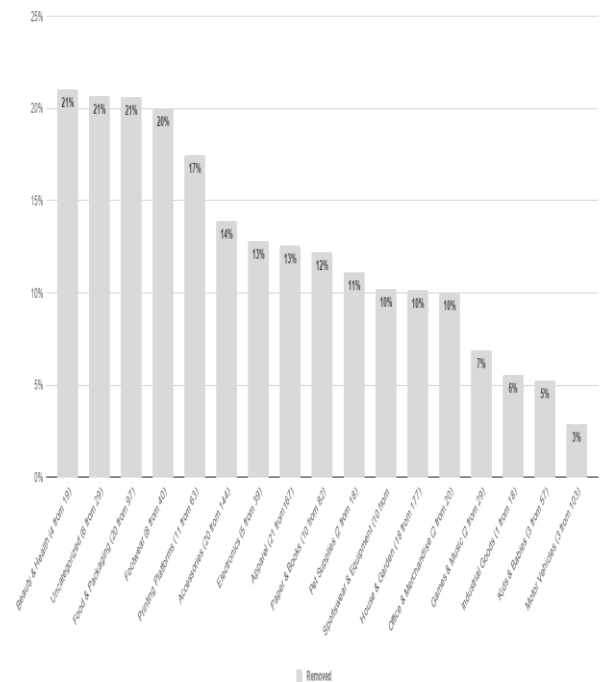


Fig. 6. Removed configurators 2017/18 compared to 2016

4. USER INTERFACE CHANGES OF ESTABLISHED CONFIGURATORS

Not only in the Configurator Database Report 2017/18 but also in the reports of 2015 [12] and 2016 [13] there is a significant market dynamic when removed and added configurators are monitored. But the fact that a product configuration solution offered by a company to their customers stays online for years doesn't mean that this solution is not changed in its appearance. Comparing configurators in each industry that remained online for the same product in 2015 and

2016 it can be noticed that changes of the user interfaces occur of many configurators in each industry (fig. 7) [14].

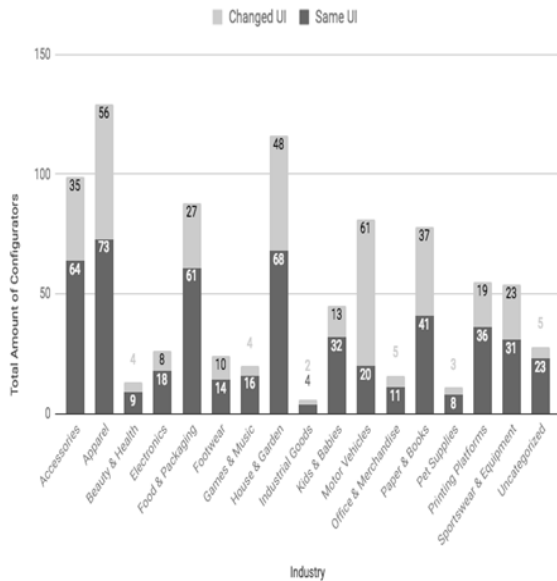


Fig. 7. Changed Interfaces per Industry from 2015 to 2016 in total in the Configurator Database 2016 (n=1200)

Some industries seem to be under stronger pressure to continuously change the user interface of their configurator. The *Motor & Vehicle* industry is leading with 75% of the configurators in that industry have undergone a modification – so three out of four mainly car configurators have changed. Also, the industries *Paper & Books* with 47%, *Apparel* as well as *Sportswear & Equipment* with 43% and *Footwear* (42%) and *House & Garden* (41%) show a high ratio of configurator changes (fig. 8) [14].

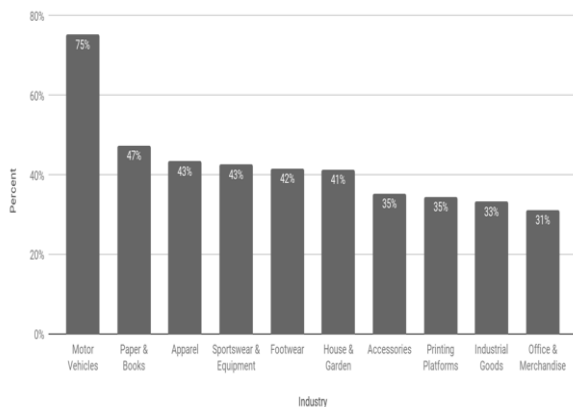


Fig. 8. Top 10 Changed User Interfaces per Industry from 2015 to 2016 in Percentage of all configurators in the particular industry of the Configurator Database 2016 (n=1200)

5. DEVISE OPTIMIZED CONFIGURATORS

The Configurator Database Report 2016 [14], made transparent that nearly 20% (n=218) of the monitored configurators are adapting to different user devices. Fig. 9 depicts an industry ranking of the configurator database in total and shows the amount of device optimized configurators in each industry. When considering the percentage of each industry *footwear* with 40% (16 out of 40), *pet supplies* with 39% (7 out of 18) and *sportswear & equipment* with 25% (25 out of 98) are leading in [15].

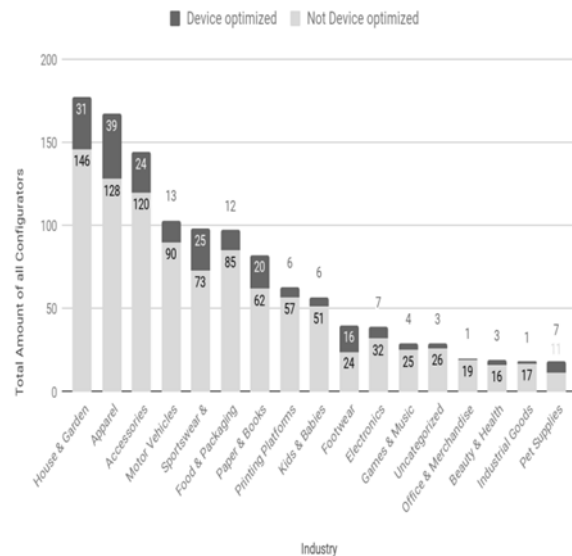


Fig. 9. Industry Ranking of Configurators in the Configurator Database 2016 (n=1200): Amount of Device Optimized Configurators vs. not Device Optimized Configurators

When taking a closer look at the distribution of device optimized configurators figure 10 shows that the *Apparel* industry is leading by covering almost 18% (total 39) of all device optimized product configurators, followed by *House & Garden* with 14,2% (total 31) and *Sportswear & Equipment* with 11,5% (total 25). [15]

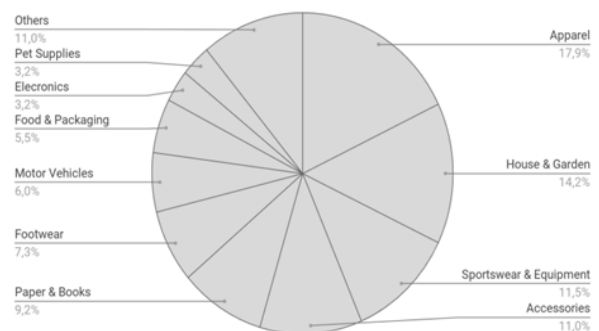


Fig. 10. Device Optimized Configurators (n=218)

Although every industry shows a number of device optimized configurators it is astonishing that still 80% of the 1200 configurators offer only a desktop resolution.

Tablet and mobile optimization might encounter a massive demand from the customer side. Smart companies are already nowadays offering device orientated product configurators.

The figures 11 and 12 show a screenshot of the mobile and desktop version of the *DeinSekt.de* configurator. This obviously uses the available screenspace to position the relevant interaction and visualization elements in different ways.



Fig. 11. Desktop version of *DeinSekt.de*



Fig. 12. Mobile version of *DeinSekt.de*

Understanding that the usage of mobile devices is already part of the daily digital consumption of more and more target groups should lead to creating solutions that fit this demand and thus create user satisfaction.

6. CONFIGURATOR DEVELOPMENT MODEL

But how can companies systematically understand what users need and want? An iterative process model for setting up the right configurator was developed by cyLEDGE and SINTEF [17]. Especially small and medium-sized enterprises (SMEs) start understanding that they can't efficiently use a try and error approach but should follow a certain realization process (fig. 13).

The iterative process model consists of five main steps situated around the customer of the company with the goal to help these customers to best navigate in the company's solution space.



Fig. 13. Configurator development process model

Step 1: Discover and plan.

Market trends as well as product and service affinity of the potential customers have to be looked at closely with the help of the own sales team as well as with a focused research. The company should reflect on how changes in society and consumer behavior influences your company. Together with an understanding of competitors and their customization strategies as well as shifts in the market provide ideas, inspiration and first assumptions to build a plan and project team on. An understanding of the company's own customization potential in terms of strategic and conceptual freedom as well as concerning the abilities of production rounds up this first main step.

Step 2: Understand the customer.

With the help of the *persona* method different customer segments are translated in a specific, but fictional person. This persona has assigned demographics, interests, education levels etc. The goal is to understand the customers thoroughly. In sketching preferred customer journeys for these personas, the essential requirements for the whole project can be determined. These journeys describe all phases the customer goes through to reach his or her goal. Assumptions on online and offline touchpoints for the customer with the product offerings of company are defined.

Step 3: Develop concept.

Building on the gained assumptions and insights of the customer journeys and the initial discovery step, ideas for navigation concepts are developed. Positive and negative experiences of customers in different touchpoints are sharpened and addressed. The concept is then sketched out using simple wireframes. Wireframing is a page schematic construction method that shows a low fidelity representation of the interaction design without graphical elements, but with simple boxes and illustrations to show the main elements. Wireframes allow internal and external real person testing and thus generating feedback. This feedback is used to iterate and refine, until an agreed-upon concept is reached.

Step 4: Build prototype.

With the validated concept the partnership with a software vendor can be initiated, the visual skin and user interface design elements can be developed and the technical implementation prototype can be implemented.

Step 5: Review.

Actual customers should be selected to test the visual design prototypes and give a honest and relevant feedback. The Evaluation of this user testing is then analyzed and used as basis for review. This is an iterative process, where the prototype is gradually scaled up towards full implementation.

Although this process model is ideally executed once with positive results another cycle of steps can be added if needed – for example if the evaluation of the user testing shows crucial problems in acceptance based on

wrong assumptions, changed market trends, new competitor situations etc.

As Customer Satisfaction is driven by product and process experience, the focus on details can be of utmost relevance for the success of the project. In mass customization the goal should not only be to create an outstanding customer experience but also a unique customization experience - an experience for the customer that is rooted in customized elements.

Creating a digital customization experience stays to be a crucial challenge when configurators are developed.

7. REFERENCES

- [1] R. Reichwald, K. Moser, J. Schlichter, S. Stegmann and T. Leckner, "Der Interaktions- und Kaufprozess für individualisierte Produkte" in: U. Lindemann, R. Reichwald and M. Zäh (Eds.), "Individualisierte Produkte: Komplexität beherrschen in Entwicklung und Produktion", Berlin, 2016, pp. 117-127.
- [2] F. T. Piller, "Mass Customization: Ein wettbewerbsstrategisches Konzept im Informationszeitalter", Wiesbaden, 2006.
- [3] M. Tseng, T. Kjellberg and S. C.-Y. Lu, "Design in the new e-commerce era" *Annals of the CIRP* 52 (2), 2003, pp. 509–519.
- [4] J. P. Gownder, "Mass Customization Is (Finally) The Future Of Products".
<http://www.forrester.com/Mass+Customization+Is+Finally+The+Future+Of+Products/fulltext/-/E-RES58967?objectid=RES58967>, 2010.
- [5] R. Dockenfuß, "Praxisanwendungen von Toolkits und Konfiguratoren zur Erschließung von Userwissen" in: C. Herstatt and B. Verworn (Eds.), "Management der frühen Innovationsphasen: Grundlagen – Methoden – Neue Ansätze", Wiesbaden, 2003, pp. 215-232.
- [6] T. Rogoll and F. Piller, "Product configuration from the customer's perspective: A comparison of configuration systems in the apparel industry", PETO'04, 2004.
- [7] F. Salvador, P. M. de Holan and F. Piller, "Cracking the Code of Mass Customization" MIT Sloan Management Review, Vol. 50 No. 3, 2010.
- [8] F. T. Piller and P. Blazek, "Core Capabilities of Sustainable Mass Customization" in: A. Felfernig, L. Hotz and C. Bagley (Eds.), *Knowledge-based Configuration: From Research to Business Cases*, Waltham, 2014, pp. 107–120.
- [9] P. Blazek, "The evolutionary process of product configurators and characteristics of configurable products" in: F. Schillaci (Ed.), *Product Configurators. Tools and Strategies for the Personalization of Objects*. Routledge, Oxon & New York, 2018, pp. 30-39.
- [10] C. Streichsbier, P. Blazek and M. Partl, "The Influence of De-Facto Standards on Users dealing with B2C Configuration Systems", *Proceedings of the MCP-AP 2010*, Taipei, 2010.
- [11] P. Blazek, C. Streichsbier and M. Partl, *Configurator Database Report 2017/18*, Raleigh, NC: Lulu Inc, 2018.
- [12] P. Blazek, C. Streichsbier and M. Partl, *Configurator Database Report 2015*, Raleigh, NC: Lulu Inc, 2015.
- [13] P. Blazek, C. Streichsbier and M. Partl, *Configurator Database Report 2016*, Raleigh, NC: Lulu Inc, 2016.
- [14] P. Blazek, C. Streichsbier, M. Partl and L. Skjelstad, "User Interface Modifications in Established Product Configurators" in: *Customization 4.0*, Cham, 2018, pp. 451-466.
- [15] P. Blazek and K. Pils, "User Interface Trends for Mobile-Optimized Product Configurators" in: *Customization 4.0*, Cham, 2018, pp. 357-373.
- [16] P. Blazek and K. Pils, "Guidelines for Setting Up Successful Product Configurator Projects" in: Z. Anisic and C. Forza (Eds.), *Proceedings of the 7th International Conference on Mass Customization and Personalization in Central Europe (MCP-CE 2016)*, Novi Sad, 2016, pp. 30-33.
- [17] O. Bakas, L. Skjelstad, B. Sjobakk, M. K. Thomassen, P. Blazek and M. Partl, "The Importance of Choice Navigation in Starting Configurator Projects" in: *Customization 4.0*, Cham, 2018, pp. 341-356.

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