Exploring configurator users' motivational drivers for digital social interaction

Chiara Grosso[1] and Cipriano Forza[2]

[1] University Cà Foscari Venice, Department of Management, Venice, Italy
[2] University of Padua, Department of Management and Engineering, Vicenza, Italy
chiara.grosso@unive.it

Abstract. At a global level, the demand for online transactions is increasing. This is propelled by both the digital transformation paradigm and the COVID 19 pandemic. The research on Web infrastructure design recognizes the impact that social, behavioral, and human aspects have on online transactions in e-commerce, e-health, e-education, and e-work. As a result, social computing features are leading the Web with information and communication technologies that facilitate interactions among web users through socially enhanced online environments. It is crucial to research the social, behavioral, and human dimensions of web-mediated activities, especially when social activities are restricted only to an online environment. The present study focuses on the social dimension of the e-commerce of customizable products. This domain was selected because of the specificity of its product self-design process in terms of customers' decision-making and their involvement in product value creation. This study aims to seek the extent that a set of customers' motivational drivers rely on their need to interact with real persons during the technology-assisted process of products' self-design. By adopting a user-centered perspective, the study considers 937 self-design experiences by 187 young adult users on a sample of 378 business-to-customers product configurators. The results should provide companies and software designers with insights about customers' need for social presence during their product self-design experience so that they can fulfill this need by using social technology that provides positive experiences.

Keywords: online sales configurator, social software, social product configuration systems, user experience (UX)

1 Introduction

The digital transformation paradigm [1] and the current global health emergency require the business ecosystem to rapidly adjust its strategy to the evolution of web technology and infrastructures. This adjustment needs to be rapid for at least two reasons: (i) the worldwide demand for online transactions is increasing and (ii) web social technologies are facilitating and supporting interactions between web users with socially enhanced online environments. As a result, web social technologies that connect customers worldwide are changing the expectation that consumers have with online transactions in terms of social presence and social interactions. Social presence is defined in literature on computer-mediated communication as the capacity of a medium to provide its users the "feeling of being there with a 'real' person" ([2], p.1) to convey human contact and sociability.

As stated in previous research on the digital business ecosystem, companies that effectively manage digital technologies gain better customer experience, streamlined operations, and new business models [3].

Despite the recognition of the urgency for digital transformation strategies to respond to customers' new expectations, most companies lack the knowledge to drive transformation through web social technologies [3]. To reduce this gap, research is needed to investigate customers' new behaviors and their need for social interaction during their online transactions. This research should help companies design technology-assisted experiences that properly respond to customer expectations.

The present study moves a step forward in this direction by investigating customers' expectations in terms of digital social interaction in the specific domain of the e-commerce of customizable products. This domain was selected because its specific process self-design product involves customers in the decision-making and a different number of choice tasks is required before an optimal solution is produced. Thus, customers may need support for their decision-making process through contact with real persons in addition to the support provided by product configurators [4] and/or recommender systems [5, 6] and enabled by social technology features. The self-design of products provides customers with several benefits both in terms of experience [7] and possession of a customized product [8]. Thus, involving customers in product value creation can be a strategy to engage customers and to differentiate companies in online markets.

As stated in previous research [9], designing gratifying product customization experiences triggers positive responses among potential customers, which are carried over to the assessment of product value ([10], p. 1029). Rewarding the mass-customization experience is, therefore, one way to increase customers' willingness to pay for the self-designed product [10, 11]. As a result, mass customizers may increase their sales volumes as rewarding shopping experiences lead to higher repurchase intentions [12, 13].

The main question that the present study aims to answer is how to integrate social technology into self-design environments to make positive experiences (almost) certain for its users. To answer this more generic question, the determinants that trigger users' need for digital social interaction during their decision-making processes must be investigated. To this end, we explore a set of consumers' motivational drivers to seek to

what extent they underlie users' need to digitally interact with real persons during their product self-design experience.

To perform the empirical exploration, we use data collected from a sample of 187 young adults who carried out 937 product self-design experiences (also referred to in this study as configuration experiences, product configuration, or configuration) on 378 online active business-to-customer (B2C) online sales configurators (OSCs) of different goods. The analysis considers each step of the users' product self-design process via online sales configurators. Results from the present study provide B2C companies that sell customizable products with insights on users/customers' needs for digital social interaction.

These insights can help companies understand how to manage social technology to fulfill their customers' expectations. They also help software designers understand how to reduce the possible mismatch between companies' e-commerce strategies and users' actual experiences, thus designing (almost) certainly positive experiences for their users/customers.

2 Related Works

The following sections provide a review of related works. They situate the contributions that the present study aims to provide in the domains of information systems, computer-mediated communication, product self-design process, and customers' behaviors.

2.1 Social presence

Web social technologies are leading the online world by facilitating and supporting user interactions with web-based features of digital social interactions, such as creating, evaluating, and exchanging user-generated content [14]. The range of social technology-mediated interactions available for web users who shop online (now called digital customers) is now quite diverse. Examples of these are reviewing and rating products and collaborative shopping experiences that allow consumers to maintain high levels of control over their online transactions Huang 2015 [15]. Online environments, including e-shops, are increasingly enhancing their capacity to provide users with the "feeling of being there with a 'real' person" ([2], p. 1). The capacity of a medium to instill this feeling is defined in the literature on computer-mediated communication as social presence. Social presence is recognized as a crucial component of interactions that take place in virtual environments wherein individuals could coexist and interact with each other [16]. A medium can enable this feeling of "warmth" by incorporating one or more web-based features that allow users to interact with other humans such after-sales e-mail support[17], virtual communities, chat [18], message boards and human web assistants [19].

In online shopping, social presence is associated with a variety of positive communication outcomes, which lead to greater purchase intentions, such as trust, enjoyment, and perceived usefulness of an online shopping website [20]. Despite existing research on the B2C product customization process that has recognized the importance of social

feedback and social interactivity between configurator users [21-24], the research on users' need to digitally interact with real persons is surprisingly still in its infancy. As a result, a growing number of product configurators have started to connect to social software that enables social interactive features. However, up to the date of the present study, none of the features integrated into configuration systems support users in selecting one or more communication partners on-demand whenever they look for proactive support at different steps of their decision-making process [25]. Moreover, results from previous studies on social product configuration systems are contradictory [23]. As an example, Franke et al. [26] found that integrating user communities into self-design processes increased user satisfaction, purchase intention, and willingness to pay. However, Moreau and Herd [22] showed that social comparisons between configurator users can lower consumers' evaluations of their self-designed products. The state of the art in this area calls for more investigation on users' need for digital social interactions and their specificities.

To this end, the present study explores to what extent a set of motivational drivers underlie users' intention to interact with one or more communication partners (such as personal contacts, experts from the company and other configurator users) to be supported at each step of their configuration experience. To investigate users' intentions to interact with specific referents involves understanding the key role of implementing social interactive features. This is because social presence may lead to different communication outcomes depending on the individual's attitude toward his or her communication partner [2]. While a likable communication partner may increase positive social outcomes, on the contrary, enhancing the social presence of a disliked communication partner could lead to less desirable results [2].

2.2 Product configuration environment

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 [27] nor substantial trade-offs in quality and time performance [28-31]. 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 self-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 [32]. Paradoxically, product variety results in an excessive amount of information on product configuration solutions which can put users in a condition called choice complexity [4, 33]. When firms attempt to increase their sales by offering more product variety and customization, this may result in loss of sales due to the choice complexity induced by product variety and customization [32]. This is called the product variety paradox.

Information technology plays a critical role in preventing the product variety paradox by better guiding users in their decision-making along the product self-design process via online sales configurators. In particular, knowledge management software such

as online sales configurator [34, 35] and recommender systems [36, 37] can profoundly simplify users' tasks by guiding their decision-making and/or suggesting optimal solutions [5, 37, 38]. Online sales configurators (OSCs) are knowledge management software applications that implement mass customization strategies [30, 35] by helping potential customers find an optimal solution. Recommendation systems reduce the risk of product variety paradox because of their ability to reduce choice complexity and proactively support users in their decision-making processes [36, 37, 39, 40] by suggesting complete configurations or ways to complete interim configurations.

Although configurator capabilities and recommender systems can support users by providing a personalized and dynamic dialogue [5, 38, 41], interactions are automatically generated by the system itself (e.g. chat box and recommender algorithms) and are implemented with features that enable human-assisted interactions with communication partners that users can select whenever they need it.

The purpose of this study is to seek determinants to enrich configurator environments with digital social interactivity and social presence to convey users with additional support to those provided by the configuration capabilities and recommender systems integrated into product configuration environments. To achieve this goal, the study explores a set of users' motivational drivers to interact with a real person to detect which determinants can support their decision-making with social interactive features (e.g. dis/likable communication partners). The relevance of this exploration relies on the boundary conditions of the benefits of increased social presence in terms of interpersonal outcomes of enhanced social presence [2]. As stated by Oh et al.[2], the implementation of social interactivity can benefit user experience, but it can also engender negative responses from socially withdrawn users who may be less motivated to attend to social cues that enhance social presence. While more socially oriented individuals prefer to interact through socially enriched features like audio, video, and face-to-face interactions, less socially oriented individuals may prefer to interact through text-based interactive features [2].

2.3 Customers' shopping motivations

Shopping motivations refer to the dispositions of online consumers toward the task of shopping online that are manifested by the expected benefits each consumer seeks to receive from the online store [42].

The literature on customer behavior describes shoppers as directed by at least three macro areas of shopping motives that drive their decision-making processes: goal-oriented motives [43], experiential-oriented motives [43], and social motives [44]. Individuals shop online differently depending on whether their motivations are primarily experiential (such as enjoying the shopping process and seeking for hedonic or social benefits), goal-oriented (such as looking for product functionalities and functional goals) [45, 46] and/or driven by social motives (such as joining a group, emulating others' behaviors, approving a trend, sharing experiences, and seeking social rewards) [44].

Goal-oriented motivations refer to the utilitarian benefits that customers expect to obtain. For the present study, we focus on convenience search (i.e. better price, product

quality, delivery cost, and saving search time) as a key determinant of a customer's effort to choose the product that best suits their cost/benefit criteria [45, 47].

Experientially oriented motivations refer to hedonic benefits that customers expect to obtain. For the present study, we focus on creative stimuli [48]. In the product self-design process, creative stimuli are relevant motivational factors because they are linked to the individual pride of authorship [7]. When self-customizing a product, the individual invests personal effort, time, and attention in defining the characteristics of the product; hence, psychic energy is transferred from the self to the product [49, 50]. In self-designing products, creativity plays a key role in customers' decision-making to create unique products (uniqueness) and products that are representative of those who create them (self-expressiveness) [8].

Social motives refer to the benefits that individuals derive from social interactions defined in literature as the enjoyment of socializing with others as well as shopping with others (e.g. friends, familiar) [51]. Social interactions while shopping also remain a robust motivator of online shopping behaviors [15, 52]. As an example, the influence of friends, family, and colleagues plays a key role both in guiding customers' decision-making processes [53, 54] and in reducing the risk perceived by those who shop online [55].

The present study aims to contribute to the research on customers' behavior in the specific domain of e-commerce for customized products. To study customers' experience when directly engaged in the design of their products is especially relevant. This is because customers may need additional support to their decision-making process by feeling in contact with real persons to achieve the benefits they seek to receive from their configuration/shopping experience.

3 Method

We start this exploration process by considering independently the motivations for interactions with different referents and the interactions at different configuration stages. Given the early stage of research on OSC users' need for social interaction, we engaged in exploratory research to examine users' motivations for interacting with different referents and at different configuration stages.

To analyze the configurator users' motivations for social interaction, we collected 937 configuration experiences made by participants of a sample of 187 potential customers using 378 sales configurators available online.

The collection of configuration experiences was made by assigning a set of five configurators to each participant. Each set was selected based on participants' preferences for specific product types in such a way that each OSC set was different from each participant and can simulate a shopping experience where participants were involved in product configuration. After each experience, a participant filled out a questionnaire.

3.1 Online Sales Configurators selected for the study

The sample of 378 online sale configurators was selected from the Cyledge database. This database is the only publicly available list of online sales configurators, and it has been used in previous research on OSCs [25]. Among the 1,252 entries in the database, an initial selection was made according to English as the de facto lingua franca [56] for business [57].

The second step of the selection procedure involved stratified probabilistic sampling. Each stratum was identified by a country–industry–product combination. As an industry-classification list, we used 17 industries that, at the time of the study, were proposed in the database (i.e. Accessories, Apparel, Beauty and Health, Electronics, Food and Packaging, Footwear, Games and Music, House and Garden, Industrial Goods, Kids and Babies, Motor Vehicles, Office and Merchandize, Paper and Books, Pet Supplies, Printing Platforms, Sportswear and Equipment, and Uncategorized).

For each stratum, we randomly chose at least two-thirds of the configurators listed in the database. In the case of fractions, we chose the smallest superior integer. Eventually, the configurators that were no longer active were replaced by active ones, which were randomly chosen from within the same stratum. This procedure recalls the one adopted in a previous study [25].

3.2 Participants to the study

With the purpose of sampling young adults, we selected management engineering students from the authors' university. Our sample of 187 participants consisted of 129 males and 60 females. The ages of the participants ranged between 22 and 42 years (with an average age of 24 years). Previous research recognized that young people represent the majority of B2C sales configurator users [4].

Before responding to the questionnaire, the participants attended an orientation at a laboratory dedicated to social product configuration systems. There, they were briefed about the meaning and purpose of each statement in the questionnaire. The roles of each referent that participants could choose as a communication partner in case they needed to interact with any real person at each step of the configuration/shopping process via online configurators were also explained.

Any questions or doubts from the participants about the configuration simulation were solved during the orientation laboratory they attended before and while they accomplished the questionnaire. Participants were aware that the shopping process was simulation and that each configurator provided different experiences depending on the product, the specificity of each OSC, and the mass customization capability of each company.

Participants are also profiled as web users to detect their confidence in online shopping. Of the participants, 79.9% had a favorable attitude toward online shopping. In more detail, 47.1% of the participants were web users who made regular purchases on e-commerce websites, 33% were web users who made occasional purchases online (e.g., only in specific product categories), 10.6% were not interested in online shopping,

and the remaining 9% did not provide an answer. Each participant filled out a questionnaire after every configuration experience (five per participant).

3.3 Questionnaire

The design of the questionnaire required several tests before drafting the final version. The tests also considered the qualitative feedback provided by a sample of participants interviewed to carry out the pre-test of the questionnaire. To structure the questionnaire, we followed the parallel1 between the step of configuration/shopping described in Franke et al.[26] and the corresponding step of customer decision-making described in Engel et al. [58]. The uniform formulation of questions (table 1 column 3) made it possible to graphically design the questionnaire as a table with 27 cells to fill up (Table 1). This way, the participants could fill out the questionnaire without having to reread similar statements/questions several times.

Table 1. – Structure of the questionnaire to fill up

Motivational drivers and assigned code	General question to be answered with the following statements: "I felt the need to interact with xxx to…"	Referent types and Configuration Steps								
		"xxx" = My contacts			"xxx" = Experts from the company			"xxx" = Other configurator users		
		Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Search for Convenience (CONV)	To reach the configuration that best meets my needs and budget									
Creative Achievement (CREA)	To get inspirations for my product configuration									
Social Feedback (SREW)	To be assured in my configuration choices									
Following parallelism between customers' decision-making process [57] and product configuration process [25], Step 1 refers to the initial product configuration idea, Step 2 refers to the intermediate product configuration (not the definitive one), and Step 3 refers to the final configuration.. Columns 1 and 2 are not present in the questionnaire, however they are reported here to clarify the logical structure of the questionnaire										

The statements refer to users' motivations to digitally interact with three types of referents: (i) individual from users' personal networks (here referred to as "users' contacts" or UXC), (ii) company representatives (here referred to as "experts from the company" or EXC), and (iii) persons unknown to users but with experience in shopping for self-design products (here referred to as "other configurator users" or OCU).

[1] In Engel et al. [57] customers' decision-making process is structured in the following steps: (a) need recognition, (b) alternative evaluation, (c) purchase, and (d) post purchase. Following Franke et al. [25] the configuration process is divided in the following steps: (a) initial idea generation, (b) intermediate evaluation, and (c) final configuration evaluation.

Statements are formulated in a way that users can express their need to interact with the three referent types at each step of their configuration process and evaluate to what extent their need is motivated by the three motivational drivers (Table 1). Each participant was asked to express their level of agreement or disagreement with each proposed statement in the questionnaire using a scale from 1 to 5 (where 1 means completely disagree, 2 disagree, 3 neither agree nor disagree, 4 agree, and 5 completely agree). To avoid the repetition of the three referents in the questionnaire, we graphically refer to each one of the possible referents with this symbol: "xxx" (see Table 1).

At this explorative stage, the study focuses on goal-oriented motivation related to the convenience search to explore to what extent users' motivation to interact with real persons is triggered by the search for the product that best suits the cost/benefit ratio that customers set for themselves [45]. As a result, we formulated the following statement:

- "I felt the need to interact with "xxx" to reach the configuration that best meets my needs and budget."

With experiential-oriented motivations, at this first stage, the study focuses on motivational drivers related to creative achievement to explore to what extent users' motivation to interact with real persons is triggered by their pride to create their own product [50]. As a result, we formulated the following statement:

- "I felt the need to interact with "xxx" to get inspired for my product configuration."

With social motives, at this first stage, the study focuses on motivational drivers related to social feedback to explore to what extent users' motivation to digitally interact with others is triggered by soliciting feedback from real persons. As a result, we formulated the following statement:

- "I felt the need to interact with "xxx" to be assured of my configuration choices."

4 Results

Besides quantitative results, the respondents provided qualitative information by commenting on their answers to the questionnaire on social interaction motivational drivers. The qualitative information was used in this section to interpret the quantitative results.

4.1 Users' motivations for digital social interaction with personal contacts during product configuration

Table 2 shows that creative achievement is a motivational driver that triggers users' need to look for social interaction during their self-design process at both steps of initial idea development (47.6%) and intermediate configuration (43%). Based on the results, when searching for creative stimuli to inspire them in their product configuration, users' levels of agreement and disagreement to get inspiration from personal contacts are not so different from each other. However, results on users' motives to interact with their

contacts are more evident in cases where there are social motives. In 51% of the cases, once the configuration process is close to being finalized (step 3), users seek reassurance from their personal contacts on their decisions on final product configuration.

The need to interact with personal contacts is perceived by participants at each step of the product configuration process to a lower or higher extent depending on the motivational driver and the specific step of product self-design and decision-making. Users' contacts are relied on in a greater degree for motivations concerning social reward and creative stimuli, while, in a much lesser degree, for goal-oriented motivations. In this regard, users clearly express their disagreement on engaged interaction with their contacts for convenience search.

Table 2. – Users' motivational drivers to interact with their contacts

Users' level of agreement to seek digital interactions with personal contacts (UXC)	Step 1: initial idea development			Step 2: interim Configuration			Step 3: final configuration		
	Motivational drivers			Motivational drivers			Motivational drivers		
	Creative achievement	Convenience search	Reassurance	Creative achievement	Convenience search	Reassurance	Creative achievement	Convenience search	Reassurance
	CREA	CONV	SREW	CREA	CONV	SREW	CREA	CONV	SREW
No answer	0.5%	0.9%	0.5%	0.4%	1.0%	0.4%	0.1%	1.2%	0.1%
No answer	27.4%	48.5%	39.5%	25.7%	45.7%	34.6%	34.6%	67.3%	24.7%
Tot. Disagree	7.8%	17.9%	13.7%	9.4%	17.0%	10.2%	14.3%	15.5%	7.0%
Disagree	16.6%	16.6%	18.1%	21.5%	19.3%	19.9%	22.5%	9.9%	17.2%
Neutral	28.3%	12.0%	19.4%	29.6%	12.7%	25.2%	19.9%	4.2%	33.2%
Agree	19.3%	4.2%	8.8%	13.4%	4.4%	9.7%	8.6%	1.9%	17.8%
Comp. Agree	100%	100%	100%	100%	100%	100%	100%	100%	100%

Tot.Disagree: totally disagree; Neutral: neither disagree nor agree; Comp.Agree: completely agree

By complementing these results with information derived from interviews, participants expressed that their contacts could advise them both in terms of creative achievement and reassurance in configuration choice before proceeding with the purchase. Conversely, users rarely expect to be advised by their contacts about product convenience budgets and other functional factors. They interact with their contacts more when they need to collect information from trustworthy individuals who are familiar with their personal tastes and habits. The opinions of these users' contacts were also relevant in terms of reassuring users about the esthetic aspects of the configured products.

Some respondents explained that they take into significant consideration the opinions of their contacts because when buying a product, they prefer that the individuals within their circles like it. The respondents also prefer to interact with their contacts prior to making their purchase decisions, as this is when they are interested in being reassured of the suitability of their selected configurations.

4.2 Users' motivations for digital social interaction with experts from the company during product configuration

Table 3 reports that the search for convenience in terms of configuration price underlies users' motivation in seeking an expert from the company to an almost equal extent at each step of the product self-design from 36.2% up to 38.7% of cases. To a lesser extent, the number of those who agree and disagree are equal in terms of user's goal achievement.

A limited percentage of users felt the need to interact with company experts for experiential motivations both at initial step 1 (18.9%) and step 2 (16.6%). Being reassured of their configuration choices was a motivational driver only in a few cases (up to 15.9%) at each step of the configuration process. Results show that experiential motivations, such as creative achievement, and social motives such as reward, were not related to users' need to interact with these referents in the majority of the configuration experiences.

Table 3. – Users' motivational drivers to interact with an expert from the company

Users' level of agreement to engage in digital interactions with Experts from the company (EXC)	Step 1: initial idea development			Step 2: interim configuration			Step 3: final configuration		
	Motivational drivers			Motivational drivers			Motivational drivers		
	Creative achievement	Convenience search	Reassurance	Creative achievement	Convenience search	Reassurance	Creative achievement	Convenience search	Reassurance
	CREA	CONV	SREW	CREA	CONV	SREW	CREA	CONV	SREW
No answer	0.6%	1.0%	0.6%	0.5%	0.7%	0.5%	0.2%	0.6%	0.3%
Tot. Disagree	47.8%	37.6%	65.3%	48.8%	33.3%	60.7%	56.9%	35.6%	56.6%
Disagree	15.9%	7.9%	12.8%	15.3%	8.5%	14.1%	18.0%	9.2%	12.7%
Neutral	16.8%	16.5%	12.1%	18.8%	18.7%	13.1%	16.2%	18.4%	14.5%
Agree	13.6%	22.3%	7.2%	13.0%	24.2%	9.0%	6.7%	23.9%	11.2%
Comp. Agree	5.3%	14.7%	2.0%	3.6%	14.5%	2.6%	1.9%	12.3%	4.7%
Tot	100%	100%	100%	100%	100%	100%	100%	100%	100%

Tot.Disagree: totally disagree; Neutral: neither disagree nor agree; Comp.Agree: completely agree

By complementing these results with information derived from interviews, participants explained that their desire to interact with company representatives was triggered by their need to gather specific information that only experts from the company could provide. For example, when users need technical information related to the configured product or the configurator itself, they prefer to interact with a company expert. In addition, users prefer to interact with an expert when they need explanations about the cost or timing of delivery. The need to interact with EXC is motivated by users' need to gather information promptly while they are configuring to enable them to quickly apply changes and continue with the configuration process, especially in the case of high-priced products, such as cars or goods that require a more accurate evaluation by users.

4.3 Users' motivations for digital social interaction with other configurator users during product configuration

Results on users' motivational drivers to interact with other configurator users show that users rely to a lesser extent on the previous two types of referents (Table 4). The users' need to interact with other configurator users is motivated by creative achievement to an equal extent at both the first (28.5%) and second steps (23.4%) of the configuration process. Similar results are registered for the convenience search. In limited cases, users were surprisingly motivated in interacting with OCU for reassurance reasons at the final configuration step (16.9%). With references to the three motivational drivers users have less motivation in interacting with OCU when they have doubts regarding their configuration solutions (step 2) or when they are close to making their final purchase decisions (step 3).

This data is surprising since product self-design environments are mostly connected with communities of users who provide mutual support to each other. Other configurator users are the only available communication partners in addition to the expert from the company reachable via email for customer care services. As a result, research on product configurators mainly focuses on the mutual support found within the community of configurator users. Our results are also in agreement with the conclusions from previous studies on the influence (mainly negative) of the information exchange between users of self-designed products [22]. These first explorative results confirm the key role of recommender systems and configurator capabilities to support those users who may not be interested in interacting with other users.

Table 4. – Users' motivational drivers to interact with other configurator users

Users' level of agreement to engage digital interactions with other configurator users (OCU)	Step 1: initial idea development			Step 2: interim configuration			Step 3: final configuration		
	Motivational drivers			Motivational drivers			Motivational drivers		
	Creative achievement	Convenience search	Reassurance	Creative achievement	Convenience search	Reassurance	Creative achievement	Convenience search	Reassurance
	CREA	CONV	SREW	CREA	CONV	SREW	CREA	CONV	SREW
No answer	1.5%	2.0%	1.7%	0.5%	1.2%	0.6%	0.2%	1.0%	0.3%
Tot. Disagree	39.1%	49.9%	59.4%	42.5%	50.6%	57.3%	53.1%	50.3%	53.8%
Disagree	12.1%	14.3%	15.9%	14.7%	14.8%	16.8%	15.7%	16.6%	14.9%
Neutral	18.9%	19.2%	14.2%	18.8%	19.7%	15.0%	16.5%	19.4%	14.1%
Agree	20.1%	11.4%	6.9%	18.1%	10.9%	8.3%	11.0%	9.8%	13.7%
Comp. Agree	8.4%	3.1%	1.8%	5.3%	2.8%	1.9%	3.4%	2.9%	3.2%
Tot	100%	100%	100%	100%	100%	100%	100%	100%	100%

Tot.Disagree: totally disagree; Neutral: neither disagree nor agree; Comp.Agree: completely agree

When complementing results from the questionnaire with information derived from interviews, participants explained that their motivations to interact with other users is related to their need to gather information from a neutral source. The adjective "neutral," as used by respondents, refers to a source that has no interest in pursuing personal

advantages, unlike a company representative might. Even so, respondents indicated that they find it difficult to trust the reliability of the comments of someone whom they do not know. The respondents indicated a preference for interacting with other users, for the most part, in cases where they had previous product knowledge. This enables them to compare their knowledge with other users' comments and, thus, assess the reliability of the information provided.

5 Discussions

The present study is one of the first studies on product configurator systems focused on understanding users' need to interact with real people to design user experiences that are enhanced with social presence. It specifically addressed this issue by focusing on users' motivational drivers to interact with one or more communication partners at each step of the product configuration process to ask for support to convenience search, creative achievement, and social reassurance. The study addresses the main research questions: how to integrate social technology into self-design environments to make positive experiences (almost) certain for its users. In responding to the main research question, the study also contributes to the research lines considered in the related work section, as described in the following:

5.1 Social presence

Since the implementation of social presence leads to different outcomes depending on an individual's attitude towards their communication partner [2], our results contribute to this research line by investigating both the dimensions of "with whom" and at "which step" of the configuration process users seek social interaction with real persons. The results show to what extent three different types of communication partners (personal contacts, experts from the company and other configurator users) become likable or dislikable depending on users' goal-oriented experiential and social motives to interact with real persons at each step of their configuration process. Our results confirm the key role of relevant others (e.g. family, friends, as colleagues) in influencing a user's decision process [59, 60]. Results show that the implementation of social interactive features to enable interaction between users and their relevant others can positively influence user experience, especially whenever these are implemented at the beginning (step 1) and the end of the product configuration process (step 3). At step 1, users seek the social presence of people socially next to them to be supported in their creative achievement, while at step 3, they seek the same kind of communication partners to be reassured on their configuration choice. The results confirm that social information from friends is especially useful for the improvement of recommendation accuracy [60].

The experts from the company are desirable communication partners when, at step 1 of their configuration, users seek convenience in finding solutions that fit with their needs. For the same goal-oriented motivation, but to a lesser extent, EXCs are considered likable partners at steps 2 and 3. During the configuration process, experts from

the company results disliked communication partners when users seek creative achievement and social reassurance.

The considered motivations drive only, to a very lesser extent, users in seeking interaction with other configurator users. This third type of communication partner is disliked in most configuration experiences. To a low extent, interactions with these partners are done to seek creative achievement motivation at the first step of product configuration and, to a lesser extent, at the second step.

5.2 Contributions on Customers' behavior research line

The present study contributes to the research on customers' behavior in a technology-mediated environment by exploring these behaviors and their motivational drivers (i.e. convenience search, creative achievement, and reassurance) in the specific domain of eCommerce for customized products. To study customers' experiences when they are directly engaged in the design of their products is especially relevant. This is because customers may need human-assisted support to face the specific decision-making challenges required to self-design a product and thus achieve the benefits they seek to receive from their configuration or shopping experience [42]. This study follows the previous research on human-computer interactions (HCI) that advocate the importance of human-centered design [61] and fulfilling users' non-instrumental needs in providing them with gratifying user experiences. In particular, studies on emotional usability, about '90teens by Logan et al. [62] and more recently by Hassenzahl et al. [63-65] highlighted that HCI must be concerned about aspects of interactive products (i.e. its fit to behavioral goals) as well as about hedonic aspects, such as stimulation (i.e. personal growth, an increase of knowledge and skills), identification (i.e. self-expression, interaction with relevant others).

Accordingly, this explorative study focuses on users' motivational drivers behind their need to interact with real persons in B2C human computer-mediated environments. We found that motivational drivers differ based on "with whom" users have to interact and "at which step" they experience this need to interact. Our findings also highlight the key role of relevant others as desirable communication partners and suggest implementing configurator environments with social interactive features that enable interaction between users and their personal contacts, since social information from people socially next to users (e.g. a friend) proved to be very useful in the improvement of recommendation accuracy [60].

5.3 Contributions to research line on product configuration environment

This study contributes to the research line on the B2C product configurator environment. The results of our exploratory research show users' need for human-assisted interactions at each step of their configuration process. Results confirm previous studies on configurator users' need for digital social interaction as experienced in the configuration environment [66]. In addition, results suggest that to maximize the benefits of the implementation of digital social interactive features, it is important for user experi-

ence designers to consider this need in terms of "with whom" and "at which step" configurator users experience it. The benefit of implementing social interactivity and social presence on user experience depends on whether or not an individual is socially-oriented. Aside from implementing systemic human-computer interactions into a configurator environment, including socially-interactive features that enable the selection of a desirable partner for human-assisted interaction whenever needed by users can assure a social presence that benefits any type of user. Despite the growing connection between OSC and social software, there is currently no social technology that has been implemented into the product configurator environment to support users in choosing a desirable communication partner for human-assisted interaction whenever they are needed during the configuration process [25].

A recent study that explored configurator users' need for digital interaction with real persons [66] reported that majority of OSC users (88%) experienced the need for social interaction in their configuration experiences. Only 4% of OSC users did not experience a desire to interact with real people in any form during their configuration experiences, while 8% did not provide a definitive answer as to whether or not they perceived this need to be relevant [66]. Moreover, users seek to interact with user contacts (75% of cases), experts from the company (68 %), or other configurator users (45%), thus highlighting OSC-user demand for human-assisted consulting during the configuration process [65]. The percentages provided by a recent study [66] indicate that the need to engage in human-assisted interactions varies depending on which type of referent is involved in the interaction (the "with whom" factor). This is unsurprising given that different referents provide different kinds of information and support. However, it raises the question of what determines configurator users' need for social interaction.

The present study moves a step towards elucidating this point by exploring to what extent users' need for digital social interaction relies on the three selected motivational drivers (i.e. convenience search, creative achievement, and social reassurance). The results of the present study show that none of the selected motivational drivers drive this need in more than 50% of users. This suggests that the motivational drivers for social interaction with real people during the configuration process are heterogeneous. Thus, several social interaction features should be provided to cater to different user needs. This complicates the work of online configurator designers.

Finally, the present research has followed an exploratory approach. It aimed to explore the strength of the effect of different motivational drivers in various steps of the configuration process and with other factors. The provided descriptive evidence paves the way for more sophisticated analyses based on inferential statistics. It will be particularly interesting to investigate how the implementation of social presence and interactive features can influence user experience in relation to their digital social interaction needs.

6 Conclusions

Digital transformation and the current health emergency call for a rapid shift from business ecosystems to digital business ecosystems. This transformation also requires companies to be prepared for the challenges of a Web environment where social technologies lead online transactions among users and are influencing their expectations in terms of social presence and digital social interactions.

On one hand, the integration of product configurator systems with social technologies requires companies to acknowledge customers' social interaction needs and implement social technologies accordingly to fulfill their needs during the self-design process. On the other hand, it requires user experience designers to acknowledge what determinants rely on this need to properly provide users with social interactive features that assure (almost) certainly positive experiences for them. The present study adopts a user-centered perspective to seek determinants to enrich configurator environments with digital social interactivity and social presence. These, in turn, support users in engaging human-assisted interactions by choosing among one or more communication partners that can assist them in their search for convenience, creative achievement, and social reward. The results of this study provide vendors with useful suggestions in acknowledging customers' social interaction needs. It also provides user experience designers with insights on how to deliver customer experiences that match customers' actual expectations in terms of social presence. Based on the results of this study, to benefit positive outcomes of social presence enhancement, OSC developers must carefully evaluate determinants such as whom users seek human-assisted interaction, what step they are in their configuration process, and what benefits they aim to achieve from their experience via OSCs.

The results obtained also open the way for strengthening some lines of research on the personalization of users' experience such as (a) the design of digital social interactive features to enable social recommender process relevant to users during product configuration experience and (b) enabling social interactions between configurator users and their relevant others and/or desirable communication partners.

Further research will address the limitations of the present explorative study. The participants in our study constitute a convenience sample and it may be representative only for young adults' potential customers of the considered products. Future research should seek to replicate our findings in truly representative samples of potential customers. Furthermore, each configuration/shopping process was only a simulation and did not end with any effective purchases.

7 References

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