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USERS' PREFERENCES FOR SOCIAL INTERACTION WHILE SHOPPING VIA ONLINE CONFIGURATORS

Chiara Grosso, Cipriano Forza

University of Padua, Department of Management and Engineering, Vicenza, Italy

Abstract: *The growing adoption of Web social technologies, such as social software, in configuration environments has enabled various social interaction options. By adopting a user-centric perspective the present paper aims to describe the emerging social interaction preferences of digital customers who are shopping for configurable products. Users' social interaction preferences were analyzed based on users' (a) product knowledge and (b) confidence in the suitability of the configured product. The knowledge of configurator users' social interaction preferences can be leveraged to improve the level of user need fulfillment, including the new needs derived by the evolution of Web social technologies, thus engaging actual and potential customers.*

Keywords*: online product configurator, Web social technologies, digital customer experience, collaborative virtual environment*

1. INTRODUCTION

The evolution of the social characteristics of the Web [1-2] and, in particular, of online social navigation technologies, has pushed e-commerce to evolve into social commerce [3].

A new generation of social commerce platforms implemented with recommender systems and/or social software supports digital customers with new interaction possibilities, such as sharing shopping information, reviewing products, and participating in collaborative shopping experiences [3-5].

Online social navigation technologies are changing the processes of engaging and managing relationships between companies and digital customers and among the customers themselves [3, 6-8]. Digital customers are no longer isolated, unlike in the era of the first generation of e-commerce websites [3]; in contrast, they are hyper-connected and are able to influence other customers' choices [9-11].

The advantages of implementing recommender systems into product configurators is widely known in both academia and industry [12-14]. In the past decade different types of Social Software (SSW) began to be connected to product configurators (e.g., forums, blog, chat, social media share buttons). Social software is Web-based software that is able to support digital customers in their efforts to gather information from customer communities (e.g., forums and blogs), where they can evaluate the comments left by other customers or interact with people with the same interests [15-16]. Social software allows users to access to their social network platforms to consult with their friends and discuss their opinions [8, 10, 17-18]. The connections between social software and product configurators provide users with different options for interaction, depending on the characteristics of the connection modality. Connections between social software and configurators can support configurator users in their efforts to gather information to enable them to make more informed and accurate purchase decisions [15-16].

When digital customers gather information online, they are able to find trustworthy sources; this becomes a critical issue due to the vast amount of user interaction and user-generated content [19]. User-generated content can be helpful, but the enormous volume can be overwhelming for Web users who are looking for specific information online. Digital customers prefer to gather information from trustworthy sources such as people who are known to them [18, 20]; reliable sources, such as other online users [21]; or experts, such as company representatives [22].

There is a lack of research on configurator users' preferences for social interaction while shopping for configurable products.

Studying users' preferences regarding social interaction—specifically, whom they prefer to interact with, receive suggestions from, as well as collect from and share information with while shopping for configurable products—can help mass customizers to provide configurator users with proper proactive support via online configurators, including support for social interaction in the modalities preferred by users.

The present paper provides preliminary results on configurator users' preferences for interaction with others by analyzing the answers of 190 users of 378 online product configurators of various consumer goods. Users' preferences regarding interaction with others were analyzed from two viewpoints based on (a) users' knowledge of the configured product and (b) users' confidence in the suitability of the configured solution.

2. THEORETICAL BACKGROUND

2.1. Web social technologies used to support digital consumers

2.1.1. Web social navigation

Social navigation refers to Web users' behavior when communicating and interacting with other users online. Social navigation behavior entails pointing out information using various communication tools, such as Web browsers, newsgroups, chat, and email [5, 23].

The literature on social navigation comprises various studies on (i) how people collaborate in Web navigation, (ii) the social aspects of the information environment [24-26], (iii) collaborative information filtering [27], and collaborative Web agents [28-31].

Some very common examples of social navigation are voluntary sharing via Webs of information with friends and colleagues or the interaction between online users, wherein one user asks others about information that s/he assumes or knows that the other users have. Social navigation, which makes relevant information accessible to every individual who is interested in it, is not limited to the dynamics of capturing and sharing information between Web users. There exist at least three main characteristics that convert general Web navigation into social navigation:

(a) The dynamic aspect of social navigation. Social navigation traces are not preplanned aspects of Web space; rather, they are "grown"—or created dynamically—in a more organic or bottom-up fashion. The term trace refers to the cue of actions realized and accordingly left online by Web users. In this way, Web social navigation is a closer reflection of what people do than a result of what designers think people should be doing.

(b) The personalization aspect of social navigation. Navigational advice is personalized to the user's goals, and the situation allows him or her to receive navigational advice.

(c) How navigational advice is mediated. The social cues that people leave behind can become formalized and transformed into social practices (e.g., letting people get off the train before you get on), rules and regulations (e.g., those governing driving), or artifacts (e.g., signs and landmarks). The visible actions of users can inform other users regarding what is appropriate behavior—what should or should not be done—and provide social affordance. At the same time, this awareness of others and their actions make Web users feel that space is alive and might make it more inviting [5].

2.1.2. Web social technologies in e-commerce

Although social navigation is still emerging as an approach to information system design, it is beginning to be implemented for commercial offerings. A widely implemented example of traces on the Web are services based on recommender systems (e.g., Amazon.com) [32 -33].

Research on social navigation has posited that the function of recommender systems should be a part of every aspect of computer systems, as processes running in the background of all applications, to allow users to receive recommendations on every area where they are searching for suggestions (e.g., from how to set their network masks to what query syntaxes to use for search engines) [23, 34]. Accordingly, prior research on recommendation systems has highlighted that intelligent recommender systems are required to provide personalized dialogues to support the customer in the product selection process and in the effective identification of the product [12-13, 35-36].

The importance of a personalized dialogue is based on the evidence that the recommendation systems produce ratings or rankings that are the same for all users, (e.g., on Amazon.com much like bestseller lists). Different forms of recommender systems are available in a large variety of practical applications [35], such as recommendation systems that are able to find patterns in data, discover similarities, and improve advice.

Although recommendation systems play key roles in social navigation, there are still challenging goals to be achieved. For example, recommender systems rely on people's disclosure of information regarding their actions (in the form of ratings or purchase data), but not all people may wish to disclose this information publicly [37]. While store-based recommender systems face the so-called "early rater" problem, they are unable to provide proper recommendations until a sufficient number of ratings have been entered. The early rater issue relates to penalizing people who enter ratings early; instead, recommender system support benefits people who ask for recommendations later [23, 38, 39]. Many recommendation systems lack feedback on whether items that a customer bought, read, or viewed online met his or her needs and whether s/he enjoyed it.

Social navigation is also supported by social software (SSW), Web-based software which encourages connections and interactions between Web users. Social software supports digital customers as they converse about their online buying experiences and their experiences with the reliability of online reviews of product and services.

SSW are able to recreate an environment in which the evaluation of information source expertise and message quality collected through social navigation is a dynamic and personalized process [6] by means of which users facilitate the continuing evaluation of information and of its sources. SSW supports users' interactions with both known and unknown people with whom they are connected via social networks, virtual communities, and blogs [4, 40-41]. In particular, SSW provides users with environments in online networks, in which their

interactions with their contacts and groups of peers are facilitated.

In the interactive environment of online social networks, users spontaneously provide and share personal information—that is, the so-called self-disclosure that occurs when a person discloses personal information about his or her interests, activities, personal status, photos, and videos [42]. SSW facilitates users' efforts to learn about products and trends by supporting information exchanges among multitudes of online friends or peers (socialization agents) who provide information about different products and enable quick evaluation of these products [20].

Research highlights that communication with reference groups and peers through SW applications enables a form of consumer socialization that has a profound impact on consumer decision-making [9-10, 18, 43].

2.1.3. Social trust in the online environment

Web social technologies enhance the online activities of users' content generation, such as discussion boards in online communities, social network profiles, auction listings and items for sale, video and photo feeds, and reviews and ratings of movies, hotels, and restaurants.

User-generated content can be beneficial to Web users, but the volume of the contents generated by Web users can be overwhelming for those who are looking for specific information online. The Web user can become frustrated when searching for useful information among thousands online data or finding what matches with his/her preferences. Due to the vast amount of user interaction and user-generated content, finding trustworthy sources has become critical [19]. Online reviews can vary widely in quality, and reviews from anonymous sources trigger issues about the reliability of the review itself.

Previous research points out that various levels of source anonymity are problematic because under conditions of ambiguous authorship, the motivation of information source is often unclear to users. Therefore, finding credible information online involves deciding which sources to believe: officials, experts, or generic and often unidentified sources on the Web, who may or may not be in a superior position to provide the most accurate information, depending on the circumstances [44-45].

Establishing social trust on the Web means finding people whose opinions are similar to those of the user or the people whom the user trusts [19]. The more social navigation increases online user interactions, the more critical an issue trust becomes. It is crucial for the Web user to be able to acquire information from and interact with trustworthy sources and people.

The possible negative impact on sales due to concerns related to the uncertainty of information quality, as well as source anonymity, pushed e-commerce companies to invest in technologies to reduce the costs of digital consumer searches for quality information.

To facilitate digital customers' efforts to find relevant information provided by trustworthy sources, e-commerce companies begun to invest in recommender systems and social software that create collaborative virtual environment that enable consumers to share their opinions and experiences without the limitations of source anonymity [46, 47].

2.2. Online configurators and social technologies

2.2.1. Shopping experience via online configurators

Shopping is an activity that includes social interaction with others [48]. One particular online shopping process comprises shopping for personalized products using online configurators [49-50].

Online configurators are defined as knowledge-based software applications that support a potential customer, or a salesperson who is interacting with the customer by specifying a product solution within a company's offerings. Online configurators are designed with the purpose of guiding users toward a configuration solution that coincides with their needs [12-13, 49, 51-53].

Previous studies have highlighted that the capabilities deployed by online configurators can provide users with benefits related to the configuration processes itself (e.g., hedonic, creative achievement benefits) and benefits related to the possession of a configured product (e.g., utilitarian benefit of uniqueness and benefit of self-expressiveness [54-56]).

Although the purpose of configurators is to support potential customers as they choose from among a company's product offerings the product solutions that best suit their needs, configuration systems often outstrip users' capabilities to identify proper solutions [57].

The more individualization possibilities are provided to configurator users, the more information gaps increase [58]; thus, users may experience uncertainty during the design process or may have no precise knowledge of what solutions might correspond to their needs.

The configurator user can also become frustrated while searching among thousands of possibilities for a solution that coincides with his or her needs [57-58]. The sense of being overwhelmed by product variety occurs primarily when the customer finds him or herself in a condition of choice complexity. Choice complexity is defined as the amount of information processing that is necessary to make a decision. The amount of information that a customer has to process before making a decision can be one determinant of the product variety paradox [52, 59, 60]. The product variety paradox refers to the paradoxical situation in which firms attempt to increase their sales by offering more product variety and customization, but the result is a loss of sales [52]. Online configurators play an important role in reducing the product variety paradox by guiding customers as they select from within mass customizers' (MCs) product offerings the product solutions that best suit their needs [59].

Interesting challenges remain for mass customizers regarding the efforts to guarantee users optimal solutions within the configuration environment by, for example, delving into users' information seeking, decision-making, and the effect of decision biases [51, 61].

2.2.2. Social technologies adopted in the online configurator environment

Recommendation systems are widely implemented in configuration environments due to their ability to reduce choice complexity and proactively support the user in his or her decision-making process [12-13]. When the number and complexity of options presented by a configurator may overwhelm the user and affect his or her ability to identify an appropriate configuration, recommendation systems can be of assistance. For example, recommender can suggest a complete configuration or ways in which to complete an interim configuration.

Several studies have pointed out how recommender systems can support the configurator user by providing a personalized and dynamic dialogue [14, 51]. The personalized and dynamic dialogues that are delivered to users by online configurators rely on different recommendation techniques (e.g., filtering-based, content-based recommender systems) [13, 35].

Recommender systems not only provide solutions to configurator users but also enable an environment for group configuration, decision-making, and collaborative shopping. An interesting case of an intelligent technology for collaborative shopping is Choicla, which is a smart application that is available for mobile devices via a free download. Choicla supports a group of friends or customers' decision-making or their efforts to achieve a common goal and share an opinion on a topic of common interest [62].

Although recommender systems play several key roles to support online users, there are limitations to be overcome.

As indicated in the previous paragraph, recommender systems need information in the form of ratings or purchase chronicles, which users may not wish to disclose. Recommender systems are able to provide users with proper recommendations only when sufficient ratings have been entered. The feedback from store-based recommenders lacks information regarding whether the choice options that were purchased or selected met the users' needs and whether they enjoyed it.

Recent studies on the product configuration process suggest that, for configurators, a promising method of providing feedback would be to include a function that allows users to submit their (interim) design solutions for them to obtain rapid social feedback from other users who are online [63]. The integration of social collaboration options during product configuration—more specifically, feedback from peers— facilitated the customer's problem-solving process because "users can assist each other during the development of the initial idea and during the design process and by giving each other constructive feedback on interim design solutions" [47].

Previous research has shown that a growing number of configurators are connected to social software [15, 64]. The various connection modalities provide different forms of support to configurator users who are sharing their created products. The possibility of sharing configured products via social networks can foster customer-perceived benefits and trigger "a simple form of collaborative recommendation" [59:6] by notifying the user's contacts of all the activities that s/he has performed from among the selected options related to product purchasing, as well as during his or her configuration process

3. METHOD

3.1. Overview of data collection

A group of 190 users used each one a different set of five preassigned online configurators (chosen from a set of 378 online configurators) for a total of 950 configuration experiences. Four of the five configurators were assigned to each participant on the bases of his or her individual product type preferences, while one configurator was common to all the participants. After their configuration experiences, all the participants filled out questionnaires regarding their interest for social interaction while configuring products through online sales configurators. The respondents also provided qualitative information to explain the answers they provided by answering the constructs of interest in the questionnaire. Qualitative information was used to interpret the results derived from the analysis of quantitative data collected through the questionnaire.

3.2. Respondents' sample description

Our sample of 190 participants comprised 129 males and 61 females whose ages ranged between 22 and 42 years old (average age of 27 years). Previous research recognized that young people represent the majority of business-to-consumer sales configurator users [59, 65-66] .

Of the respondents, 94.7% had a favorable attitude toward online shopping. In more detail, 46.8% of the respondents were Web users who made regular purchases on e-commerce websites, 47.9% were Web users who made occasional purchases online (e.g., only in specific product categories), and the remaining 4.3% of the sample were not interested in online shopping. Thus, we can conclude that this was a sample of online shoppers.

Of the sample, 98% indicated that they were always connected to the Web via smartphone and had at least one social media profile, 43% of the respondents were moderate users of social network platforms, and 51% were the kind of social network users called "observers". Observers are social network users who want to see what others are doing on social network platforms [67]. They are users who freely view someone's social network profile and discover interests and information by observing others' activities on social platforms.

Of the respondents, 71.3% were not interested in sharing their comments nor ratings on the products they purchased and thereby producing online content about their shopping experiences. However, surprisingly, 92.6% of the sample were interested in reading the comments and ratings left by other customers online.

Finally, 89.4% of the respondents had favorable views regarding engaging in collaborative shopping experiences similar to the shopping experience in retail.

3.3. Configurator sample description

The sample of configurators was selected from the Cydlege database, which is the only publicly available list of online sales configurators. Accordingly, this database has been used in previous research [16].

Among the 1,249 entries in the database, an initial selection was made according to country. A total of 378 configurators were selected from countries where English is the predominant language (i.e., Australia, Canada, India, Ireland, New Zealand, the United Kingdom, and the United States). The rationale for choosing configurators from countries where English is the first language was that English is considered the de facto lingua franca [68] for business [69].

The second step of the selection procedure involved stratified probabilistic sampling. Each stratum was identified by the country–industry–product combination. Eventually, the configurators that were no longer active were replaced by active ones, which were randomly chosen from within the same stratum. For each stratum, we randomly chose at least two-thirds of the configurators listed in the database (in the cases of fractions, we chose the smallest superior integer numbers).

The sample of configurators were selected for each of the 17 industries proposed in the database (i.e., Accessories, Apparel, Beauty & Health, Electronics, Food & Packaging, Footwear, Games & Music, House & Garden, Industrial Goods, Kids & Babies, Motor Vehicles, Office & Merchandise, Paper & Books, Pet Supplies, Printing Platforms, Sportswear & Equipment, and Uncategorized).

3.4. Questionnaire description

A questionnaire containing different sets of questions was provided to respondents to study configurator users' interest regarding social interaction during their configuration processes. The respondents were asked to express their interest in interacting with three different referents: users' online contacts, an expert from the company, and other configurator users. The respondents expressed their agreement regarding their interest in interacting with different referents; they did this on a Likert scale from 1 to 5 (i.e., 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree).

Set of questions on users' off and online profiles. This provided respondents with an initial set of questions to profile the sample (i.e., gender, age, and nationality). The initial set was followed by a series of questions on the online attitudes of Web users: use of devices connected to the Internet, interest in and frequency of online shopping, time dedicated to online activity, use of and participation in social network platforms.

Set of questions on users' interest for social interaction. This provided respondents with a set of questions to answer once they completed all five configuration processes. Each respondent was provided with a set of questions to express his or her level of agreement regarding interacting with others during two specific situations: (1) users' product knowledge and (2) intention to buy— users' confidence in the suitability of the configured product:

1. Product knowledge – *question* (1a) when users have no previous knowledge of the product to be configured and *question* (1b) when users have previous product knowledge;
2. Confidence in the suitability of the configured product – *question* (2a) when users are close to purchasing the solution they configured and *question* (2b) when users are in doubt regarding the suitability of their configuration solution. In other words, users are in doubt regarding whether the selected configuration solution is what they are looking for.

For each situation, each respondent had to answer questions regarding his or her agreement regarding interacting with three referents (*with whom*), in a synchronic or asynchrony way (*how*), and *where* they agree to interact during the configuration process. More details follow below.

I. *With whom* refers to users' interest in interacting with one or more referents from the following: (Ia) users' contacts, such as individuals whom the user knows and trusts [18], (Ib) a company representative, such as a person who has expertise [22], (Ic) other configurator users, such as individuals of equal standing who have experience shopping via online configurators and product configuration processes [47]

II. *How* refers to users' interest in an interaction option that is provided in a synchrony modality (e.g., real-time interaction, such as via live chat) or in asynchrony modality (e.g., non-real-time interaction, such as via email).

III. *Where* refers to users' interest in an interaction option that is performed inside the configurator webpage, such as the environment in which the configuration/shopping process takes place or outside the configuration environment (e.g., another Web platform, forum, blog, or Web channel).

4. RESULTS

4.1. Users' interest in interacting with others during configuration processes

4.1.1. Users' interest in social interaction at different levels of users' product knowledge

When configurator users have previous knowledge of the product to be configured, they are more interested to interact with their contacts than with other referents. As shown in Table 1, in all four interaction options

considered ([no real-time, in], [no real-time, out], [real-time, in], [real-time, out]c) the percentage of respondents that are interested in receiving additional information from their own contacts is always greater than he percentage of respondents that are interested in receiving additional information from other configurator users and is greater (or equal) than he percentage of respondents that are interested in receiving more information from company experts.

Conversely, when configurator users do not have previous knowledge of the product to be configured, they are more interested to interact with experts from the company than with other referents. As shown in Table 1, in all four options considered ([no real-time, in], [no real-time, out], [real-time, in], [real-time, out]) the percentage of respondents that are interested in receiving additional information from company experts is always greater than he percentage of respondents that are interested in receiving additional information from other configurator users or from their own contacts.

The level of user product knowledge influences not only his/her preferences on with whom to interact but also his/her preferences on where and when to interact. In the following, we present these where-when preferences with reference to each referent.

User contacts. *Question 1a*. When configurator users have no previous knowledge the greater percentage of users (49%) is interested in interacting with their contacts in real time outside the configuration environment. Up to 37% of users is interested in the interaction option [real-time in] and an almost equal percentage of them is interested in the interaction option [no-real time out]. *Question 1b*. When users have previous product knowledge, the 49% of users prefer to interact with their contacts in real time outside the configuration environment (Table 1).

Table 1 *Users' product knowledge and social interaction interests*

Users' Product knowledge	*Question 1a*				*Question 1b*			
	When I do not know the configured product, I am interested in receiving more information from XXX				*When I already know the product to be configured, I am interested in receiving more information from XXX*			
	no Real-time		Real-time		no Real-time		Real-time	
	In	Out	In	Out	In	Out	In	Out
XXX=UXC								
Agree %	15%	36%	37%	49%	17%	38%	38%	49%
Disagree%	62%	38%	39%	25%	60%	38%	41%	26%
Neutral	23%	26%	24%	26%	23%	24%	21%	25%
No answer	1%	-	-	-	-	-	-	-
tot	100%	100%	100%	100%	100%	100%	100%	100%
XXX=EFC								
Agree %	53%	54%	82%	55%	17%	18%	38%	18%
Disagree%	28%	22%	6%	24%	57%	58%	35%	55%
Neutral	19%	25%	12%	21%	25%	24%	27%	27%
tot	100%	100%	100%	100%	100%	100%	100%	100%
XXX=OCU								
Agree %	24%	31%	35%	27%	12%	20%	16%	21%
Disagree%	52%	39%	39%	42%	64%	59%	52%	56%
Neutral	24%	30%	26%	31%	25%	21%	33%	23%
tot	100%	100%	100%	100%	100%	100%	100%	100%

In: in the same configuration environment, out: in a different configuration environment; UXC: user contacts; EFC: expert from the company; OCU: other configurator users.

An expert from the company. *Question 1a*. When they have no previous product knowledge, 82% of users is interested in interacting in real time in the same configuration environment with a company representative, such as an expert referent (Table 1). Of the users, 55% look for real-time interactions with an expert from the company outside the configuration environment (e.g., blogs, forums, and dedicated Web platforms). The 54% of users is interested in the interaction options [no real-time out] and an equal percentage (53%) is interested in the [no real-time in] interaction option. *Question 1b*. In the case of previous knowledge, the results show that only up to the 38% of users is interested in interacting with a company representative in real-time inside the configuration environment (e.g., chat).

Other configurator users. In Table 1, the results show that only up to the 35% of users is interested in interacting with OCU when users do not have product knowledge. Instead, the greater percentages of users avoid interacting with other configurator users in almost all four interaction options.

4.1.2. Users' social interaction interest at different levels of his/her confidence in the suitability of the configured product

When users are close to purchase their configuration, they are more interested to interact with their personal contacts than with other configurator users or with company experts (see Table 2 both question 2a and 2b). This interest is greater when they are in doubt about the suitability of the configured solution (in Table 2 the percentages of agreements with question 2b are higher than the percentages of agreements with questions 2a). The results show that in both situations related to the final purchase decision (question2a) and evaluation of the final configuration solution (question2b), the users have no interest for interacting with company representatives in all four situations considered ([no real-time, in], [no real-time, out], [real-time, in], [real-time, out]). As well, as reported in Table 2, the results show that the users have no interest also in interacting with other configurator users in both depicted circumstances in all four interaction options considered ([no real-time, in], [no real-time, out], [real-time, in], [real-time, out]).

The level of user confidence in the suitability of the configured product influences not only his/her preferences on with whom to interact but also his/her preferences on where and when to interact. In the following, we present these where-when preferences with reference to each referent.

User contacts. *Question 2a*. Before taking the purchase decision for the configured product, the 56% of users is interested in interacting with individuals from among their contacts in real time outside the configuration environment. Of the users, 43% is interested in the interaction option [real time in], as shown in Table 2. *Question 2b*. When users are in doubt regarding whether the configuration selected is the one that coincides with the product they are searching for, 76% is interested in interacting with their contacts in real time outside the configuration environment. Of the users, 54% express the interest in interacting in real time but

within the configuration environment, and 52% of the users is interested in a [non-real-time out] interaction option (Table 2).

An expert from the company. *Question 2a*. Of the users, 81% of users have no interest in the interaction option [no-real-time out] with company representatives, and 73% have no interest in the interaction option [no-real-time in] (Table 2). Of the respondents, 74% have no interest in interacting in real time outside the configuration environment, and 61% have no interest in the [real-time in] interaction option. *Question 2b.* When users are in doubt regarding whether their configuration is the one they are looking the 39% of them seek to interact with a company representative with the interaction option [real-time in] within the configuration environment (tab.2).

Table 2 *Users' confidence in the configured solution suitability and interaction interests*

Users' Purchase Intention	*Question 2a*				*Question 2b*			
	I would like to receive the opinion of XXX about the configured solution before taking my purchase decision				*Whenever I am in doubt about the suitability of the configured solution, I would like to receive the opinion of XXX*			
	no Real-time		Real-time		no Real-time		Real-time	
	In	Out	In	Out	In	Out	In	Out
XXX=UXC								
Agree %	20%	32%	43%	56%	29%	52%	54%	76%
Disagree%	59%	43%	31%	20%	46%	24%	26%	13%
Neutral	21%	25%	26%	24%	25%	24%	21%	12%
tot	100%	100%	100%	100%	100%	100%	100%	100%
XXX=EFC								
Agree %	9%	6%	18%	10%	18%	15%	39%	24%
Disagree%	73%	81%	61%	74%	58%	65%	39%	53%
Neutral	18%	13%	21%	16%	24%	19%	21%	23%
No answer	1%	-	-	-	-	-	-	-
tot	100%	100%	100%	100%	100%	100%	100%	100%
XXX=OCU								
Agree %	8%	13%	11%	14%	13%	22%	31%	24%
Disagree%	76%	75%	63%	71%	64%	61%	47%	52%
Neutral	16%	12%	26%	16%	24%	17%	23%	24%
tot	100%	100%	100%	100%	100%	100%	100%	100%

In: in the same configuration environment; Out: in a different configuration environment; UXC: user contacts; EFC: expert from the company; OCU: other configurator users.

Other configurator users. *Question 1a*. When users are almost ready to make their final purchase decisions, only up to 14% of them is interested in engaging in the [real-time out] interaction option with other users outside the configurator environment (e.g., via chats in forums or blogs). Of the users, 76% have no preferences for the [no real-time in] interaction option, and another 75% have no preferences for the [no real-time out] interaction. *Question 2b.* When users are in doubt regarding whether their configuration solution is the one they are seeking, up to 31% look for the [real-time in] interaction option and another 24% for the [real-time out]. In cases in which no real-time interaction exists, the 64% of users have no interest the interaction option [no real-time in] and another 61% avoid the interaction option [no real-time out].

5. DISCUSSION

The respondents provided qualitative information to comment the answers provided with the questionnaire on social interaction preferences. The qualitative information is used in the present section to interpret the quantitative results presented in the previous section.

5.1. Users' overall motivations for interacting with different referents

Users' motivations for interacting with individuals from among their contacts (UOC). The respondents explained that their preferences for interacting with their own contacts were in keeping with the 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 on the esthetic aspects of the configured products.

Some respondents explained that they take into significant consideration the opinions of their contacts because when users buy a product, they also want the individuals within from their circles to like it. The respondents prefer to be able to interact with their contacts also before they make their purchase decisions, as this is when they are interested in being reassured by their contacts regarding the suitability of the selected configuration.

Interactions with the users' contacts are generally preferred outside the configuration environment because an environment that is outside the configurator is perceived by respondents as a space that is more secure and private than the configurator with regard to collecting information. An example of an environment outside the configurator in which respondents prefer to interact with their contacts in a non-real-time modality is via social network platforms or email. Some examples of environments outside the configurator in which respondents prefer to interact in real time with users' contacts are WhatsApp, Telegram Messenger (instant messaging application for smartphones), and Facebook Messenger (instant messaging application for Facebook users).

Users' preferences for interacting with an expert from the company (EFC). The respondents explained that their preferences regarding interacting with company representatives are derived from the need to gather specific information that only experts from the company are able to 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 a delivery.

Users prefer the [real-time in] interaction option, such as via chat. This preference is motivated by users' need to gather aditional information in a timely manner while they are configuring so as to enable them to quickly apply changes and continue with the configuration process. In the case of high-priced products, such as cars or goods that require a more accurate evaluation by users, users prefer to the [non -real time out] interaction option with an expert from the company. Examples of

non- real-time interactions outside the configuration environment include emails, blogs, or platforms where questions are left for them to be answered).

Users' preferences for interacting with other configurator users (OCU). Respondents' motivations to interact with other users is related to their need to gather information from a neutral source. The adjective "neutral," used by respondents, refers to a source that has no interest in pursuing personal advantages, unlike a company representative might. Only up to 35% of users prefer to interact with other users to gather information about their previous experiences with products and configurators, to get inspired by them, or to learn about possible unknown aspects of the product's functions. Users prefer to interact with other users in real time within the configurator, but this is not feasible, as there are no options for this kind of interaction inside the configurator environment. A feasible option is interaction with other users in a non-real-time modality outside the configurator environment (e.g., via a forum) or in a no-real-time modality within the configurator by replying to the comments or reviews posted in the dedicated section (if any).

5.2. Users' contingent motivations for social interaction preferences during the analyzed circumstances

5.2.1 Users' product knowledge

UOC. An interesting result is that in situations in which users have no product knowledge and in which they have previous product knowledge, they prefer to interact with their contacts outside the configurators (Table1), for example, by communicating via another Web platform or Web channel. The respondents explained that for them, it is easier to reach their contacts via real-time interaction channels (e.g., WhatsApp, Telegram, or Facebook Messenger).

EFC. In cases in which users have no previous product knowledge, 82% prefer to interact with an expert from the company. The respondents explained their preferences as motivated by their need to interact with individuals who are able to provide technical information, and only company representatives can quickly deliver technical information and the functional details of the product or configurator. The greater percentage of respondents avoid interacting with a company expert when they have previous product knowledge. The respondents explained that they perceive a company representative as an individual who has a personal interest in selling the company's products and who may, thus, act in a way that influences them to buy these products.

OCU. For only a small percentage of the respondents (up to 35%), other users are a valuable source of information (Table1). The greater percentage of the respondents indicated that they find it difficult to trust someone whom they do not know, as well as the reliability of that individual's comments. The respondents indicated a preference for interacting with other users, which they do, for the most part, in cases in which they have previous product knowledge. This enables them to compare their knowledge with other users' comments and, thus, to assess the reliability of the information that is provided.

5.2.2. Users' confidence in the suitability of the configured solution

UOC. Users' contacts are respondents' preferred referents to interact with in situations in which purchase decisions are being made and in which the suitability of configured products is being evaluated. This preference is related to the users' need for suggestions and indications provided by trustworthy sources who are personally known to the user.

EFC. An interesting result is that the greater percentage of the users avoid the option to interact with company representatives in both situations—that is, while making the purchase decision and while evaluating the suitability of the configured solution. Based on the motivations provided by the respondents, experts from the company are perceived by users as individuals who are more interested in selling products than they are in achieving customer satisfaction.

OCU. Users have no interest for interacting with other configurator users in either situation—that is, when users are close to making their final purchase decisions or when they have doubts regarding their configuration solutions. At both of these stages (configuration and buying), respondents consider it useless to consult with other configurator users, once the configuration process is close to being finalized.

6. CONCLUSIONS

This study analyzed configurator users' preferences for interacting with different referents while shopping for configurable products (i.e. the users' contacts, experts from the company, and other configurator users). These were analyzed based on users' different levels of: (a) product knowledge, and (b) confidence in the suitability of the configured solution.

The present study highlights that users' preferences for social interaction depends on various drivers, and vary depending the analyzed circumstances (i.e., the users' product knowledge and confidence with the final configuration solution). In specific, drivers that influence users' preferences for social interaction are: *with whom* interactions are enabled, *how* interactions occur (i.e. in real-time or not), *when* interactions are realized during the configuration process, and *where* social interactions take place (i.e. inside or outside of the configuration environment).

Preliminary results from our study show that users' preferences for social interaction rely on their interest in finding trustworthy sources of information. Specifically, the users perceived company representatives as reliable experts who provide the most accurate information related to functional and/or technical information on both the configurator and the configured product. Users prefer to interact with an expert from the company inside the configuration environment and preferably in real time to collect information, resolve possible doubts, and quickly return to the configuration process. No-real time interaction is also preferred when users ask an expert from the company for more technical information.

Users prefer interacting with individuals from among their contacts outside of a configurator environment using instant message applications (i.e. WhatsApp, Telegram, and Messenger) to quickly reach trustworthy individuals who are familiar with their personal tastes and habits.

Interaction with other configurator users is preferred only by a restricted percentage of respondents who prefer interactions outside of the configuration environment and mostly during the development of the configuration's initial idea. This preference for interacting is motivated by users' interests in getting inspired by other users' experiences and/or collecting additional information about the supplier, delivery time, and quality of the service.

For mass customizers who sell their products via online configurators to connect their toolkits with social software that are able to satisfy users' preferences for social interaction can be a strategy to reduce customers' efforts of finding relevant information provided by trustworthy sources. Accordingly, to prevent the possible negative impact on sales due to customers' concerns on the uncertainty of information quality or even users' abandon before purchasing.

Even with its limitations, the preliminary analysis provided by this study provides insights for designers to convert configuration environments into collaborative virtual environments in accordance with users' preferences for interacting with different referents, depending on circumstances, and different drivers (i.e., when/where)

Given the variety of users' preferences for social interaction, further research is required to classify the variety of preferences and profile digital customers' social interaction behaviors while they shop via online product configurators.

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CORRESPONDENCE

Chiara Grosso, Ph.D., Experienced researcher
University of Padua,
Dep. of Management and Engineering
Stradella S. Nicola 3
36100 Vicenza, Italia
chiara.grosso@unipd.it

Cipriano Forza., Ph.D., Professor
University of Padua,
Dep. of Management and Engineering
Stradella S. Nicola 3
36100 Vicenza, Italia
cipriano.forza@unidp.it