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Do customization programs of e-commerce companies lead to better relationship with consumers?

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ABSTRACT

The purpose of this study is to propose a model that explains the consumers' perception of customization in e-commerce. This study suggests two determinants of consumer attitude toward the e-commerce website with customization options: perceived participation and perceived company responsiveness. Consumer attitude was posited to influence consumers' intention to consider a long-term relationship with an e-commerce company. In this model, two consumer characteristics—consumer expertise and preference stability—were considered as moderators of the relations between consumers' perception of participation and company's responsiveness and consumer attitude toward the customization program. The model was tested by structural equation modeling (SEM) using AMOS 14.0, and the posited relations were confirmed. The moderating effect of preference stability was found significant. The perceived participation level of those with a more stable preference influenced their attitude toward the customization experience, while the company's responsiveness was influential only for those with a less stable preference.

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1. Introduction

According to ACNielsen' s report (2010), approximately 875 million people worldwide have shopped online, and this percentage went up 40 percent in two years. eMarketer (2011) predicted that the e-commerce market would reach 323 billion euro ($407 billion) in sales by 2011, accounting for 15.6 percent of overall retail sales. In addition, as consumers actively share information on products online, they have evolved into active participants who voice their opinions regarding various marketing activities of firms (Joo and Kim 2002). Although some businesses such as computer (e.g., www.dell.com), motorcycles (e.g., www.vtx.honda.com), cars (e.g., www.scion.com), specialty chemicals (e.g., www.chemstation.com), candy (e.g., www.mymms.com), and postage-stamp (e.g., www.stamps.com) have already actively executed online customization services, not much of academic attention has been paid on online customization until recently (Puligadda et al. 2010). Verhoef et al. (2009) also called for more future research that can delve into the impact of technology-mediated interactions in retailing on customer experience. Therefore, research is needed on new marketing strategies that can satisfy these proactive online consumers. One of the proven ways that online retailers may respond to their consumers is providing customized products and services.

Customization is one of the strategies adopted by online retailers to better serve their customers. Online interaction and real-time data distribution available in the e-commerce environment have helped firms understand their consumers' needs better and faster, and thereby cultivated an environment suitable for customization (Coupey 2001). Amazon.com is a good example that has well utilized the Internet, collected information on customers and thereby providing truly-customized services. Another example, and even more concrete evidence, is the case of www.threadless.com. Threadless.com is a T-shirts company that displays wide-ranging designs, colors and artworks of T-shirts, and produces and sells them according to its customers' orders. In addition, its customers often provide their artwork to the company so that it can develop a new product out of customers' designs. This is a great example of company–customer co-creation, and bigger companies like Nike, Land's End, and Levi's also have adopted various systems of customization to provide products and services better fit to their customers' needs.

Consumers are exposed to greater uncertainties on the Internet than they would be in brick-and-mortar stores. These uncertainties, such as the risk of fraudulent websites or privacy issues on top of the inability to examine apparel products, may influence consumers when they make a purchase decision. Developing solid

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relationships between consumers and companies is therefore a very effective way of reducing consumer uncertainties. The merit of a solid consumer-firm relationship lies in the fact that it ultimately influences consumer behavior. If a consumer has a good relationship with an e-commerce company, the services provided in the company's website to the consumer will minimize his/her perceived risks, induce repeated visits and purchases from the websites, and generate positive word-of-mouth effects (Crosby et al.1990, Henning-Thurau and Klee 1997, Jap et al. 1999, Kim and Cha 2002).

Customization programs in e-commerce are established based on the interaction of a company with its consumers and thus may bolster the relationship. During interaction, relationships are built among the participants, and the processes and consequences of the relationships determine the quality of the relationship. The discussion of customization and relationship quality therefore will be meaningful in establishing a firm's marketing strategies, considering that the ultimate purpose of a firm's marketing activities is to develop an enduring relationship with consumers. A strong and affirmative relationship quality positively influences consumer loyalty toward the firm (Schlesinger and Heskett 1991). Its many benefits include increased sales and positive word-of-mouth effects (Reichheld 1996) and high customer retention rates (Reichheld and Sasser 1990). Particularly for e-commerce, consumers prefer certain online shopping malls and willingly sign in for membership of particular sites, which implies a long-term relationship (Park 2001).

Although many cases evidence the value of mass customization strategies, caution is needed in implementing the strategy. Mendelson and Parlaktürk (2008) found that a firm with an inferior cost or quality position is less likely to benefit from the customization strategy. Besides, certain consumers are reluctant to utilize customization services. As Rust and Chung (2006) suggested, customization determines the customer satisfaction and relationships, consequently, influences the company's financial performance. Despite this significance, however, it has rarely been discussed in the manner through which consumers' perception of firm's customization efforts ultimately influences the consumer-firm relationship. The present research seeks to empirically explore the relations between customization and relationship quality, and identify possible moderators of such relations from consumers' perspectives rather than companies' perspectives. We focused on how consumers form attitude toward a customization programs of online retailers in response to their own input and company's input, thereby discussing the effectiveness of companies' activities.

This research pursues two objectives: (1) identifying a model that explains the consumers' perception of apparel customization in e-commerce in order to determine how their perceptions influence the quality of consumer-firm relationship; and (2) identifying the consumer characteristics that moderate the relations between consumer perception of customization and their attitudes toward the relationship quality. We expect to provide more meaningful guidelines to online apparel retailers as they try to adopt customization in the rapidly expanding apparel e-commerce business.

2. Conceptual background

2.1. Consumer response to apparel customization programs in e-commerce

Customization refers to the activity of collecting information from customers and tailoring products, services and transactional environment to meet their needs (Smith and Barclay 1997, Srinivasan et al. 2002). In e-commerce, consumer-firm interaction is initiated when the consumer logs onto a website, and continues even after he/she leaves the website. For example, the company may send e-mail messages informing the customer of the delivery status and providing information when new products that the customer would be interested are made available.

Therefore, customization in e-commerce may be defined as the activities that companies perform in order to meet the customers' needs, by utilizing the interactivity, connectivity and openness of the Internet, applying the information to products and services through a flexible corporate process, and providing the products and services to customers at competitive prices. Regarding consumer responses to customization, Simonson (2005) suggested a four-stage model: preference development, perception of the offer, acceptance or rejection of the offer, and maintaining customized relationships. The "Preference development" stage occurs before consumers are exposed to the companies' website, and the outcome of this stage depends on the personal traits or attributes of the consumers. "Evaluation of the offer" is a process in which customers experience and perceive the companies' customized offers. "Acceptance or rejection of the offer" is a stage in which consumers form an attitude toward the final outcome of customization and decide whether to keep using the customization program for their future purchases. "Maintaining customized relationships" is a stage in which a long-term relationship is determined.

We formulated a conceptual framework of consumers' responses to apparel customization programs in e-commerce based on Simonson's (2005) consumer response model (see Fig. 1) and the attitude formation part of TRA model, which is based on the multi-attribute attitude model (Fishbein and Ajzen 1975). The difference between our model and Simonson's model is that Simonson focused on consumer response to the *product*, but we focused on consumer response to the *customization program,* which may include consumers' reaction to the process as well as the outcome of customization. Previous research asserts that customization program is appreciated by consumers not only for the value they achieve from the final outcome (product) but also for the enjoyable experience of participating in the production or design process (Kumamoto 2002, Chang and Lee 2010). We expected that consumers' attitudes toward the customization program would reflect consumers' evaluation of their experience as a whole. Thus, consumers' attitude toward the customization program is a better antecedent of their intention for long-term relationship with the retailers than their attitude toward a product.

Consumers log onto an Internet apparel shopping mall with varying preferences and demands. In the offer-evaluation stage, consumers have a chance to experience the customization program offered by an Internet shopping mall while exploring different options to customize the product. Consumers perceive and evaluate the attributes of the customization program. Fishbein's multi-attribute attitude model (Fishbein and Ajzen 1975) suggests that consumers will consider various attributes of the customization program and form an attitude toward the program based on how they perceived the attributes. In the acceptance/rejection stage, consumers form a positive or negative attitude toward the customization program in general as they decide whether or not they want to purchase the customized product. In other words, consumers will decide whether or not the experience was favorable. Lastly, in the maintaining customized relationship stage, a positive perception of the customization program experience will result in future commitment to relationship. If the experience of customization is favorable, they will form a positive attitude toward the Internet shopping mall, and consequently build an intention to invest in a further relationship with the company.

In addition, Simonson (2005, p. 35) claimed that consumers' preference was not always clear in the preference development stage, but the stability of their preference had impact on their

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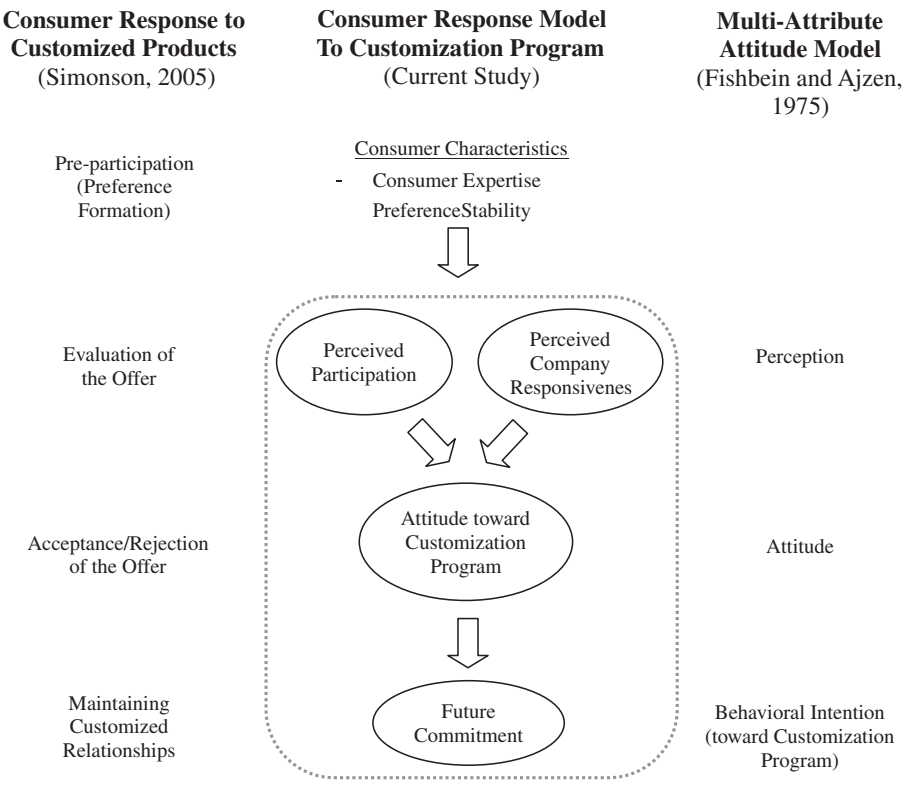

Fig. 1. The conceptual model of the study.

evaluation on provided options. When consumers first encounter a customization program, they may not know their roles or may feel that they are not fully capable of conducting the roles. However, they are still responsible for the roles until the customization is completed. In the course of that, consumers are required to have expertise to some extent. Accordingly, such uncertainty or incompetency will affect their perception of the customization experience. This implies that consumers' *preference stability* and the extent to which consumers are ready to perform their role in the process, or *consumer expertise*, can moderate the role of consumer perception in the offer-evaluation stage. In the following section, the relations between the variables at each of these stages are examined in more detail.

2.2. Perception of a customization program

The multi-attribute attitude model suggests that consumers' perception of product attributes determines their attitudes, which in turn affect their behavior intention. The attributes that are considered here are usually more than one, and thus consumers consider multiple attributes when they develop their attitude toward a certain object. Consumers who log onto a website with a customization program are exposed to a combination of information and asked to participate in the process of customization to a certain degree. According to the previous literature, if other elements (such as product offerings and service levels) are held constant, a customization program may be characterized by the level of consumer participation (Fredriksson and Gadde 2005, Gilmore and Pine 1997, Lampel and Mintzberg 1996, Miceli et al. 2007) and the company's ability to actually deliver the demanded products in the way the consumer wants (Miceli et al. 2007, Srinivasan et al. 2002, Silveria et al. 2001). We propose that these two elements are important attributes of a customization program and consumers' attitude is determined based on their perception of these attributes.

Gilmore and Pine (1997) mentioned the degree to which consumers participate in the production process including design, product assembly and delivery as one factor that determines the content of a customization program. Other scholars (Fredriksson and Gadde 2005, Lampel and Mintzberg 1996; Miceli et al. 2007) also asserted that higher level of consumer participation may warrant better fit to customers' needs. Some customization programs offer a variety of options from which consumers can choose, while other programs have limited options. Generally, consumers are known to be satisfied with the results when they participate in the process (Franke et al. 2010), and consumers may feel they are more actively participating when they have a wider range of options. Even with the same level of options provided, however, their perception of participation may differ depending on consumers' previous experience or expectations.

The second element of a customization program is the company's responsiveness, or the ability to respond to the customization request of consumers. Previous literature (Srinivasan et al. 2002; Silveria et al. 2001) contended that the level of customization is determined by the firm's characteristics, such as agile production, supply chain management, customer-driven designs and production, and simple manufacturing. Miceli et al. (2007) also mentioned the firm's interaction flexibility as an indicator of a high level of customization. If companies have highly flexible systems, they can offer more customized programs. As in the case of consumer participation, however, consumers' perception of a company's flexibility and agility may play a more important role than the actual or objective levels of the company's flexibility and agility in determining consumers' attitude toward the customization program.

This study proposes two factors as determinants of consumers' evaluation of a customization service: (a) *the perceived participation*, or consumers' perception of their own input in companies' design, production, assembly and delivery activities, and (b) *the*

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perceived company responsiveness, or consumers' perception of the companies' input, or the flexibility and speed with which companies respond to their demands.

2.3. Attitude toward the customization program

The acceptance/rejection stage of Simonson's model (2005) is associated with consumers' purchase decision. While they are making the decision whether or not they should accept the offer, consumers will also form an attitude toward the customization program, whether the customization program was favorable.

According to the multi-attribute attitude model, consumers form attitude toward a product based on their perception of multiple attributes of the product, and positive perception forms positive attitudes in this process. Accordingly, it is expected that consumers will form their attitudes toward a customization program based on the key attributes of customization, their own input and the company's input, and they will develop more positive attitude when their evaluation of these attributes of the customization program is positive.

As previous research (Franke et al. (2009), Randall et al. (2007)) contended, we expected the perception of higher level of perceived participation will lead to a better attitude because the more input consumers provide in the customization process, chances are better that retailers will provide products that fit closer to consumer preference. We also expect for the same reason that the perception of higher level of company responsiveness will positively contribute to consumer attitude toward customization program. If consumers perceive that the company has the ability to deliver what they demand for, it is more likely they form a better attitude. The following hypotheses are posited:

H1. Consumers' perception of the participation attribute will have positive effects on their attitudes toward a customization program.

H2. Consumers' perception of the responsiveness attribute will have positive effects on their attitudes toward a customization program.

2.4. Consumer-firm relationship quality

Based on multi-attribute attitude model, consumers' positive attitudes influence their intention to purchase. Dodds et al. (1991) suggested that consumers' favorable attitude toward a brand have positive effects on consumers' intention to continuously choose the brand. In other words, positive attitudes apparently lead to the intention to repeat purchase, not only a single incidence of purchase. Recent research on online customization (Teng 2010) also supported that satisfaction and immersion with customized service increase the loyalty intention. Accordingly, consumers' attitudes toward a customization program will influence their intention to continuously use the program. Such intention refers to consumers' tendency and intention to continuously interact with products and/or services, not a one-time purchase intention. Customer-firm relationship quality can be strengthened by the customers' trust in and commitment to the partner firm (Morgan and Hunt 1994). Besides, satisfaction with the relationship involves the relationship between trust and commitment (Walsh et al. 2010). Considering that customers' intention to build long-lasting relationships with an online shopping mall is a long-term indicator and represents enduring desire to maintain a relationship, we thereby regard future commitment to relationship as a dependent variable. And we expect that customers' attitude based on their perception toward a customization program will have influence on their future commitment to relationship because the perception of customization programs reflects consumers' confidence in company's ability and trustworthiness.

The link between perception of customization, attitude toward the customization program, and the development of consumer-firm relationship was asserted by Hanson (2000) as well as by Simonson (2005). According to Hanson, customization facilitates consumer participation in the design, production, and delivery of products and services, and influences the development and continuation of consumer-firm relationships. Simonson suggested that consumers' evaluation of customization programs influences the attitude toward customized offers, and eventually the maintenance of customized relationships. In this regard, it is expected that their attitude will have positive influence on the future commitment to relationship. Therefore, the following hypothesis may be specified regarding customization and future commitment.

H3. The consumer attitude toward the customization program will have a positive influence on the consumers' future commitment to the relationship with the company.

3. Consumer characteristics as moderators

Consumers bring in their personal traits or attributes when they come in contact with the customization program (Miceli et al. 2007, Mills and Morris 1986, Puligadda et al. 2010, Simonson 2005). Since all individuals are different, their personal traits and attributes will influence their perception of and attitude toward customization and the resulting relationship quality. Verhoef et al. (2009) also suggests that the effect of technology-mediated interactions in retailing can be moderated by consumers' characteristics such as technology readiness. The related literature pointed to two consumer characteristics that moderate the relationship between consumer perceptions of customization on relationship quality: consumer expertise and preference stability.

3.1. Consumer expertise

Mills and Morris (1986) and Suh (2008) argued that a certain level of consumer knowledge is necessary for consumer participation in production to be successful. Miceli et al. (2007) cited that knowledge is one of the dimensions that account for unique characteristics of online consumers. Furthermore, Puligadda et al. (2010) verified that consumers' objective and subjective knowledge of customized products moderate the impact of their evaluation about customization attributes on their satisfaction with customization platform. Besides, Mathwick et al. (2010) used the term Computer Mediated Customization Tendency (or CMCT) to refer to individual differences in evaluating online customization program.

In the customization program, consumers need to have sufficient knowledge about the product they will purchase. If the customers do not feel comfortable to play this role in the production process, not only will their performance be poor, but they will also be distressed, which will result in doing harm to both the consumer and the firm. Therefore, the positive effect of consumer perception of customization may be maximized for the consumers who are capability to carry out the role imposed by companies. Accordingly, "consumer expertise" has been regarded as one of the consumer characteristics that moderate the relationship between evaluation of customization and future commitment to relationship. We expected that higher consumer expertise would enhance the relationship between the consumer perception of customization and future commitment to relationship.

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H4. The effect of consumer perception of customization on future commitment to relationship will differ by consumer expertise. The effect of consumer perception of customization will be stronger for the consumers with more expertise than for the consumers with less expertise.

3.2. Preference stability

Simonson (2005) noted that consumer responses toward customization differ according to the stability/instability or full/weak development of consumer preference. For Simonson, "developed preference" referred to the clear definition of the desired product. Other studies (Fiore et al. 2004, Lee et al. 2010) revealed that consumers who have a higher tendency to try new or different appearance styles and to see how they look on the body tend to be more likely to adopt mass customization option or image interactivity technology in online shopping and show positive attitude toward the online retailer. Franke et al. (2009) and Shen and Ball (2011) also found that customers' insight into their preference and their ability to express the preferences has positive effect on the benefits derived from customization or personalized recommendations. Here, consumers' insight into and the ability to express preferences is analogous to Simonson's discussion of stability of preference. In other words, these scholars state that the stable and well-developed preference toward desired products influences the acceptance of customization program. Therefore, we considered "preference stability" as another characteristic consumer feature that influences perception of customization and future commitment to relationship, and define this term as 'the extent to which consumers can clearly define what attributes they want the product to have, and how stable their definition of the desired product is.' Consumers who are not clearly aware of their preference may have difficulties proceeding through the customization process because customization programs ask for input from the consumers. The positive effect of perceived customization may be maximized for the consumers who have a stable and well-developed preference and clearly knows what they want or do not want. Therefore, the following hypothesis was posited:

H5. The effect of consumer perception of customization on future commitment to relationship will differ by consumers' preference stability. The effect of consumer perception of customization will be stronger for the consumers with well-developed preference than for the consumers with less-developed preference.

To summarize, the factors that determine consumers' perception of customization (i.e. perceived participation and perception of responsiveness) and future commitment to relationship were identified through a literature review. Consumer perception of customization is expected to positively influence consumer attitude toward the customization program, and consequently, future commitment to relationship. In addition, consumers' perception of customization and companies' responsiveness will be moderated by individual consumer's expertise and preference stability. Individual consumer characteristics themselves may not directly influence relationship quality, but, depending on the level or the intensity, they will adjust the effect of consumers' perception of customization on their attitude toward the customization program.

4. Research methods

4.1. Sample

Data were collected online in South Korea, with the help of an online survey company. Korean consumers were considered appropriate for the current study as they are very fashion-oriented and technology-savvy, with the highest percentage of online shoppers in the world (ACNielsen 2010), hence many of them are familiar with online shopping procedures. The annual volume of Internet shopping mall transaction in South Korea was US$21 billion in 2010, with the highest share of 16.9% being attributable to clothing and other fashion-related products (Korea National Statistical Office 2011).

The target population was consumers in their 20s and 30s who have bought apparel products in Internet shopping malls. The rationale for selecting this age group was twofold: first, they are more likely to feel comfortable using the computer than the older age groups, and second, this group is known to have purchased apparel products online more than any other age groups in Korea. Korean Netizen Profile survey which is conducted annually to track changes in the IT related lifestyle of Koreans, revealed that 65.6% of the respondents in this age group are online apparel product purchasers in October, 2010 (Korea Federation of Advertising Association & Internet Marketing Council of Korea 2011). An email invitation to participate in a study on online apparel customization was sent to the panel members of the online survey firm within the age range. This survey firm recruits panel members who are willing to respond to marketing research at all times proportional to the age and occupation distribution of Korean population. The firm provides monetary rewards to the panel members when they complete the research questionnaire. A question asking whether they have bought apparel products in Internet shopping malls was posed as a filtering question, and only those who answered 'yes' to this question participated the survey. The respondents were led through an online customization process for a casual shirt, and then answered the questionnaire. Out of the 419 responses collected, 390 were included in the final analysis, after 29 incomplete responses or outliers were excluded. The final sample had a gender ratio of about 1–2, 33.6 % being women and 66.4 % men. According to the statistics from a previous research (Sung and Jeon 2006), men are more likely to buy apparel online in South Korea. Besides, Korean Netizen Profile survey released in October, 2010, also revealed that 60% of all the male respondents, especially, 80% of the ones in their 1920's or 1930's have purchased apparel products online. The sample, therefore, was regarded as representing the online apparel shoppers in South Korea and acceptable for the current study. Besides, this sample is appropriate for the product which is casual shirts, because it is more likely to be purchased by men even though it is unisex The average monthly clothing expenditure of the respondents was approximately US$115. Table 1 shows the characteristics of the respondents.

5. Stimuli

We established an online apparel shopping website in which subjects can experience a customization program of a casual shirt. The reason we chose apparel as the product category is twofold: (1) apparel is a product category frequently purchased online, and (2) may provide augmented benefits through customization. According to an ACNielsen report (2010), clothing/accessories/shoes had been steadily rising in the rank of the most-sold items, and ranked the second (36%) next to books (41%) in year 2008. In comparison, video/DVDs/games category was 24% and airline tickets/reservations 24%. Especially in Korea, the fashion category ranked the first (16.9%) of the most-sold items, followed by the travel and reservation service (13.5%) in year 2010 (Korea National Statistical Office 2011).This confirms that e-commerce has established itself as a common distribution channel of apparel and fashion products. Also apparel is closely related to the wearer's self-image, personality, and physique. Consumers therefore tend to have very diverse and specifically-defined needs, which warrant

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Table 1
Respondents characteristics.

Variables	*n* (%)	Variables	*n* (%)
Gender		*Monthly personal allowance (m = US$317)*	
Female	131(33.6)	US$42∼83	32(8.2)
Male	259(66.4)	US$92∼167	58(14.9)
Total	390(100.0)	US$175∼208	15(3.8)
		US$217∼250	116(29.7)
Age (m = 31.2)		US$258∼292	13(3.3)
21 ∼ 24	45(11.5)	US$300∼333	23(5.9)
25 ∼ 29	119(30.5)	US$342∼375	4(1.)
30 ∼ 34	94(24.1)	US$383∼417	86(22.1)
35 ∼ 39	132(33.8)	US$425∼825	26(6.7)
Total	390(100.0)	Over US$833	17(4.4)
		Total	390(100.0)
Type of apparel previously purchased on the Internet			
Suit	34(8.7)	*Monthly expenditure on apparel (m = US$97)*	
T-Shirt	161(41.3)	Up to US$42	130(33.3)
Casual Shirt	46(11.8)	US$50∼83	132(33.8)
Sweater	18(4.6)	US$92∼125	35(9.)
Khakis/Jeans	86(22.1)	US$133∼167	63(16.2)
Jumper	32(8.2)	US$175∼208	5(1.3)
Coat	5(1.3)	US$217∼250	16(4.1)
Skirt	3(.8)	Over US$333	9(2.3)
Others	5(1.3)		390(100.0)
Total	390(100.0)		

the continual increase in consumers' demand for customized apparel (Kim 2008).

Casual shirts were selected as the shopping item because they are actively traded in Internet shopping malls, easily customizable, and may be bought and worn regardless of gender. In fact shirts are the items which can be relatively easily customized offline as well as online. In Korea, since online customization is at the burgeoning stage, shirts, either casual or dress shirts, are often selected for customization due to their standardized production process. The parts of a shirt are traditionally modularized for made-to-measure production. In the stimuli, the design of an actual e-commerce shopping mall was used, and the price of the casual shirt was set at 29,000won, which is approximately US$25. A basic prototype of a casual shirt was provided with the options of parts that consumers can select and modify on their own. For example, various options of fabric materials, colors, and trimmings (e.g., collar, pocket, cuffs design) were provided in pictures so that consumers can select what they prefer. In addition, instead of selecting a standardized size of products, consumers could choose to alter the size of each part of the shirt.

After participating in the customization program, respondents were asked to answer questions designed to measure their perception of customization and relationship quality. Fig. 2 shows example pages of the website.

6. Measures

A questionnaire was developed to measure the perception of and attitude toward the apparel customization program and their commitment to relationship. Future commitment to the relationship, a key element of the relationship quality was measured in terms of respondents' willingness to commit to the relationship with the e-commerce company, as well as consumer characteristics such as consumer expertise, preference stability, and demographic characteristics. The questionnaire used a 7-point Likert scale ranging from 1 for "strongly disagree" to 7 for "strongly agree." Through a preliminary survey with 30 apparel experts, the adequacy, validity and reliability of the questionnaire were confirmed.

The scales to measure the *perceived participation level* were derived from previous studies (Hubbert 1995; Lampel and Mintzberg 1996; Yoon et al. 2005) and were modified to fit the online apparel purchase situation. The scales measured the degree to which the consumers perceived that they were asked to participate in designing and constructing the products, provide their private information needed to tailor products and services to their demand, and make choices in the service process. The measures of *perceived company responsiveness* were developed based on Silveria et al. (2001) and Holweg (2005). The measure was adapted in order to evaluate whether or not companies could provide products and services of the exact design and specified quality at the speed demanded by consumers. The measures of attitude toward the customization program consisted of 5 items from Batra and Ray (1986) and Edell and Burke (1987). These questions measured the general feelings and evaluations of consumers of the customization program. One item related to the enjoyability of the shopping mall was excluded in order to improve the reliability and validity scores.

The relationship quality is often measured in terms of its intensity, depth and duration (Storbacka et al. 1994, Barnes 1997). In this study, however, respondents were put in a situation to judge a hypothetical company, so the intensity or depth of the relationship did not seem relevant. Accordingly, the future commitment to relationship was measured by the intention to purchase shirts from the shopping mall, intention to repeat visit, and intention to recommend to others. The measure developed by Kumar and Scheer (1995) was used to measure this concept.

Since appropriate measures did not exist for the moderating variables, *consumer expertise* and *preference stability*, the measures for these variables were developed by the authors, following a psychometric scale developing method. We interviewed three industry experts who are working for apparel companies and three consumers who had experience purchasing clothing items online. In the interview, questions were asked related to the stages of the purchase process that require consumer participation and the expected consumers' roles in the purchase process and the knowledge required to carry out the roles and what preference decisions are needed by the consumers to successfully make a purchase of a casual shirt in an online shopping mall with customization features. Based on the list of purchase process and knowledge mentioned in the interviews, 10 statements were written out on *consumer expertise* to measure whether or not consumers are familiar with and

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Fig. 2. Examples of website pages (choices of fabrics and design details).

competent to carry out the procedure they need to go through in order to purchase the product exactly fit for their desired specifications and to demand various services. From the list of preference decisions mentioned in the interviews, 11 *preference stability* statements were written to measure the extent to which consumers can clearly define what attributes they want the product to have, and how stable their definition of the desired product is.

6.1. Reliability and validity of the measures

The reliability and validity of the measures were examined using SPSS 12.0 and AMOS 16.0. The Cronbach's alpha levels for the final measures used were higher than .80. In order to verify the discriminant validity and convergent validity of the variables, confirmatory factor analyses were conducted. The measurement models showed a good fit of the model to the data. Even though the chi-square was significant, the CFI and GFI were above .90 and RMR was lower than .05 and RMSEA was lower than .07. The convergent validity was evaluated through the significance of *t*-values for each path coefficient of the confirmatory factor analysis model (Fornell and Lacker 1981), and the construct's estimated average variance extracted (AVE) above .50 and composite reliability (CR) above .70. As shown in Table 2, the *t*- values for all path coefficients were significant, all the construct AVE estimates were

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Table 2
Results of Confirmatory Factor Analysis ($\chi 2 = 199.61$, *d.f.* = 71, Q-Value = 2.81, GFI = .932, CFI = .974, RMR = .024, RMSEA = .069).

Measurement weights	Standardized estimate	AVE	CR
P1 → perceived participation	.850*	.771	.895
P2 → perceived participation	.854*		
P3 → perceived participation	.851*		
P4 → perceived participation	.819*		
C1 → perceived company responsiveness	.844*	.767	.896
C2 → perceived company responsiveness	.862*		
C3 → perceived company responsiveness	.825*		
Att1 → attitude-customization program	.873*	.712	.936
Att2 → attitude-customization program	.898*		
Att3 → attitude-customization program	.829*		
Att4 → attitude-customization program	.911*		
I1 → future commitment	.895*	.712	.934
I2 → future commitment	.836*		
I3 → future commitment	.895*		
Covariances	**Standardized estimate**	**SIC**	
Perceived participation ↔ company responsiveness	.873*	.762	
Perceived participation ↔ attitude	.695*	.483	
Company responsiveness ↔ attitude	.738*	.511	
Attitude ↔ future commitment	.937*	.878	
Perceived participation ↔ future commitment	.690*	.476	
Company responsiveness ↔ future commitment	.738*	.545	

* $p < .001$.

above .50 and CRs were above .70, which confirmed the convergent validity.

According to Fornell and Lacker (1981), for the construct to demonstrate discriminant validity, all construct AVE estimates should be larger than the corresponding squared inter-construct correlation estimates (SIC). Based on this criterion, all constructs except attitude and future commitment passed the criteria, yet the AVE of attitude (.712) and future commitment (.712) was lower than the SIC of attitude-future commitment (.878). To delve into the discriminant validity issue further, we referred to Anderson and Gerbing (1988), and Dunn et al. (1994)'s test of discriminant validity. According to this method, correlations among latent variables of the measurement model are compared to those of the theoretical model, in which all the correlations between latent variables are fixed to 1. For the model comparison, a chi-square test is recommended. If the chi-square difference test is significant, then the constructs are regarded to possess discriminant validity and the latent variables are considered to measure distinct constructs. Based on this, we calculated the chi-squares and tested the difference. The chi-square statistics for constrained model (theoretical model) and unconstrained were 73.34 ($df = 14$) and 64.13 ($df = 13$) each, and showed a significant difference ($\Delta\chi^2 = 9.21$, $p < .01$). Therefore we decided to maintain the two constructs in the research model. Besides, the statements used to measure attitude toward the customization program and intention to have a long term relationship were stated clearly distinct conceptually. Further, attitude and behavioral intention are theoretically expected to be highly correlated (Fishbein and Ajzen 1975), unless external restraints exist. Further, according to the results of the analysis, the relationship between perceived company responsiveness and future commitment to relationship was not completely mediated by attitude, which indicates that attitude and future commitment to relationship are not identical constructs. Cautions would be needed, however, in interpreting the results.

7. Results and discussion

7.1. Effect of consumer perception of customization program on future commitment

Structural equation modeling (SEM) with AMOS 16.0 was used to test the model. The latent variables for SEM were perceived participation, perceived company responsiveness, attitude toward customization program, and future commitment to relationship. The SEM results on the theoretical model are shown in Fig. 3.

Goodness-of-fit indices revealed that the χ^2 value was significant, but the Q value ($=\chi^2/df$) did not exceed 3, both RMR and RMSEA lower than .08, and GFI and AGFI higher than .90. All these indices confirmed the acceptability of the model. The paths from perception of company responsiveness and perception of participation to the attitude toward customization program were statistically significant. Therefore, both Hypothesis 1 and Hypothesis 2 were supported. In addition, the subsequent path from attitude toward customization program to future commitment was significant. The path coefficient for "attitude toward customization program → future commitment" was .85 ($p < .01$), and so Hypothesis 3 was supported. In general, the model implies that a higher perception of participation and company responsiveness will generate a favorable attitude toward the customization program, and if consumers have a positive attitude toward the customization program that the online store offers, they will have higher intention to invest in a good relationship with the firm.

Specifically, standardized path coefficients from perceived participation and perceived company responsiveness to attitude toward customization program were .30 and .46, respectively. This may indicate that consumers who perceive that companies are equipped with flexible and acute systems and committed to let consumers participate in the design process will have favorable attitudes toward customization program, and subsequently their commitment to relationship investment will grow stronger. In particular, perceived company responsiveness had a larger total effect ($r = .48$) than perceived participation ($r = .28$) on consumers' attitudes toward customization program. Therefore, companies are advised to emphasize their abilities to flexibly and acutely respond to customers' demands, and to make and deliver demanded products when implementing customization programs.

Furthermore, the coefficient of the direct path, "perceived company responsiveness → future commitment" was statistically significant (.21, $p < .001$), whereas that of "perceived participation → future commitment" was not. In other words, if consumers perceive that companies have the ability to respond to their needs promptly and flexibly, their intention for relationship investment will increase even when a favorable attitude toward the customization program is yet to be formed. The perceived participation, however, does not have a direct impact on the willingness to invest in further relationship. In other words, it is the company's ability or trustworthiness that counts, rather than consumer participation. Hence, a higher level of participation itself will not always lead to a better relationship quality unless consumers form a favorable attitude based on their experience.

When the paths from perception of company responsiveness through attitude toward customization program to future commitment were divided into direct effects and indirect effects, the total effect of perceived company responsiveness on future commitment was .64 ($p < .01$), with direct effects of .21 ($p < .01$) and indirect effect through attitude being .43 ($p < .01$). The stronger indirect effect via the attitude toward customization program than direct effect suggests that even the companies perceived to have good reputation may gain through establishing consumers'

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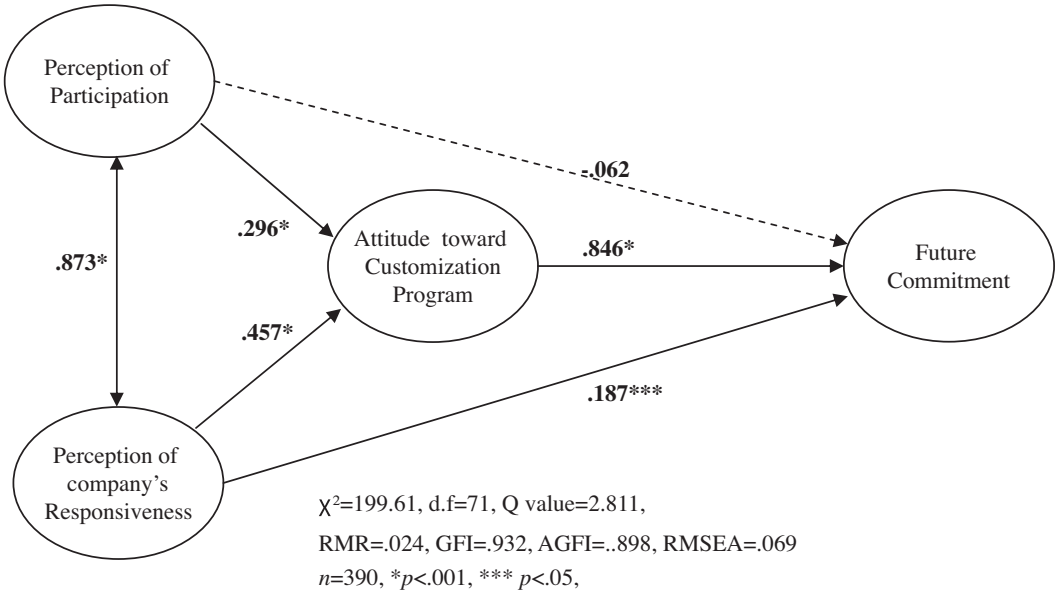

Fig. 3. Analysis results of the structural equation model of the effect of consumer perception of customization program on the consumer future commitment.

positive attitudes toward customization program because a stable positive attitude leads to a stronger relationship with consumers.

8. Consumer characteristics and their moderating effects

8.1. Moderating effects of consumer expertise

In order to identify how the overall paths of the model differ according to the consumer expertise in participation, the sample was divided into two groups (low- and high-consumer expertise groups) using K-means cluster analysis based on their consumer expertise scores. The rationale for using K-means cluster analysis instead of median split-half to identify groups was because consumer expertise was measured using multiple items, and these items may have different degrees of contribution to the group differences. Multi-group SEM was conducted to test the differences of the paths in the resulting two groups. The sample sizes of the low- and high-consumer expertise groups were 190 and 195, respectively. Table 3 compares the major goodness-of-fit indices of the multi-group comparison model.

According to the multi-group comparison results provided by AMOS 6.0, the fit indices for the unconstrained model (Model 1) and the invariant measurement weight model (Model 2) were not significantly different. In other words, the measurement weights for these two groups were not different. When Model 2 and Model 3 (invariant structural weight model) were compared, the fit indices were significantly reduced, indicating that the structural weights of the models for the two groups were significantly different. Therefore, Model 2 was adopted as the final model, and the hypothesis related to the moderating effect of consumer expertise (H4) was supported. Unlike the base model, the direct paths from perceived participation and perceived company responsiveness were not significant for group models. The multi-group comparison results are presented in Fig. 4.

For the low-consumer expertise group, the perceived participation affected attitude toward the customization program but the perceived company responsiveness did not. In comparison, for the group with high consumer expertise, perceived participation affected the attitude toward the customization program more than perceived company responsiveness did. It indicates that those who are less confident about their expertise as consumers showed more favorable attitudes when they perceived a higher level of participation in the customization process, which could be a challenge to them.

When pairwise parameter comparisons were made, two groups significantly differed in terms of the magnitude of all the structural paths, with the high-consumer expertise group showing larger path coefficients for all paths. The higher association between perceived participation and perceived company responsiveness for the high-consumer expertise group suggests that this group believed that companies that are able to respond to their demand in a due manner are more likely to provide a higher level of consumer participation, and vice versa, yet company responsiveness is more important than a higher level of participation. For this group, a positive attitude toward the customization program would induce them to commit strongly to a relationship with the company.

8.2. Moderating effects of preference stability

To identify the path differences according to the preference stability, the original sample was again divided into less- and more-developed preference groups, of size 190 and 195, respectively, using K-means cluster analysis based on their consumer expertise scores. A multi-group SEM was conducted to test the path differences. The direct path from perceived participation to future commitment to relationship was not significant for either group. Table 4 compares the major goodness-of-fit indices of the multi-group comparison models.

When a multi-group comparison was conducted, the comparison of the fit indices showed no significant difference between Models 1 and 2, which confirmed the invariant measurement weight. There was no significant difference between Models 3 and 4, however, indicating no difference in structural paths of the two groups. The Model 5 demonstrated a significantly reduced model fit. In other words, the correlation between perceived participation and perceived company responsiveness were different for two groups. The high preference stability group model showed a higher association between perceived participation and perceived company responsiveness ($r = .872$, $p < .001$) (see Fig. 5). This indicates that consumers who perceive they participated more in the process perceived higher responsiveness of the company or vice versa. Even though this association was comparatively weaker

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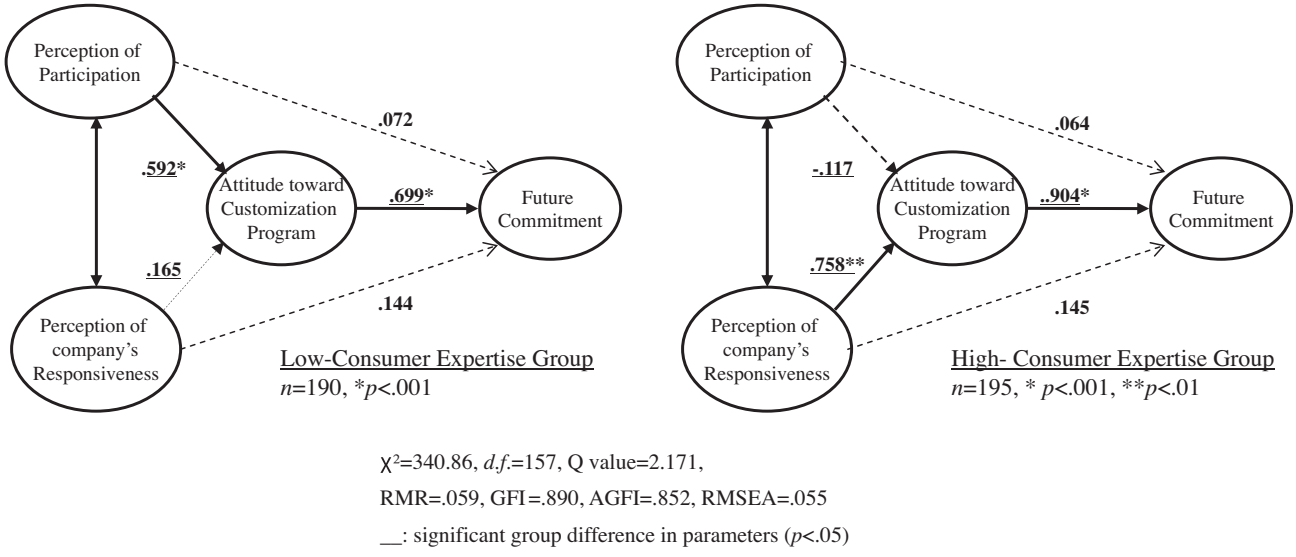
Table 3
Multi-group comparison models of consumer expertise groups.

Model	χ^2	*df*	χ^2/df	RMR	GFI	AGFI	RMSEA	Model	Δdf	$\Delta\chi^2$	*p*
Model 1	306.04*	142	2.16	.033	.899	.850	.055				
Model 2	320.36*	152	2.11	.043	.895	.855	.054	vs. Model 1	10	14.32	.159
Model 3	340.86*	157	2.17	.059	.890	.852	.055	vs. Model 2	5	20.49	.001
Model 4	366.07*	160	2.29	.143	.882	.845	.058	vs. Model 3	3	25.22	.006
Model 5	392.14*	162	2.42	.177	.876	.840	.061	vs. Model 4	2	26.07	.000
Model 6	419.09*	176	2.38	.174	.868	.842	.060	vs. Model 5	14	26.95	.020

Model 1: Unconstrained model.
Model 2: Invariant measurement weight model.
Model 3: Invariant structural weight model.
Model 4: Invariant structural covariance model.
Model 5: Invariant structural residuals model.
Model 6: Invariant measurement residuals model.
* $p < .001$.



χ^2=340.86, *d.f.*=157, Q value=2.171,
RMR=.059, GFI=.890, AGFI=.852, RMSEA=.055
__: significant group difference in parameters (p<.05)

Fig. 4. Customization-relationship models of consumer expertise groups (standardized estimates).

for low preference stability group, the correlation was also high and statistically significant ($r = .732$, $p < .001$). The hypothesis related to the moderating effect of preference stability (H5) was not supported.

9. Conclusions and implications

This research aimed to identify the effect of perception of customization program on the attitude toward the program and consumer future commitment to relationship in the e-commerce environment, while considering the moderating effects of consumer characteristics. For this purpose, a theoretical model was developed and tested through SEM. The study results are summarized with the following conclusion and implications.

First, a literature review of the previous research on customization was conducted to derive the factors that determine consumer perception of customization within the e-commerce environment, namely perceived participation and perceived company responsiveness. The effects of these factors on the future commitment to relationship in e-commerce setting were empirically identified. Companies may need to consider these factors in developing marketing strategies to implement customization programs with the purpose of enhancing relationship quality.

Second, by investigating the variables that moderate perception of customization and future commitment to relationship, this study identified the paths through which customization features contribute to the relationship quality. Strategic directions were suggested on how companies exercising customization could prevent customer from moving away from their online stores. According to our findings, both perceived participation and perceived company responsiveness had favorable influences on attitude toward customization programs, and a good attitude toward a customization program provided by an online store is helpful in building a better relationship with customers.

Encouraging consumers to participate in design, production and delivery of products and services, and assuring them that the company can flexibly and acutely respond to consumer demands are worthwhile efforts for companies to make, in order to enhance the relationship quality with customers. The perceived ability of the company to flexibly and acutely respond to consumer demands also found to directly influence the future commitment to relationship. In other words, even when consumers are not satisfied with the actual experience of customization, if the firm is perceived to have the ability to deliver what they demand, consumers may be willing to invest in a long-term relationship with the firm. This result is in accordance with the literature on customer relationship management (Crosby et al. 1990, Henning-Thurau and Klee 1997) that trust is an important component of relationship quality. Consumers' trust in the firm's ability seems to alleviate the perceived risk due to the inability to examine the product beforehand.

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Table 4
Multi-group comparison models of preference stability groups.

Model	χ^2	*df*	χ^2/df	RMR	GFI	AGFI	RMSEA	Model	Δdf	$\Delta\chi^2$	*p*
Model 1	297.54*	142	2.10	.033	.901	.854	.053				
Model 2	311.28*	152	2.05	.042	.897	.858	.052	vs. Model 1	10	13.74	.185
Model 3	319.87*	157	2.04	.053	.895	.859	.052	vs. Model 2	5	8.58	.127
Model 4	338.87*	160	2.12	.109	.889	.855	.054	vs. Model 3	3	19.00	.005
Model 5	342.37*	162	2.11	.117	.888	.855	.054	vs. Model 4	2	3.51	.173
Model 6	359.35*	176	2.04	.115	.880	.857	.052	vs. Model 5	14	16.98	.257

Model 1: Unconstrained model.
Model 2: Invariant measurement weight model.
Model 3: Invariant structural weight model.
Model 4: Invariant structural covariance model.
Model 5: Invariant structural residuals model.
Model 6: Invariant measurement residuals model.
* $p < .001$.

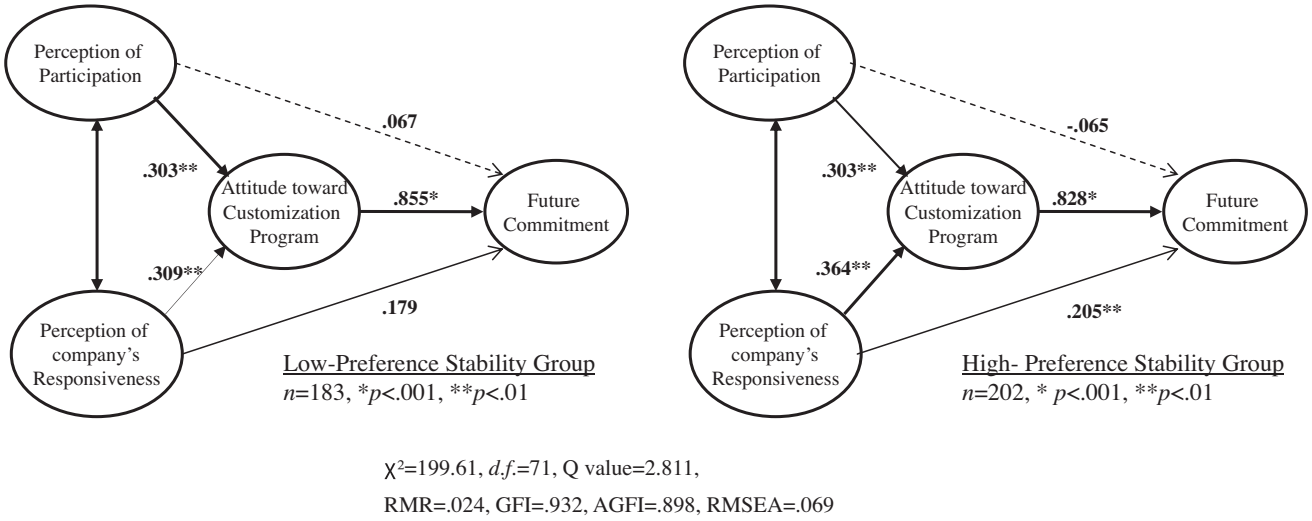

Fig. 5. Customization-relationship models of preference stability groups (standardized estimates).

Consumers' perception of company's responsiveness reflects the confidence in the company's competence to implement customization. Our finding that company trustworthiness leads to commitment to a long-term relationship, implies that well designed customization program can enhance the relationship between consumers and a firm. Though perceived participation showed no direct impact on future commitment, the concept is closely related with experience-based trust and has potential to enhance the relationship quality overall which was suggested by Chen and Dhillon (2003). Therefore, its indirect effect through satisfaction with the customization program needs further attention for research in the future.

The effectiveness of these efforts, however, may differ depending on the state or characteristics of the consumers. The consumer characteristics such as consumer expertise moderated the effect of these company efforts. Specifically, for the low-consumer expertise group, perceived participation correlated with better attitude, while the company's ability to respond was more influential for the high-consumer expertise group. This result was contrary to our expectation as well as to the findings from previous studies (Bendapudi and Leone 2003, Franke et al. 2009). A possible reason for disparity with previous research may be the influence of the firm's performance, which was not considered in the previous studies. The group differences may be interpreted that the high-consumer expertise group believes that they have the ability to judge a companies' performance and thus rely more on their judgment of the company than simply how much they are asked to participate. The low-consumer expertise group, on the contrary, seems to be influenced by the perceived level of participation because they are not confident about their judgment of the firm's responsiveness, and are less willing to commit to a long-term relationship even when their purchase experience was satisfactory.

As such, company approaches to consumers must be individually tailored to their characteristics. To be specific, consumers with more stable preference are more likely to be heavy customization shoppers. In this regard, it is an efficient and effective way for companies to assure their customers that they are ready to responds to consumer demands as quickly and flexibly as possible, before trying directly to increase the level of consumer participation. Findings of this study also suggest that once customers developed positive attitudes toward a customization, this group of consumers is likely to build a strong relationship with the company. They are also likely to have keen interest in fashion. Therefore, customization programs for fashion items must be carefully designed to promptly and acutely respond to customization demands of such consumers.

The present study has several limitations. First, the experimental setting of the Internet shopping mall may have introduced differences from the actual online shopping environment. The dependent variables, the attitude toward customization program and the future commitment to relationship were highly correlated which may have influenced the discriminant validities of these

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constructs, possibly due to the hypothetical nature of the responses. The consumers were in a hypothetical situation of making a customized purchase, and, therefore, their behavior and attitudes may not have exactly represented those in the actual online purchase situation. Using more extensive research resources may facilitate a research design to become more representative of the actual setting. Second, the product was limited to an apparel item, a casual shirt. Since consumer responses may differ according to specific product categories and consumers may have preference toward this particular item, it is recommended that the model suggested in this study be tested by using different items. Third, the gender ratio of the study sample was skewed with two-thirds of the respondents being men and the results may have represented less of female consumers' response. Fourth, this study examined both men and women by using the same product, but if different stimuli according to gender are utilized, more intriguing results may be delivered.

For the future research, we suggest to test the model with various product categories that require higher consumer expertise such as high-tech electronic items or higher preference stability such as high-fashion clothing. This may intensify the moderating effects of these variables. Also, the experiential and affective aspects of customization process may be investigated. This study mainly focused on perceptual aspect, but affective aspects such as self-congruency between firm and consumer, or consumers' enjoyment in the customization process may also influence consumers' commitment to e-commerce firm with a customization program.

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