Consumer Attitudes Toward Online Mass Customization: An Application of Extended Technology Acceptance Model

Hyun-Hwa Lee
Assistant Professor, Textiles and Apparel, School of Human Ecology, The University of Texas at Austin University Station

Eunyoung Chang
Assistant Professor, Department of Fashion Design, Yuhan College

This study investigates consumer attitudes toward the online codesign process in mass customization among Korean consumers. The extended Technology Acceptance Model (TAM) was our theoretical framework, along with the constructs of perceived control and enjoyment. Web skill and fashion involvement were integrated as individual characteristics variables in the model. Data from 749 self-administered surveys collected in South Korea were used in this study. Findings indicated that TAM was an effective conceptual framework in explaining consumer response to the online codesign process. The statistically significant results of the perceived enjoyment and control constructs in the extended TAM suggest the importance of their addition to building a model to explain consumer attitudes toward the online codesign process.

doi:10.1111/j.1083-6101.2010.01530.x

Introduction

With consumers’ growing interest in expressing individuality and increasing purchasing power, companies need to think of their consumers as individuals (Piller & Muller, 2004). Mass customization makes this possible by providing individually customized products and exciting shopping experiences to consumers (Fiore, Lee, & Kunz, 2004). Mass customization is a combination of mass and custom-made production processes, in which the production can be specialized to each consumer (Coronado, Lyons, Kehoe, & Coleman, 2004; Pine, 1993). This business concept has been noted for decades as the most advanced market segmentation strategy (Bardakci & Whitelock, 2004) and as an effective way to generate customer loyalty to a company (Ansari & Mela, 2003; Goldsmith & Freiden, 2004). Use of the Internet is considered necessary in customizing products in that it has allowed effective and spontaneous
communication between the company and the consumer (Anderson, 2002; Hibbard, 1999; Kim, 2002; Lee, 2000).

Companies like Land Rover, Dell, Gateway, Adiamondisforever.com, J.C. Penney, Hallmark, Adidas, Lands’ End, Nike, and Shirtcreations have applied the concept of mass customization in their online businesses. These companies allow consumers to select a range of options to complete the product design process. This is a codesign process, which is one variation of mass customization and is adopted by most industries that currently employ mass customization (Fiore, 2008). An apparel company, Land’s End, has implemented the online codesign process to let its consumers participate in the design process by selecting combinations of color, fabric, style, detail, and size to create their own customized jeans, dress shirts, and chinos (Coia, 2003; Ives & Piccoli, 2003). This codesign process meets customer needs for expressing their individuality; the benefits of this process have been noted by consumers who were unhappy with the conventional standardized products (Piller, 2003; Piller & Muller, 2004; Piller, Schubert, Koch, & Moslein, 2005). This codesign process decreases perceived risk related to fashion by making consumers participate in the design process, and increases consumer satisfaction through enhancing individuality by creating a unique fashion product (Berger & Piller, 2003; Fiore, et al., 2004). As it is a collaborative process between consumer and company, it requires a high level of consumer involvement to be successful (Piller et al., 2005; Ulrich, Anderson-Connell, & Wu, 2003).

Mass customization and the codesign process often rely on the use of digital technology (for example, the Internet, mobile medium, or rich media), which allows consumers to participate in the development and design of a product. “Digital Consumers” are essential to the success of the process. As today’s “digital consumers” usually use digital technology such as the Internet, mobile medium, and rich media for their shopping activities, and are young and familiar with computer, there would be the potential benefits for them in the mass customization business (Fiore, 2008). According to the Cotton Incorporate Lifestyle Monitor, mass customization is the most popular digital technology among women ages 16 to 24 years (“Customized clothing,” 2005).

Since there is no theoretical framework for mass customization research (Piller et al., 2005), understanding and explaining consumer attitudes toward mass customization, especially the online codesign process, would be beneficial to both academia and industry. Therefore, this study was conducted to understand consumer attitudes toward the codesign process and the Technology Acceptance Model (TAM) was adapted as the framework for the study. TAM has been used extensively in Information Technology (IT) and provided empirical support for several studies (for example, Davis, Bagozzi & Warshaw, 1989; Davis & Venkatesh, 1996; Davis, Bagozzi & Warshaw, 1992; Mathieson, 1991; Taylor & Todd, 1995; Venkatesh, 1999). This model has been applied to various technology formats such as online shopping (Childers, Carr, Peck, & Carson, 2001; Gefen & Straub, 1997; Koufaris, 2002; Lin & Lu, 2000; Liu, Tucker, Koh, & Kappelman, 2003; O’Cass & Fenech, 2003),
rich media (Kim & Forsythe, 2007; Lee, Fiore, & Kim, 2006), and mobile devices (Cheong & Park, 2005; Liao, Tsou, & Huang, 2007; Shin, 2007). It has explained consumer attitudes toward the new technology. However, to the best of our knowledge, no research has applied TAM to mass customization, or to the online codesign process.

In a 1989 study by Davis, Bagozzi, and Warshaw, the authors developed two initial constructs for TAM, perceived usefulness and perceived ease of use, which are key determinants to explain technology adoption. In a later study (Davis et al., 1992), the perceived enjoyment construct was added to TAM as enjoyment of technology was found to affect its acceptance by consumers. Providing a pleasant and enjoyable shopping environment has been emphasized in both offline and online retailing settings because of its positive impact on consumers’ attitudes and purchase intention (Joines, Scherer, & Scheufele, 2003; Kolsar & Galnraith, 2000; Webster, Trevino, & Ryan, 1993). As the importance of this hedonic perspective of the shopping experience has been noted, extending TAM with perceived enjoyment has been examined (Childers et al., 2001; Lee et al., 2006). Childers et al. (2001) examined TAM with perceived enjoyment in an online grocery shopping setting; Lee et al. (2006) applied the concept of enjoyment with the two initial variables of TAM to rich media usage in an online apparel retailer context. Both studies found that perceived enjoyment was a strong factor in predicting positive consumer attitudes. In addition, previous studies have suggested that more research on consumers’ ability (skill) to work with the codesign process is needed (Anderson-Connell et al., 2002), because not all consumers have skills to control the codesign process (Duray, Ward, Milligan, & Berry, 2000; Piller, 2004; Piller et al., 2005). This inability to control the process might discourage consumers from using mass customization (Blecker & Abdelkafi, 2006; Piller, 2003, 2004), as it negatively influences how consumers evaluate mass customized products (Godek, Brown, & Yates, 2004). Although perceived control has been applied to theoretical frameworks such as Theory of Planned Behavior (TPB) (Ajzen, 1985), and flow (Novak, Hoffman, & Yung, 2000), not much research has applied this concept to TAM. In addition, Agarwal and Prasad (1999) indicated that individual characteristics had not been included in the original TAM model which had significant impacts on technology acceptance and usage. The present study is to integrate the individual level factors, web skill and fashion involvement, as antecedents of TAM constructs.

Therefore, understanding how consumers perceive the codesign process in accordance with their ability is needed in order to predict the use of the codesign process. The purpose of the present study is to examine Korean consumers’ attitudes toward the codesign process of mass customization, incorporating perceived control and perceived enjoyment along with the two initial constructs of TAM. As previous scholars have indicated the importance of extending mass customization process beyond Europe and U.S. (Schipchandler & Moore, 2000), therefore the present study focuses on the consumer market in Korea.
Literature Review

Mass customization
Mass customization started to gain popularity in the 1990s (Ives & Piccoli, 2003). Since then, mass customization companies shifted the focus from manufacturing to customer interaction and, therefore, to the relationship between the business and the consumer (Piller, 2003). With the use of the Internet, industries are not limited when it comes to finding individual customers’ preferences in the mass customization process and they are able to enhance their relationship with consumers (McManus, 2000). One variation of mass customization used online is the codesign process, which requires company-to-customer interaction (Piller et al., 2005). Codesign activities let consumers decide what to design by selecting and/or matching items from a list of options or predefined components (Duray et al., 2000). These combinations can better meet the individual’s needs than the traditional products mass produced by companies (Berger & Piller, 2003). In the codesign process, the consumer can create a unique product and the company can understand consumers’ preferences based on the selection they made (Duray et al., 2000; Simonson, 2005). Many consumers who were unhappy with standardized products are willing to pay a premium for customized items (Piller, 2003; Piller & Muller, 2004).

In the apparel industry, Land’s End has used the Internet to launch its line of custom tailored chinos (Ives & Piccoli, 2003). From this Web-based service, trousers could be tailored based on length, waist size, color, and style options. Lands’ End was able to gather consumers’ body measurement and their preferences through the online codesign process (Ives & Piccoli, 2003). Kamali and Loker (2002) studied consumer involvement in the online codesign process. They divided their subjects into three groups: one that had the option of buying a ready to wear t-shirt, another that had 50 options to choose from to codesign a t-shirt and another that had 37,500 choices to select. They found that the members of the third group had the most interest in buying the customized t-shirt, they were more satisfied with the product, and they reported high satisfaction with the Web interface.

In contrast to the finding of Kamali and Loker (2002), other research on mass customization indicated that too many choices provided in the codesign process negatively influenced consumers’ interests in mass customization and deterred consumers from mass customization (Blecker & Abdelkafi, 2006; Godek et al, 2004; Piller, 2003, 2004). Lee (2004) did a study of the codesign process for children’s clothing with two levels, more interactive and less interactive. The more interactive site has 756 options to select and the less interactive site has 189 choices to choose to codesign children’s jacket, overall, and t-shirt. The results of the study showed that consumers evaluated the more interactive codesign process higher than the less interactive site, yet had less intention to purchase the customized product than members of the less interactive codesign site. Therefore, research is still needed to examine consumer response toward the codesign process in terms of the extent of the choices provided on Web sites. Moreover, none of the previous
research studied the consumers perception about the codesign process related to how useful, easy, enjoyable, and controllable it is. Therefore, the purpose of the present study is to fill the gap that has been ignored by previous research on mass customization.

**Theoretical Framework**

**Technology acceptance model (TAM)**

Davis, Bagozzi, and Warshaw (1989) developed the Technology Acceptance Model (TAM) to predict the use of technology systems in the workplace. They adapted the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) to develop TAM because usefulness and ease of use are the key determinants of Information Technology (IT) adoption (Davis et al., 1989). Scholars applied the TAM to examine acceptance of information technology and there is much empirical support for this model (Agarwal & Prasad, 1997, 1999; Chau, 2001; Davis, 1989; Davis, 1993; Davis, Bagozzi, & Warshaw, 1989; Davis & Venkatesh, 1996; Mathieson, 1991; Taylor & Todd, 1995; Venkatesh, 1999; Venkatesh & Davis, 1996; Venkatesh & Morris, 2000). Davis, Bagozzi, and Warshaw (1992) extended the model by including the enjoyment concept in addition to the two initial constructs of perceived usefulness and ease of use. Several scholars have applied this concept to examine whether or not the use of technology affects its acceptance. TAM also has been widely applied to understanding Web site use (Moon & Kim 2001; Teo, Lim, & Lai 1999), online shopping (Barkhi & Wallace, 2007; Chen, Gillenson, & Sherrell, 2002; Chen & Tan, 2004; Childers et al., 2001; Gefen & Straub, 1997; Koufaris, 2002; Lin & Lu, 2000; Liu et al., 2003; O’Cass & Fenech, 2003; Vijayasarathy, 2004), technology used by online retailers (Kim & Forsythe, 2007; Lee, et al., 2006), and mobile devices (Cheong & Park, 2005; Liao et al., 2007; Shin, 2007; Wang, Lin, & Luarn, 2006).

**Technology acceptance model and online mass customization**

*Perceived ease of use.* Perceived ease of use is an important determinant of the use of technology or systems along with perceived usefulness in TAM (Davis, 1989; 1993; Davis et al., 1992; Mathieson, 1991). The importance of perceived ease of use has been reinforced in TAM because of the poor user interface impact on the rejection of the technology in IT (Venkatesh & Davis, 1996). Perceived ease of use in TAM is “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320).

As the online codesign process seeks consumer involvement in selecting the fabric, color, style, detail, and size options (Duray et al., 2000), providing clear and user-friendly interfaces would be important. Previous research related to online retailing support that good layout design, effective search engines, transparent navigational structures, and user-friendly interfaces are conducive to usage (Agarwal & Venkatesh, 2002; Devaraj, Fan, & Kohli, 2002; Lohse & Spiller, 1999; McKinney,
Researchers who studied TAM have shown that perceived ease of use is a direct determinant of perceived usefulness (Davis et al., 1989; Davis & Venkatesh, 1996; Gefen, Karahanna, & Straub, 2003; Taylor & Todd, 1995; Venkatesh, 1999; Venkatesh & Davis, 1996; Venkatesh & Morris, 2000; Venkatesh, Speier, & Morris, 2002). These findings have suggested that perceived ease of use is significantly related to attitudes and/or intention through perceived usefulness. However, scholarly work related to perceived ease of use has provided mixed results on the effects of perceived ease of use on consumer attitudes toward technology and/or online stores. There were significant positive effects of perceived ease of use in online retailing on attitudes toward online retailing (Chen & Tan, 2004; Chen et al., 2002; Moon & Kim, 2001; O’Cass & Fenech, 2003; Vijayasarathy, 2004). However, Heijden and Verhagen (2004) and Liu et al. (2003) found that perceived ease of use had no significant effect on attitudes toward an online store. To provide better clarification on these mixed findings about perceived ease of use from the previous literature, we applied this concept to the online codesign process, and formulated the following hypotheses:

H1: Perceived ease of use of the online mass customization will positively affect perceived usefulness of the online mass customization.

H2: Perceived ease of use of the online mass customization will positively affect attitudes toward the online mass customization retailer.

H2-1: Perceived ease of use of the online mass customization will indirectly and positively affect attitudes toward the online mass customization retailer.

Perceived usefulness. Perceived usefulness is “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989, p. 320). Perceived usefulness in TAM has been found to have a significant impact on attitudes toward online retailers (Chen et al., 2002; Chen & Tan, 2004; Kim & Forsythe, 2007; Koufaris, 2002; Lee et al., 2006; Lin & Lu, 2000; O’Cass & Fenech, 2003; Vijayasarathy, 2004). Kim and Forsythe (2007) examined consumers’ attitudes toward online retailers using a 3-D virtual model, and found that perceived usefulness was an important predictor of consumer attitudes toward an online retailer. Their findings support other empirical research where perceived usefulness as a construct of TAM was the significant determinant of attitudes toward online retailing (Childers et al., 2001; Lee et al., 2006; O’Cass & Fenech, 2003; Vijayasarathy, 2004).

Mass customization helps to create value by tailoring each product for each customer (Goldsmith & Freiden, 2004; Piller, 2003). In mass customization, the customer becomes the co-producer (Wikstrom, 1996) by participating in the design and production process before the actual sales transaction (Kamali & Loker, 2002).
Codesign is used as a way to meet customer needs for mass customization (Piller et al., 2005) and can allow the company and consumer to develop new product ideas simultaneously (Piller, 2003). The online codesign process would be perceived as useful in the online shopping setting by helping consumers to select options based on their preferences and showing the product before they make a final purchase decision. In most cases, consumers received prompt feedback while they participated in the codesign process (Piller et al., 2005; Franke & Piller, 2004). Most consumers can see the advantages of mass customization (Piller, 2003). Fiore et al. (2004) investigated consumers’ motivation to use the codesign process. Their findings indicated that consumers used the codesign process to create a unique fashion product and assert their individuality. These perceptions also had a positive influence on consumers’ responses to the codesign process. Therefore, we propose:

H3: Perceived usefulness of the online mass customization will positively affect attitudes toward the online mass customization retailer.

Perceived enjoyment. Davis et al. (1992) defined perceived enjoyment as “the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated” (1992, p. 1113). They found that perceived enjoyment was the significant determinant in the adoption of a technology along with usefulness and ease of use. Much emphasis on perceived enjoyment has been discussed and applied to previous research on online retailing. All of the previous research indicated the strong positive effects of perceived enjoyment on attitudes toward online retailers (Childers et al., 2001; Eighmey & McCord, 1998; Heijden & Verhagen, 2004; Jarvenpaa & Todd, 1996–97; Lee et al., 2006; Mathwick, Malhotra, & Rigdon, 2001).

Fiore et al. (2004) examined the motivation of young adults in using the codesign process. They found that the codesign process gives consumers exciting experiences, which make them more interested in the process. In line with Fiore et al.’s (2004) study, other scholars found that consumers are interested in the customization process (Anderson-Connell et al., 2002; Piller & Muller, 2004). The codesign process is an interactive feature as it requires selecting choices provided by online retailers. Childers et al. (2001) indentified the strong effects of perceived enjoyment on attitudes toward online grocery shopping and suggested that creating interactive features would differentiate online from in-store shopping. Lee et al. (2006) investigated the effects of image interactivity technology as one format of rich media in the Web site. They compared two levels of interactive technology on consumers’ attitudes toward online retailers. Lee et al.’s (2006) study suggested that richer technology leads to higher perceived enjoyment and that perceived enjoyment had a positive and significant influence on consumers’ attitudes toward online retailers. Although previous research revealed the importance of enjoyment in shopping context, little is known about the concept of perceived enjoyment as applied to the mass customization context. We, therefore, hypothesize:
H4: Perceived enjoyment of the online mass customization will positively affect attitudes toward the online mass customization retailer.

**Perceived control.** Perceived control has previously been used to investigate people’s ability to deal with situations such as locus of control (Rotter, 1966), self-efficacy (Bandura, 1982), Theory of Planned Behavior (TPB) (Ajzen, 1985), and flow (Novak et al., 2000). Perceived control has been similarly defined as people’s control over specific action or environment (Ajzen, 1985; Bandura, 1982; Hoffman & Novak, 1996; Novak et al., 2000). Although prior research related to control (Langer, 1975; Tompke, 1981; White, 1959) has indicated the positive influence of perceived control on people’s feelings about the situation and their expected outcomes, TAM has overlooked the effect of control in the framework (Mathieson, 1991; Venkatesh, 2000). Mathieson (1991) compared the TPB to TAM and found that control was as much a significant determinant of consumers’ attitudes as other constructs, such as perceived usefulness and perceived ease of use in TAM. However, Mathieson (1991) only examined the perceived control as the construct of TPB and did not incorporate the concept into TAM. Although integrating the perceived control concept with TAM would be a fruitful way of extending TAM, few researchers have examined this concept.

The online codesign process requires the consumer to interact with the company to select the pre-defined options available on the Web site (Duray et al., 2000). However, as Piller (2003) argued, not every consumer is comfortable with this process. Some frustration can be raised from the codesign setting (Piller, 2003). This perception of the codesign process would be a disturbed feeling with the situations, inability to control the codesign process, and/or the sense of being overwhelmed by the sheer number of choices. This perceived inability to have control over the situation might discourage the use of mass customization (Piller et al., 2005). Godek et al. (2004) studied the effect of perceived control on the consumer decision process and product evaluation in the mass customization setting by manipulating perceived and desired control. They found that the consumer decision process and product evaluation are higher when both perceived control and desired control match, either high or low. That is, when consumers feel that their desired ability is matched with the actual control over the situation, perceived control from the customization process positively influenced the consumer’s evaluation of and responses to the process. In the study of consumers’ interest in mass customized apparel products, Anderson-Connell et al. (2002) found that some consumers lacked the confidence in their ability to complete the mass customization. According to previous research, codesign cannot take place without consumers’ involvement (Duray et al., 2000). Research is needed to examine how consumers perceive the control over the mass customization situation, and its effects on their attitudes. Thus, we propose:

H5: Perceived control of the online mass customization will positively affect attitudes toward the online mass customization retailer.
The effects of attitudes on consumers’ response to online mass customization

Researchers have indicated that attitudes toward a technology is an antecedent to intention, creating a belief-attitudes-intention relationship (Davis, 1993; Mathieson, Peacock, & Chinn, 2001). The attitudes toward the use of a technology is a major determinant of whether or not a consumer will use it (Davis, 1993). Positive attitudes will result in the use of a technology and negative attitudes will result in its rejection (Liker & Sindi, 1997). Researchers applied TAM to online shopping, including the relationship between attitudes and behavior intention, and they found that attitudes positively influences behavioral intentions (Chen & Tan, 2004; Heijden & Verhagen, 2004; Moon & Kim, 2001; O’Cass & Fenech, 2003). Research has repeatedly shown that consumers’ attitudes toward online retailing positively influences their responses. These consumer responses include intention to buy, intention to return to the online store, and intention to recommend products to others (Balabanis & Vassileiou, 1999; Jarvenpaa & Todd, 1996–97; Korzaan, 2003; Shim & Drake, 1990; Yoh, Damhorst, Sapp, & Lazniak, 2003).

Moreover, research has found that Web site’s interactive features are important in improving consumers’ attitudes toward an online retailer, desire to browse the Web site, and online purchase intention (Fiore & Jin, 2003; Gehrke & Turban, 1999; Li, Daugherty, & Biocca, 2001; Udo & Marquis, 2000). As the codesign process delivers the interactive features by letting consumers select different options provided on the Web site, it would be important to examine consumers’ attitudes and its effects on consumer response, such willingness to purchase a mass customized product, and willingness to recommend the purchase of a customized product in this setting to others. Fiore et al.’s (2004) study of consumer motivation to use the codesign process found that consumers’ exciting experience had a significant positive effect on their willingness to codesign a product. In other research, consumers who realized the benefit of the customization were willing to spend money to purchase a customized product (Piller & Muller, 2004). Goldsmith and Freiden (2004) studied consumers’ attitudes toward the customized market and discovered that more than 40% of consumers had purchased a mass customized product. In addition, mass customization lowered return rates (Ives & Piccoli, 2003; Winter, 2003) and increased customer loyalty (Ives & Piccoli, 2003; Piller & Muller, 2004). Therefore, we propose:

H6: Attitudes towards the online mass customization retailer will positively affect willingness to purchase mass customized fashion product through the online retailer.

H7: Attitudes towards the online mass customization retailer will positively affect willingness to make a recommendation for friends to purchase mass customized fashion product through the online retailer.

The effects of individual characteristics on TAM constructs

Although TAM has been widely used to predict individual’s acceptance and usage of new technology, many scholars noted that emphasis of individual-level factors has been neglected in the model (Agarwal & Prasad, 1999; Kwon & Chidambaram,
2000; Lee et al., 2006; Venkatesh & Davis, 2000). These studies found significant effects of individual characteristics such as prior experiences with similar technology, participation of training for technology, and shopping orientation to consumers’ shopping experiences on TAM framework. Koufaris (2002) applied Web skill to online shopping (Banudura, 1982; Barbalet, 1998). The concept of Web skill (Koufaris, 2002) is close to self-efficacy (Banudura, 1982; Barbalet, 1998) in that it is users’ own judgment about their ability as it relates to computer skills to complete online shopping. Koufaris (2002) found that consumers who believed that they had greater web skill perceived more control and enjoyment with online shopping. In online mass customization context, consumer’s judgment about individual’s ability to use a interface by selecting different options (e.g. color, fabric, design etc.) provided by companies to complete their task (e.g. finalizing customized products), would be a crucial factor to predict constructs of TAM. Those who believe that they have greater ability to codesign products will perceive that online mass customization process is ease to use, and enjoyable, as well as controllable. Therefore, based on previous research, different level of web skill will influence consumers’ usages of online mass customization. Thus, we generate the following hypotheses:

H8: Web skill will positively affect perceived ease of use of the online mass customization.

H9: Web skill will positively affect perceived enjoyment of the online mass customization.

H10: Web skill will positively affect perceived control of the online mass customization.

In addition to web skill, consumers might have different experiences with online mass customization process based on individual interests with products and/or services. The codesign process requires consumers’ involvement by its nature of the process to develop customized products (Piller et al., 2005; Ulrich, Anderson-Connell, & Wu, 2002), and it allows customer to express their individuality by creating a unique fashion product (Berger & Piller, 2003; Piller, 2003; Piller & Muller, 2004). Involvement is defined as “the extent to which consumers are concerned with a particular purchase decision and consider it to be important to them” (Schifman, & Kanuk, 1983). Fashion involvement is the level of individual interests and importance about fashion (O’Cass, 2001). Consumers who have a high level of involvement committed their time and efforts to complete the shopping tasks (Engel, et al, 1995). Furthermore, consumers with high fashion involvement had positive satisfaction with pre-and postpurchase satisfaction (Yoo, 1996). The codesign process is an online prepurchase process that provides individuals with various options to select to customize their desired products. Therefore, consumers with greater fashion involvement would have positive experiences with the process. Thus, we proposed the following hypotheses:

H11: Fashion involvement will positively affect perceived usefulness of online mass customization.
H12: Fashion involvement will positively affect perceived enjoyment of online mass customization.

Method

Sample
We obtained a total of 749 responses over a 6-week period from students at six universities and colleges in the Seoul metropolitan area in South Korea. The data were collected using a self-administered survey. The sample for this study represented a variety of undergraduate majors from the college of human ecology and art (57.1%) and engineering and science (23.4%). One hundred sixty-nine subjects (22.6%) were male and 560 subjects (75.6%) were female. Ninety-five percent were between the ages of 18 and 26. This sample was appropriate for the present study because members of this age group are highly interested in mass customization (“Customized clothing,” 2005). All respondents in this study had previous Internet shopping experiences. They reported using the Internet for any purpose for an average of about 3 hours per day. The respondents were given a gift valued at $2 for participating in the study.

Stimuli
The stimuli were prepared with the purpose of visually explaining the mass customization process to the respondents. The authors prepared color print pictures depicting the mass customization process by showing the four sequential stages in the codesign process of athletic shoes from a well known company’s Web site. The company logo was deleted from the pictures to control the brand effect, which might influence the results of the study. The four pictures were an example of someone selecting one of the possible choices at each stage. The stimulus of the first stage shows the participants the selection process of gender step. The picture of the second stage shows the detail selection step where details such as the shoes’ base, overlay, laces, and accents etc. could be chosen. The picture of the third stage shows the personalizing step for the shoes where initials, words or symbols for the shoes could be selected. The fourth picture is the review step that shows all the options selected by the consumer and shows the final picture of the codesigned athletic shoes. During each selection process, the pictures also showed different views of the shoes that had been codesigned.

Procedure
Each participant was given a printed survey to complete. On the first page of the survey, participants were asked to respond to descriptive questions including how many hours per day they spend on the Internet and about their Internet shopping experiences. On the second page, they were provided with the following definition of mass customization: “the process that allows consumers to participate in the product design process to create the customized product that you want by selecting different options of color, fabric, styles, details, and size offered by the company.”
Next, the respondents viewed the prepared stimuli of the four sequential steps in the codesign process of athletic shoes. They were then asked to complete questions related to the TAM constructs, the perceived usefulness, perceived ease of use, perceived enjoyment, and perceived control of the mass customization process. Finally, they responded to questions about attitudes toward online mass customization, and willingness to 1) purchase mass customized products from online retailers, and 2) recommend for friends to purchase mass customized products from online retailers.

Instrument
To measure perceived usefulness, ease of use, and enjoyment, we used Childers et al.’s (2001) scale, which was adapted from Davis (1989) and Davis et al. (1992). We used three items of perceived control originally used in Ghani, Supnick and Rooney (1991) and then modified and used by Koufaris (2002). We used four items from Bruner and Hensel (1996) to measure attitudes towards online mass customization. To assess consumers’ responses to mass customization (willingness to purchase mass customized products and to recommend for friends to purchase mass customized products from online retailer), we used two items from Engel, Blackwell, and Miniard (1995). To measure web skill we borrowed three items from Koufaris (2002). To assess fashion involvement, we modified involvement scales developed by Zaichkowsky (1985). The questionnaires were prepared in English, first using the original scales, and translated into Korean. Because of the language sensitivity, to achieve maximum accuracy in translation, the Korean translation version was back translated. Two bilingual experts reviewed Korean and English versions of the questionnaire, and finalized the language in the instrument.

Results
Model testing
The conceptual model consists of nine latent variables (web skill, fashion involvement, perceived usefulness, perceived ease of use, perceived enjoyment, perceived control, attitudes toward online mass customization, willingness to purchase mass customized products though online retailers, willingness to recommend for friends to purchase mass customized products through online retailers). The causal model analyses were conducted by a maximum-likelihood estimation procedure using LISREL 8.72. Descriptive statistics and Cronbach’s \( \alpha \) were also calculated by using SPSS 13.0.

Measurement model
Fifteen indicators were initially considered as a measurement model, however, correlation analysis indicated the low correlation values among indicators within constructs. Confirmatory factor analysis also revealed lower than 0.50 of factor loadings in several items of the measurement models. Therefore, these items were removed from further causal model testing. The final measurement model consisted
Table 1: Descriptive statistics and correlation coefficients of model constructs

<table>
<thead>
<tr>
<th>Model constructs</th>
<th>Mean a</th>
<th>Std. Dev.</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Web skill1</td>
<td>5.01</td>
<td>1.42</td>
<td>.680</td>
</tr>
<tr>
<td>2. Web skill2</td>
<td>4.37</td>
<td>1.42</td>
<td>.685 .606</td>
</tr>
<tr>
<td>3. Web skill3</td>
<td>4.52</td>
<td>1.33</td>
<td>.685 .606</td>
</tr>
<tr>
<td>4. Fashion involvement 1</td>
<td>6.13</td>
<td>1.23</td>
<td>.166 .173 .166</td>
</tr>
<tr>
<td>5. Fashion involvement 2</td>
<td>6.08</td>
<td>1.22</td>
<td>.209 .231 .166 .595</td>
</tr>
<tr>
<td>8. Perceived usefulness 1</td>
<td>4.75</td>
<td>1.52</td>
<td>.102 .148 .115 .108</td>
</tr>
<tr>
<td>10. Perceived ease of use 1</td>
<td>4.10</td>
<td>1.26</td>
<td>.072 .074 .131 .063</td>
</tr>
<tr>
<td>11. Perceived ease of use 2</td>
<td>4.18</td>
<td>1.35</td>
<td>.144 .183 .203 .100</td>
</tr>
<tr>
<td>12. Perceived enjoyment 1</td>
<td>4.48</td>
<td>1.44</td>
<td>.064 .116 .129 .040</td>
</tr>
<tr>
<td>14. Perceived control 1</td>
<td>4.40</td>
<td>1.41</td>
<td>.058 .095 .105 .071</td>
</tr>
<tr>
<td>15. Perceived control 2</td>
<td>4.71</td>
<td>1.45</td>
<td>.100 .141 .123 .029</td>
</tr>
<tr>
<td>16. Attitudes 1</td>
<td>4.95</td>
<td>1.52</td>
<td>.106 .117 .097 .118</td>
</tr>
<tr>
<td>17. Attitudes 2</td>
<td>4.87</td>
<td>1.56</td>
<td>.065 .084 .071 .110</td>
</tr>
<tr>
<td>18. Attitudes 3</td>
<td>4.92</td>
<td>1.66</td>
<td>.077 .094 .080 .116</td>
</tr>
<tr>
<td>19. Attitudes 4</td>
<td>4.99</td>
<td>1.48</td>
<td>.067 .070 .072 .121</td>
</tr>
<tr>
<td>20. Willingness to purchase mass customized products through online retailers</td>
<td>4.51</td>
<td>2.05</td>
<td>.060 .099 .092 .018</td>
</tr>
<tr>
<td>21. Willingness to make a recommendation for friends to purchase mass customized products through online retailers</td>
<td>3.89</td>
<td>1.32</td>
<td>.018 .015 .100 .056</td>
</tr>
</tbody>
</table>

- Measurement for construct 1 through 7 were based on a 7-point scale where 1 = “Strongly Disagree” and 7 = “Strongly Agree”.
- N = 702.
of 12 indicators. Table 1 shows the intercorrelations among these indices. The correlation pattern of the indices shows that the multi-item factors have good discriminant validity. The indices of the same construct are more highly correlated with each other than with the indices of any other construct.

Table 2 presents the results of the measurement model, including the standardized factor loadings, \( t \)-values, Cronbach’s \( \alpha \), and composite reliability. Confirmatory factor analysis of the measurement model for indices showed that factor loadings of indicators for each construct were statistically significant and sufficiently high for structural model testing. The confirmatory factor loading values for model constructs ranged from .56 through .90. To check reliability of multi-item scales, we estimated Cronbach’s \( \alpha \) and composite reliability. Cronbach’s \( \alpha \) for all multi-item scales, which ranged from .68 through .92. Composite reliability for all constructs was calculated based on Fornell and Larcker’s suggestion (1981), which consider the actual factor loadings for each construct. The values of all constructs were greater than .70 which recommended as an indicator of a reliable measure (Hair, Anderson, Tatham, & Black, 1998). Therefore, we conducted subsequent structural equation analysis using these measurement models to test the proposed hypotheses.

**Structural model: Hypotheses testing**

*Model fitting.* Overall, goodness of fit of the causal model was assessed using fit indices (e.g., GFI, AGFI, CFI, NFI, and RFI). For the statistical significance of parameter estimates, \( t \)-values were used. The results of structural equation modeling obtained for the proposed conceptual model revealed a chi-square of 331.86 (\( df = 167; p < .001 \)), goodness-of-fit index (GFI) of .96, adjusted goodness-of-fit index (AGFI) of .94, comparative fit index (CFI) of .99, normed fit index (NFI) of .98, and chi-square/\( df \) of 1.99. In general, fit statistics greater than or equal to .90 for GFI, NFI, and CFI indicate a good model fit (Bagozzi & Yi, 1988; Hair, et al., 1998). Also, root mean square error of approximation (RMSEA) values ranging from .05 to .08 are acceptable (Hair et al., 1998); therefore, the RMSEA of the model (RMSEA = .051) also suggests that our model fit is acceptable. Figure 1 shows the final model with structural path coefficients and \( t \)-values for each hypothesized relationship as well as squared multiple correlations (\( R^2 \)) for each endogenous construct.

*Hypothesis testing.* Figure 1 shows the results of the causal model testing and hypotheses analysis. All hypotheses, except hypothesis 2 (H2: \( -1.11; t = -1.42 \)), the path from perceived ease of use to attitudes toward the online mass customization, were statistically supported. The hypothesis from perceived ease of use to perceived usefulness (H1: \( .58; t = 10.79 \)) received positive statistical support. As we hypothesized, the path from perceived usefulness to attitudes toward the online mass customization (H3: \( .30; t = 4.41 \)), the path from perceived enjoyment to attitudes toward the online mass customization (H4: \( .42; t = 4.14 \)), and the path from
Table 2 Measurement model results—Summary of Confirmatory Factor Analysis

<table>
<thead>
<tr>
<th>Construct (η)</th>
<th>Indicators (λ)</th>
<th>Standardized Factor Loading (λ, t-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web skill (η₁)</td>
<td>I am not very skilled at using the Web. +</td>
<td>.86*</td>
</tr>
<tr>
<td></td>
<td>I know how to find what I want on the Web.</td>
<td>.78 (21.32)</td>
</tr>
<tr>
<td></td>
<td>I know more about using the Web than most users.</td>
<td>.79 (21.37)</td>
</tr>
<tr>
<td>Cronbach alpha = 0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fashion Involvement (η₂)</td>
<td>To me, fashion (is) ——— ———.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unimportant—Important</td>
<td>.77*</td>
</tr>
<tr>
<td></td>
<td>Interesting—Boring +</td>
<td>.76 (16.96)</td>
</tr>
<tr>
<td></td>
<td>Unappealing—Appealing</td>
<td>.73 (16.63)</td>
</tr>
<tr>
<td></td>
<td>Needed—Not Needed +</td>
<td>.72 (16.24)</td>
</tr>
<tr>
<td>Cronbach alpha = 0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived usefulness (η₃)</td>
<td>If I actually purchased a mass customized product through online,</td>
<td>.78*</td>
</tr>
<tr>
<td></td>
<td>the mass customization process through online would . . . . .</td>
<td></td>
</tr>
<tr>
<td></td>
<td>be useful in buying what I want.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>improve my shopping productivity.</td>
<td>.78*</td>
</tr>
<tr>
<td></td>
<td>enhance my effectiveness in shopping#</td>
<td>.90 (20.25)</td>
</tr>
<tr>
<td>Cronbach alpha = 0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived ease of use (η₄)</td>
<td>If I actually purchased a mass customized product through online,</td>
<td>.79*</td>
</tr>
<tr>
<td></td>
<td>the mass customization process through online would . . . . .</td>
<td></td>
</tr>
<tr>
<td></td>
<td>be clear and understandable.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>be easy to learn.</td>
<td>.79*</td>
</tr>
<tr>
<td></td>
<td>not be easy to use.#</td>
<td>.69 (13.74)</td>
</tr>
<tr>
<td>Cronbach alpha = 0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived enjoyment (η₅)</td>
<td>If I actually purchased a mass customized product through online,</td>
<td>.82*</td>
</tr>
<tr>
<td></td>
<td>the mass customization process through online would . . . . .</td>
<td></td>
</tr>
<tr>
<td></td>
<td>be fun for its own sake.</td>
<td>.81 (21.59)</td>
</tr>
<tr>
<td></td>
<td>be enjoyable.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>be boring#</td>
<td></td>
</tr>
</tbody>
</table>
Table 2 (Continued)

<table>
<thead>
<tr>
<th>Construct (η)</th>
<th>Indicators (λ)</th>
<th>Standardized Factor Loading (λ, t-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cronbach alpha = 0.80</strong>&lt;br&gt;Composite reliability = .87</td>
<td>Perceived control (η₆)</td>
<td>If I actually purchased a mass customized product through online, the mass customization process through online would...&lt;br&gt;make me feel confused. +&lt;br&gt;make me feel frustrated. +&lt;br&gt;make me feel in control.#</td>
</tr>
<tr>
<td><strong>Cronbach alpha = 0.68</strong>&lt;br&gt;Composite reliability = .79</td>
<td>Attitudes toward online mass customization (η₇)</td>
<td>If I actually purchased a mass customized product through online, the online mass customization process would...&lt;br&gt;be good.&lt;br&gt;be pleasant.&lt;br&gt;be interesting.&lt;br&gt;be useful.</td>
</tr>
<tr>
<td><strong>Cronbach alpha = 0.92</strong>&lt;br&gt;Composite reliability = .95</td>
<td>Willingness to purchase mass customized product through online retailers (η₈)</td>
<td>I would be willing to buy mass customized products through online retailers.</td>
</tr>
<tr>
<td></td>
<td>Willingness make a recommendation for friends to purchase mass customized product through online retailers (η₉)</td>
<td>I would be willing to recommend my friends to buy mass customized products.</td>
</tr>
</tbody>
</table>

aMeasurement based on a 7-point Likert scale where 1 = “Strongly Disagree” and 7 = “Strongly Agree”.<br>+ Reversed coded item; # Dropped item; * fixed to 1.

perceived control to attitudes toward the online mass customization were positively significant (H5: .10; t = 2.40). In addition, consumer attitudes toward online mass customization positively affected willingness to purchase mass customized products from online retailers (H6: .26; t = 6.74) and willingness to make a recommendation for friends to purchase mass customized products through online retailers (H7: .55; t = 13.86). In terms of examining the effects of individual characteristics on TAM
Attitudes toward online mass customization

Willingness to purchase mass customized products through online retailers

Perceived ease of use

Perceived usefulness

Web skill

Perceived enjoyment

Fashion involvement

Perceived control

H1: .56 (10.25)

H2: -.11 (-1.56)

H3: .31 (4.82)

H4: .41 (4.24)

H5: .10 (2.26)

H6: .27 (6.98)

H7: .49 (13.71)

H8: .19 (4.05)

H9: .14 (3.45)

H10: .16 (3.26)

H11: .15 (3.40)

H12: .10 (2.22)

Figure 1 A model showing causal paths and $R^2$ for applying TAM on consumer attitudes toward online mass customization

$\chi^2(df = 167) = 331.86; \text{GFI} = .96; \text{AGFI} = .94; \text{CFI} = .99; \text{NFI} = .98; \text{RMR} = .051.$

Note: t-values are in parentheses ($t > 2.00$); dotted lines indicate insignificant paths.

framework, all the paths we hypothesized received significant supports: Web skill to perceived ease of use (H8: .19; $t = 4.05$), Web skill to perceived enjoyment (H9: .14; $t = 3.45$), and Web skill to perceived control (H10: .16; $t = 3.26$). Participants who have higher fashion involvement perceived online mass customization process more useful (H11: .15; $t = 3.40$) and enjoyable (H12: .10; $t = 2.22$).

Decomposition of Effects. To assess the significance of direct, indirect, and total effects of predictor variables on dependent variables, the decomposition of effects analysis was conducted. Table 3 presents the decomposition effects of the model. Our proposed conceptual model explained a moderate amount of variance for perceived usefulness of mass customization ($R^2 = .34$), attitudes toward the mass customized online retailer ($R^2 = .40$), and willingness to recommend for friends to purchase mass customized product through online retailer ($R^2 = .24$). However, the variance for willingness to purchase mass customized products from online retailers was low ($R^2 = .07$).

There was a significant indirect effect from perceived ease of use to attitudes toward the online mass customization mediated by perceived usefulness. Thus, H2-1 was supported. Among the TAM constructs, perceived enjoyment had the strongest direct effect (.46) on attitudes toward the online mass customization retailers. Again, perceived enjoyment had the strongest indirect effects on willingness to purchase mass customized fashion product through the online retailer (.13) and
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Total Effects</th>
<th>Indirect Effects</th>
<th>Direct Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived usefulness</td>
<td>Web skill</td>
<td>.11 (3.86)</td>
<td>.11 (3.86)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fashion involvement</td>
<td>.14 (3.45)</td>
<td>.14 (3.45)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived ease of use</td>
<td>.56 (10.25)</td>
<td>.56 (10.25)</td>
<td></td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>Web skill</td>
<td>.19 (4.05)</td>
<td>.19 (4.05)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fashion involvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived enjoyment</td>
<td>Web skill</td>
<td>.15 (3.45)</td>
<td>.15 (3.45)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fashion involvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Control</td>
<td>Web skill</td>
<td>.16 (3.26)</td>
<td>.16 (3.26)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fashion involvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes toward online mass customization</td>
<td>Web skill</td>
<td>.09 (3.84)</td>
<td>.09 (3.84)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fashion involvement</td>
<td>.08 (3.09)</td>
<td>.08 (3.09)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived usefulness</td>
<td>.31 (4.82)</td>
<td>.31 (4.82)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived ease of use</td>
<td>.09 (0.72)</td>
<td>.20 (4.40)</td>
<td>-.11 (−1.56)</td>
</tr>
<tr>
<td></td>
<td>Perceived enjoyment</td>
<td>.41 (4.24)</td>
<td>.41 (4.24)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived control</td>
<td>.10 (2.26)</td>
<td>.10 (2.26)</td>
<td></td>
</tr>
<tr>
<td>Willingness to purchase mass customized product through online retailers</td>
<td>Web skill</td>
<td>.02 (3.38)</td>
<td>.02 (3.38)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fashion involvement</td>
<td>.02 (2.83)</td>
<td>.02 (2.83)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived usefulness</td>
<td>.08 (3.98)</td>
<td>.08 (3.98)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived ease of use</td>
<td>.02 (0.72)</td>
<td>.02 (0.72)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived enjoyment</td>
<td>.11 (3.65)</td>
<td>.11 (3.65)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived control</td>
<td>.03 (2.15)</td>
<td>.03 (2.15)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attitudes toward online mass customization</td>
<td>.27 (6.98)</td>
<td>.27 (6.98)</td>
<td></td>
</tr>
<tr>
<td>Willingness to make a recommendation for friends to purchase mass customized product through online retailers</td>
<td>Web skill</td>
<td>.04 (3.72)</td>
<td>.04 (3.72)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fashion involvement</td>
<td>.04 (3.02)</td>
<td>.04 (3.02)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived usefulness</td>
<td>.15 (4.57)</td>
<td>.15 (4.57)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived ease of use</td>
<td>.03 (0.72)</td>
<td>.03 (0.72)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived enjoyment</td>
<td>.20 (4.08)</td>
<td>.20 (4.08)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perceived control</td>
<td>.05 (2.24)</td>
<td>.05 (2.24)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attitudes toward online mass customization</td>
<td>.49 (13.71)</td>
<td>.49 (13.71)</td>
<td></td>
</tr>
</tbody>
</table>

Note: t-values are in parentheses. Significant effects (t > 2.00) are shown in bold.

willingness to recommend for friends to purchase mass customized product through online retailers (.25) compared to other constructs in TAM. Along with perceived enjoyment, perceived usefulness and perceived control had significant indirect effects on willingness to purchase mass customized fashion product through online retailers (.10, and .04, respectively) and willingness to recommend for friends to purchase mass customized product through online retailers (.18 and .09, respectively). The results of the study suggest that all TAM constructs, except for perceived ease of use, were mediated by attitudes toward online mass customization.
Discussion and Implications

As previous research pointed out, little theoretical research on mass customized Internet shopping sites has been conducted (Piller et al., 2005). The present study attempted to examine the extended TAM with individual characteristics variables in relation to mass customization, especially the codesign process offered by an online retailer. The findings of the study indicated that TAM was a useful conceptual framework to explain consumer response to the online codesign process. In addition, previous scholars have suggested the need for mass customization research in non-U.S. markets to understand the global perception of mass customization (Schipchandler & Moore, 2000; Piller & Muller, 2004), this study assessed Korean consumers’ perception of online mass customization.

Consumers’ attitudes toward online mass customization influence their willingness to purchase mass customized products online and their willingness to recommend it to their friends. In other words, consumers who have more favorable attitudes toward the online codesign process are more likely to purchase customized products online and recommend it to their friends. Moreover, the results of decomposition effects show that respondents’ attitudes towards online mass customization (or mediated the effects) have a significant indirect effect of perceived usefulness, perceived enjoyment, and perceived control on willingness to purchase mass customized products and willingness to recommend for their friends to purchase mass customized products through online retailers. The findings of the present study confirm the belief-attitudes-intention relationship (Ajzen, 1991; Fishbein & Ajzen, 1975) as perceived usefulness, perceived enjoyment, and perceived control as a belief system, and these beliefs influence the intention through attitudes (Ajzen, 1991; Fishbein & Ajzen, 1975). This positive consumer response to the codesign process shows a promising future for businesses offering online mass customization.

According to marketing research, word of mouth has a strong influence on consumers’ product and service choices (Bansal & Voyer, 2000; Swanson & Davis, 2003; Westbrook, 1987). In this study, there were stronger total effects on willingness to recommend that friends purchase mass customized products through online retailers, compared to willingness to purchase mass customized products. The result of the study suggests that management of word of mouth is a key marketing strategy in promoting the codesign process to consumers in Korea. The present study was conducted in a collectivistic culture where people are sensitive to the judgment and opinions of others (Chang & Lee, 2002), and therefore, word of mouth would be a useful way to educate and advertise the codesign process in other countries with a cultural background similar to Korea. Moreover, the respondents of the study were technology-savvy college-age students with a strong interest in fashion and new products (Chang & Seltzer, 2006). This group would be a potential target for online mass customization.

Consumer attitudes toward online mass customization were significantly and positively predicted by perceived usefulness, perceived enjoyment, and perceived
control. Perceived ease of use was found as the insignificant determinant of attitudes toward the online codesign process in TAM, but it indirectly predicted consumer attitudes toward the online codesign process, mediated by perceived usefulness. The significant influence of the perceived usefulness on attitudes toward online mass customization indicates that the respondents also recognized the usefulness of the codesign process. This finding supports previous findings on the effects of perceived usefulness on attitudes toward online retailers (Chen et al., 2002; Chen & Tan, 2004; Childers et al., 2001; Gefen & Straub, 1997; Koufaris, 2002; Lin & Lu, 2000; O’Cass & Fenech, 2003; Vijayasarathy, 2004).

The findings of the study show that perceived ease of use has been a direct determinant of perceived usefulness and its indirect influence on attitudes toward online mass customization. However, there was an insignificant direct effect of perceived ease of use on attitudes toward the online mass customization. Previous research reported mixed findings of the influence of the ease of use on attitudes to the use of technology. Although empirical research has found significant direct effects of perceived ease of use on attitudes toward technology usage (Chen & Tan 2004; Chen et al., 2002; Moon & Kim, 2001; O’Cass & Fenech, 2003; Vijayasarathy, 2004), other research has found insignificant effects of perceived ease of use on consumer responses to technology usage (Heijden & Verhagen, 2004; Liu et al., 2003). Both Heijden and Verhagen (2004) and Liu et al. (2003) found the significant direct effect of perceived ease of use on perceived usefulness, and indirect effects of perceived ease of use on attitudes toward technology usage and purchase intentions through perceived usefulness. Consistent with previous research, the results of this study show that perceived ease of use is the predictor of perceived usefulness, not the predictor of attitudes toward online mass customization. Perceived ease of use affects perceived usefulness, which directly influences attitudes toward online mass customization. Liu et al. (2003) argued that since consumers might perceive the benefits and costs of the Web interface, perceived usefulness could be a benefit, which is influenced by the perceived ease of use. In other words, user-friendly interfaces are still important for consumers who use online retailers (Vijayasarathy, 2004; McKinney et al., 2002) because of its perception affect on the benefits of the Web site. By providing clear and simple directions of the online mass customization process, consumers recognize the benefit of it.

The results of the present study show that perceived enjoyment followed by perceived usefulness, had the strongest effects on attitudes toward online retailers in TAM. In the literature on TAM in technology usage in IT, when perceived enjoyment was not integrated as a construct, perceived usefulness was the strongest determinant (Davis, 1989; Davis, et al., 1989; Davis & Venkatesh, 1996; Li et al., 2001; Mathieson, 1991; Taylor & Todd, 1995; Venkatesh, 1999). However, when it was included with the original constructs, perceived usefulness and perceived ease of use, perceived enjoyment was the key factor to predict the consumers’ responses to online retailers (Childers et al., 2001; Lee et al., 2006). Both Childers et al. (2001)
and Lee et al. (2006) applied perceived enjoyment as extended TAM constructs to the online shopping setting. The result of our study corroborate the provision of entertainment to consumers as an important marketing strategy (Arnold & Reynolds, 2003), and enjoyment in online shopping context as key factors in creating positive consumer responses (Childers et al., 2001; Eighmey & McCord, 1998; Jarvenpaa & Todd, 1996–97; Lee et al., 2006; Mathwick et al., 2001). In line with other online retailing research, some of the previous work related to mass customization also found that the consumer expected mass customization to be fun and exciting (Fiore, et al., 2004; Piller & Muller, 2004), and therefore, this study supports that consumers’ enjoyment was caused by the online mass customization process. We suggest that online mass customization retailers should consider providing a pleasurable, useful, and user-friendly online environment for consumers when incorporating an online mass customization process.

The study incorporated two individual characteristics with TAM framework, web skill and fashion involvement. The results show that consumers who believe that they are skilled with using the Web perceived online mass customization process to be easy to use, manageable and enjoyable. Codesign process requires consumers’ participation to select right options to customize products, therefore, individuals with confidence to handle the process would be an important factor to consider for the practitioners. Similar to web skill, previous research indicated that self-efficacy had a significant impact on individuals’ adoption of Internet technology (Eastin, 2002; Eastin & LaRose, 2000), and current research also asserted the importance of the factor as one of individual characteristics to predict online mass customization context.

In addition to web skill, fashion involvement variables also examined as one of individual characteristics and the results show that consumers with greater fashion involvement perceived the online mass customization process more useful and enjoyable than those with lower fashion involvement. Interestingly, Piller and Muller (2004) found that the countries like Italy and Spain, which are more fashion conscious, are more likely to reject of mass customization. This may be because consumers in those countries who like to follow the trends in fashion think that mass customization doesn’t fit in this mold. In the present study, participants’ level of fashion involvement was very high: mean values of all three items are greater than 6 in a 7-point scale. Korea is also known as a very fashion conscious country in Asia. Therefore, the findings of the present study somewhat contradicts with Piller and Muller (2004) in that consumers with high fashion involvement perceive online mass customization process as more useful and enjoyable. Although there are some different findings from previous studies, it does provide the strong potential for online mass customization in targeting young adults in Korea, and does suggest further study about mass customization in Korean market.

Strong effects from perceived usefulness and perceived enjoyment in TAM framework to attitudes toward online mass customization shows that young adults who were participants of the present study highly considered those two variables


compared to other variables (control and ease of use). One of the significant contributions of this study was to investigate the effect of perceived control on TAM. This attempt extends the TAM and the mass customization literatures. The role of the control has been overlooked in TAM as previous research has indicated (Mathieson, 1991; Venkatesh, 2000). It is important not to confuse the consumers who might not be comfortable using the mass online customization (Duray et al., 2000; Piller, 2003). The study found that the effect of perceived control significantly influences attitudes toward online mass customization. That is, consumers who perceived that they could control the codesign process had greater positive attitudes toward online mass customization. This result supports Godek et al.’s (2004) conclusion that control over customization would influence consumers’ responses to the process. This finding suggests that considering the perception of consumers’ control was a significant determinant of attitudes toward online mass customization along with other constructs in TAM. As previous work related to control indicated, control is an important factor in how people feel about a situation and how they think about the outcome (Langer, 1975; Tompson, 1981; White, 1959).

The present study has several theoretical implications to academia. First, the findings of the study asserted TAM framework online mass customization context with an integration of individual variables. TAM was appropriate framework to explain consumers’ attitudes toward online mass customization setting. Moreover, two variables with individual characteristics, one skill related and the other considered their interest in fashion were also explained constructs in TAM. Therefore, the study suggests that further study related to individual levels as antecedents of each of TAM construct would be valuables. Furthermore, the present study has made significant steps in integrating perceived control into the TAM construct by not just comparing two models of TAM and TPB as Mathieson (1991) did. Moreover, the significant effects of perceived control on consumers attitudes toward online mass customization suggest that understanding the levels of skill needed to participate in the online codesign process of a target market would be the first step for a company that is planning to use the mass customization as a marketing strategy. Therefore, this provides that perceived control is a crucial variable to explaining new technology acceptance along with other variables, and we would strongly suggest considering it as an addition to TAM framework in future study.

Based on the results of the study, we conclude that online mass customization was explained by extended TAM, perceived usefulness, perceived ease of use, perceived enjoyment, and perceived control in that consumer attitudes toward online mass customization was enhanced by four constructs directly and indirectly. Moreover, consumer responses to the mass customization process, willingness to purchase mass customized products and willingness to recommend that friends purchase mass customized products through online retailers, also increased directly by attitudes toward online mass customization, and four constructs in TAM (e.g. perceived usefulness, perceived ease of use, perceived enjoyment, and perceived control) indirectly. Therefore, ensuring these TAM constructs in
developing and providing online mass customization would be crucial to attracting consumers.

The present study has some limitations. The sample consisted of college-age students, mainly females (75.6%) in Seoul, Korea; this hinders the generalization of the results. To understand consumers’ responses to online mass customization, considering gender effect in how people respond to codesign would be valuable. With the balanced number of participants comparing both gender effects might provide interesting results in consumer attitudes towards online mass customization. Moreover, this age group was adept at using Internet technology, so this might influence their perception of the codesign process. Administering this survey to the general population, would include older consumers who have less experience with computers and would therefore provide different results. In addition, the product used in the mass customization process was athletic shoes; therefore, some limitations were related to product involvement in the present study. However, as industry reports indicated the group most interested in the mass customization process is women between the ages of 16 to 24 years (“Customized clothing,” 2005), the sample was appropriate for the mass customization study. Furthermore, not all industries are suitable for mass customization (Comstock, Johansen, & Winroth, 2004; Radder & Louw, 1999). The present study examined consumers’ perceptions about a current codesign process for athletic shoes manufactured by a real company, and demonstrated its acceptance among young adult consumers. Moreover, the respondents did not actually participate in the codesign process in the study. Therefore, it would be interesting to examine consumer attitudes toward the online mass customization with actual participation in the online codesign process, and compare the results of the study with the present study. In addition, there are two variables in the model that are measured by single-item measure. This might cause the results that show significant weak explanation of willingness to purchase mass customized products from online retailers ($R^2 = .07$) compared to willingness to recommend for friends to purchase mass customized product through online retailer ($R^2 = .24$). Further study with multiple-item measure steps for these variables would be valuable. Future research may explore other product categories in order to examine consumers’ experiences of mass customization, and extend the sample to other age groups such as baby boomers. As Goldsmith and Freiden (2004) indicated, this group of consumers has a strong sense of individualism. Understanding customer preferences in terms of choices in the codesign process, and examining the degree of the choices provided in the codesign process would be beneficial to both industry and academia. Furthermore, studying consumers’ perceived risk of mass customization would be rewarding.

References


Hibbard, J. (1999, April 12). Assembly online: The web is changing mass production into mass customization. *Information Week*, 85–86.


About the Authors

**Hyun-Hwa Lee** is an Assistant Professor in the Division of Textiles and Apparel at The University of Texas at Austin. Her research interests include consumer behavior in a multi-channel retailing context and effects of technology on marketing and retail environments.

**Address:** 1 University Station, A2700, Austin, TX 78712, USA  
**E-mail:** leeh@austin.utexas.edu

**Eunyoung Chang** is an Assistant Professor in the Department of Fashion Design at Yuhan University in Korea. Her major research area is fashion consumer behavior related to emotional consumption and digital shopping behavior.

**Address:** 636 Gyeong-in Ro, Sosa-Gu, Bucheon, Korea  
**E-mail:** eunyoung@yuhan.ac.kr