# Effect of Brand Difference on Multichannel Apparel Shopping Behaviors in a Multichannel Environment

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## Abstract

*The current study aimed at investigating the effect of brand difference on the path parameters in the Structural Equation Model for a multichannel retailing context proposed in the literature. This study examined three apparel retail brands' structural or path invariance in a multichannel retailing context using multiple-group SEM. The model fit comparison in the multiple-brand invariance test showed that the Chi-square test for difference in the model fit was statistically significant. These results indicated that the path parameters in the Structural Equation Model across the three brands tested were not invariant, and they were significantly different across the three brands. Multiple-group causal models were successfully applied to assess apparel retail brands' structural invariance. As a result, it was revealed that the developed Structural Equation Model needs to be applied to each brand separately.*

**Keywords:** apparel retail brand, measurement invariance test, multichannel retailing, multiple-group SEM

## *1. Introduction*

Since successful management of multichannel retailing has been shown to enhance both offline and online sales (Forrester Research, 2003), there has been growing interest and researches in what drives multichannel apparel shopping behaviors in a multichannel environment (Schoenbachler & Gordon, 2002; Kim & Park, 2005; Kumar & Venkatesan, 2005; Choi & Park, 2006; Jin, Park, Kim, 2010). For example, researchers have recently investigated the effect of consumers' demographics, shopping orientation, perceived usefulness of information source (Choi & Park, 2006), prior experience with the online channel and/or frequent purchases (Kumar & Venkatesan, 2005), and consumers' attitude toward offline store of a multichannel retailer (Kim & Park, 2005) on consumers' multichannel shopping behaviors. Moreover, Schoenbachler and Gordon (2002) proposed a model of channel choice, suggesting five factors - perceived risk, past direct channel experience, customer motivation to buy from a channel, product category, and web site design, all of which might influence the likelihood of purchasing from multiple channels.

Although a massive volume of studies describing consumer buying behaviors in a multichannel shopping environment have been published, there are still knowledge gaps to be filled for understanding consumer shopping behaviors in a multichannel retailing context. For example, the research methodology of the measurement invariance, which is prevalently used in academic areas such as psychology and marketing, focuses on evaluation of the lack of variance between the measurements used in the context of the two sample groups (Tucker, Ozer, Lyubomirsky, Boehm, 2006). Measurement invariance can be referred to as "whether or not, under different conditions of observing and studying phenomena, measurement operations yield measures of the same attribute" (Horn & McArdle, 1992, p. 117). Accordingly, the measurement invariance test can allow researchers to draw strong conclusions in cross-national consumer behavior researches in a multichannel retailing context so that they can help multichannel retailers to extend their markets globally. However, few of studies in the multichannel retailing literature have dealt with measurement invariance tests. A key concern in typical cross-national consumer researches dealing with consumer behaviors is to examine whether the instruments designed to measure the relevant constructs are cross-nationally equivalent (Hui & Triandis, 1985). One way to verify equivalency is to test measurement invariance.

Horn (1991) stated that without evidence of measurement invariance, the study would show weak conclusions. Therefore, the current study applies a measurement invariance test to verify equivalency across the apparel retail brands and utilizes multiple-group structural equation modeling (SEM) to examine the effect of brand difference on the path parameters in the Structural Equation Model developed by Noh (2008) in a multichannel retailing context.

## *2. Literature Review*

### 2.1. Multichannel Retailing

Multichannel retailers sell their products across online and offline channels, such as the Internet, kiosks, catalogs, mobile phones, and traditional store channels, to increase their revenue and be competitive in the retail market (Lohse & Spiller, 1998; Ponsford, 2000; Stone, Hobbs, Khaleeli, 2002) Stone et al. (2002) defined multichannel retailing as a distribution strategy to serve customers across various channels or media. In the multichannel environment, an integrated multichannel retail strategy helps increase store sales by moving online traffic to physical stores and helps online sales by moving offline store customers to the Web, creating a two-way synergistic effect (Lawson, 2001). In Chu and Pike's (2002) study, the National Retail Federation's Shop found that 78% of online shoppers purchased merchandise at the retailer's physical store and 45% shopped at the retailer's catalog, and 23% of catalog shoppers also bought merchandise at the retailer's Internet site.

A positive synergistic effect on multichannel shopping was found when customers were contacted through multiple channels such as retail stores, e-mail, direct mail, and mobile marketing (Kumar & Venkatesan, 2005). It was also found that customer contacts across multiple channels were an effective strategy for reducing the risk customers perceived in new channels and for educating customers about various purchase channels to help them to migrate to other channels. Jin, et al. (Jin, Park, Kim, 2010) examined a positive synergistic effect of online and offline operations on performance of multichannel retailers. They discovered that both firm reputation and consumer offline channel use affected consumer offline satisfaction, which in turn influenced online satisfaction and loyalty to online channels. Multichannel retailers have enjoyed an effective two-way synergistic effect of sales, as well as marketing and advertising, as compared to single-channel retailers (Jaffe, 2000). Zhang et al. (2009) found that more than 80 percent of U.S. retailers were multichannel operators selling merchandise through multiple channels in 2009. In addition, multichannel retailers accounted for 72% of all online sales in 2002 (Haeberle, 2003).

Multichannel retailers can retain customers as well as acquire new customers in the competitive online business in a multichannel shopping environment (Park & Stoel, 2005). For instance, Forrester Research (2003) reported that multichannel retailers increased both online and offline sales through an effective and efficient multichannel approach, leading to greater customer retention and customer loyalty for the retailers. Multichannel retailing can promote long-term loyalty by offering customers diverse shopping options for their convenience, leading to long-term business success (Dholakia, Zhao, Dholakia, 2005). Multiple transaction channels have been successful in global markets (Choi & Park, 2002). For example, Korean retailers have been using multichannel retailing integration as a new retailing strategy to increase sales and profits. It was reported that Korean multichannel online purchasers preferred online stores for purchasing because they perceived benefits such as lower price and free shipping. Korean consumers browsed for information related to products at the physical store and then purchased online (Choi & Park, 2002). As another example, apparel retailer Eddie Bauer has used a multichannel retailing strategy to extend its markets globally to Germany and Japan. The company's global sales and profits have increased through tri- channels (i.e., stores, catalogs, and websites) (Peters, 2005).

### 2.2. Multichannel Shopping Behavior

Multichannel shoppers are defined as "customers who have made a purchase in more than one channel in the observed time period" (Kumar & Venkatesan, 2005, p. 45). Multichannel shoppers are important for retailers' success (Forrester Research, 2004a) because they spend more and they are more loyal than single channel shoppers (Allbusiness.com, 2001; Pastore, 2001). Choi and Park (2006) defined shoppers based on their shopping behaviors (i.e., multichannel offline purchaser, single-channel offline purchaser, multichannel online purchaser, and single-channel online purchaser) and found that "multichannel offline purchasers" who used online sources for information searches but made purchases offline in a Korean market were apt to be younger and have higher incomes and education levels as compared to "single-channel offline purchasers" who only shopped offline in a Korean market.

Multichannel shoppers frequently search for product items online and buy them offline (Forrester Research, 2004a). Forrester Research (2004b) reported that 11 percent of online customers bought products online and then picked up the order in the physical store so as not to pay for shipping. The main reason for their avoiding purchase via the Internet is attributed to perceived risk in Internet purchasing (Liang & Huang, 1998). Similarly, retailers selling apparel in the online format tend to utilize integrated multiple channels because many consumers believe that apparel, more than other products, needs a sensory inspection before it is purchased through the internet (McCorkle, 1990). Multichannel retailers can provide more opportunities for physical product inspections to online apparel shoppers.

A well-integrated multichannel retailing strategy based on understanding multichannel shoppers' behaviors provides a number of chances to increase the sales and profits of multichannel retailers. Therefore, understanding multichannel shoppers' behaviors is crucial for multichannel retailers' success. Several researchers have conducted studies related to consumers' online shopping behaviors in a multichannel shopping context (Kim & Park, 2005; Noh, 2008; Kim, Kim, Kumar, 2003). Kim et al. (2003) found that consumers who had a favorable attitude toward online shopping were more inclined to purchase clothing via the Internet than those who did not have a favorable attitude toward online shopping. They found a significant impact of attitude toward online stores of multichannel retailers on the consumers' intentions to purchase apparel through the online stores of multichannel retailers. Kim and Park (2005) investigated the effect of consumers' attitude toward offline store of a multichannel retailer on consumers' multichannel shopping behaviors. They found that attitude toward a retailer's offline store had a positive impact on attitude toward its online store and purchase intentions via the online store operated by the same retailer.

A useful structural equation model regarding multichannel shopping behaviors was developed, and the model fit was tested based on survey data (Noh, 2008). The study examined the interrelationships between consumers' prior in-store shopping experience with the multichannel retailer and their brand attitude, as well as the causal relationships of consumers' prior in-store shopping experience with the multichannel retailer and their brand attitude with consumers' online shopping beliefs, attitudes, and purchase intentions at the website of the multichannel retailer in the multichannel shopping context. For the purpose of brand selection, 11 multi-channel apparel specialty retail brands targeting female college students were included in the survey instrument. The respondents were asked to evaluate the selected brands with regard to their prior buying experience and the degree of liking for each brand. First, four brands out of those retail brands were selected for the model development. Finally, only three brands (*Gap*, *Old Navy*, and *American Eagle*) were used for the model development with one brand (*WetSeal*) eliminated due to the least number of responses. With the selected brands, two measurement and structural models were developed, as shown in figure I. The constructs of the measurement model were assessed through confirmatory factor analysis, and single-group structural equation modeling (SEM) with Amos 16.0 was conducted to evaluate the structural models for three selected apparel retail brands.

As a result, it was found that consumer's prior in-store shopping experience had a positive relationship to their search and evaluation beliefs via positively predicting choice and purchase beliefs, attitudes, and online purchase intentions only for the *Old Navy* brand. In addition, brand attitude appeared to be a key predictor of indirect increases of consumers' online purchase intentions for each brand through positively predicting online shopping beliefs and attitudes at the website of each brand.

### 2.3. Measurement Invariance

Measurement invariance can be considered the extent to which measurements conducted under different conditions yield equivalent measures of the same attributes (Horn & McArdle, 1992). If measurement invariance test is not established as a logical prerequisite, differences between groups cannot be significantly interpreted. In the social sciences, a large amount of research attempts to make comparisons between groups of people. The groups can be divided by many criteria such as time, nationality, ethnicity, gender, or any number of other factors. When scales or sets of items do not measure similarly across groups, they do not assess the groups in the same ways. In other words, measured group differences do not reflect real differences in the unobserved latent variables. Therefore, researchers need to conduct measurement invariance tests to make group comparisons.A number of scholarly researches have reviewed, assessed, and recommended measurement practices in the organizational sciences (Bagozzi & Phillips, 1991; Bagozzi & Heatherton, 1994; Hinkin, 1995; Schmidt & Hunter, 1996; Hinkin, 1998).

Previous researches have recognized the need to check for invariance across groups by examining factor loadings to make a valid group comparison (Carp & Carp, 1983; Liang & Bollen, 1985; Liang, Lawrence, Bollen, 1986; Liang, Lawrence, Bollen, 1987; Povot, Diener, Colvin, Sandvik, 1991; Shevlin & Bunting, 1994; Tucker, Ozer, Lyubomirsky, Boehm, 2006). For example, Tucker, et al. (2006) examined the comparability of Satisfaction with Life Scale (SWLS) scores with measurement invariance for the SWLS tested across U.S. and Russian student and community cultural groups. Liang et al. (1987) investigated race differences in the factorial structure of two measures in well-being research, testing measurement invariance across white and black samples. In addition, measurement invariance tests have been used in a variety of research areas including gerontology, education, cross-cultural psychology, developmental psychology, marketing, and criminology (Bagozzi & Edwards, 1998; Steenkamp & Baumgartner, 1998).

Accordingly, measurement invariance tests need to be applied to the research dealing with several groups, such as research regarding cross-national consumer behaviors, to verify equivalency of the measurement instrument across the groups. However, few measurement invariance tests appear in the multichannel retailing literature.

## *3. Methodology*

The current study applies a measurement invariance test to examine three apparel retail brands' structural or path invariance in the Structural Equation Model developed by Noh (2008). Measurement invariance test using multiple-group confirmatory factor analysis is conducted to make sure that items are equally reliable across the groups of three retail brands. Sets of items include prior in-store shopping experience, brand attitude, search and evaluation beliefs about online shopping, choice and purchase beliefs about online shopping, online shopping attitudes, and online purchase intentions scales.To assess the equivalence of measurement instruments, unconstrained and three constrained models are constructed. The corresponding coefficients (i.e., regression coefficients, covariance, and residual variances) across three brands are permitted to load freely in the unconstrained model (base model). The first constrained model is built, in which the corresponding coefficients (i.e., factor loadings) across three brands are presumed to be equal. The other two constrained models are constructed as follows: one is a constrained model in which the covariances among the factors are constrained to be equal across the brands. The other is a constrained model in which the error variances are constrained to be equal across the brands.

The base and the constrained models are assessed by maximum likelihood estimation and evaluated by three fit measures – the comparative fit index (CFI), incremental fit index (IFI), and the root mean square error of approximation (RMSEA). Then, chi-square fit measures are obtained to find how well the unconstrained and the constrained models fit the data. This study compares the two chi-square values for the unconstrained and the constrained models. The difference in two chi-square values for the unconstrained and constrained models yields an omnibus chi-square value whose statistical significance is then judged. The positive results of measurement invariance test can lead to the next analysis using multiple-group structural equation modeling (SEM). Multiple-group SEM is conducted to test structural invariance across three brands simultaneously to determine whether the individual path parameters across the three brands are invariant or not. The base model (paths assessed independently) and the constrained model (paths restricted to be equal) are used to test the structural invariance across the three brands. The three ft measures (i.e., CFI, IFI, and RMSEA) are also used in multiple-brand invariance test (i.e., structural invariance test). The difference in chi-square values for the base and the constrained models is used as a determinant of structural invariance.

## *4. Results and Discussion*

As a result of the measurement invariance test, the fit indices (CFI = 0.913, IFI = 0.914, and RMSEA = 0.061) of the base model indicate an acceptable model fit across the brands as shown in table I. For three constrained models, an acceptable three fit indices (CFI = 0.884 ~ 0.910, IFI = 0.884 ~ 0.911, and RMSEA = .059 ~ .062) are also obtained as shown in table 1.

**Insert table (1) about here**

The measurement invariance test reveals that the omnibus chi-square is not statistically significant ($p$=.063) between the base model and the constrained model with measurement weights equal, indicating that the base and the constrained model are invariant. As shown in table 1, the base model and the other two constrained models are significantly different. This result indicates that structural covariances and error variances are not invariant across three groups.

However, the same measurement instruments can be applied across the groups because the corresponding factor loadings between two models (i.e., base and constrained models) are invariant. This positive result of measurement invariance test leads to the next analysis using multiple-group SEM. Multiple-group SEM is performed to test structural invariance across the groups (i.e., three brands) simultaneously to determine whether or not the individual path parameters across the three brands are invariant. The base model (free parameter estimation) and the constrained model (equality constraints imposed on parameter estimation) are used to test the invariance of path parameters across the three brands. The results of the multiple-brand invariance test are presented in Table 2.

**Insert table (2) about here**

The base model is assessed by maximum likelihood estimation and evaluated by CFI, IFI, and RMSEA. The CFI, IFI, and RMSEA are 0.911, 0.912, and 0.056 respectively, indicating an acceptable fit for this base model across the three brands (see Figure 1). To generate the constrained model, equality constraints are imposed on all path parameters across the brands. In the constrained model, the values of CFI, IFI and RMSEA demonstrate an acceptable fit of the model (CFI= 0.908, IFI= 0.908, and RMSEA= 0.055) (see Figure 2).

**Insert Figure (1) about here**

**Insert Figure (2) about here**

Then, the model fit comparison between the base model and the constrained model across the three brands is conducted. As shown in table II, the model fit comparison between the base model and the constrained model across the three brands yields that the chi-square test for difference ($\Delta\chi^2$) is statistically significant ($\Delta\chi^2 = 61.188$, $\Delta df = 42$, $p = .028$). These results indicate that the path parameters in the conceptual model across the three brands tested are not invariant (see Figure 1). Therefore, the Structural Equation Model developed by Noh (2008) needs to be applied to each brand individually because the path parameters are significantly different across the three brands; this developed Structural Equation Model cannot be applied to all three brands together. In other words, the path parameters in the Structural Equation Model across three brands are affected by dividing the group into three brands.

The findings of the current study are supported by Noh's Structural Equation Model for the *Old Navy* brand (Noh, 2008), which suggested that consumer's prior in-store shopping experience had a positive relationship to their search and evaluation beliefs, choice and purchase beliefs, attitudes, and online purchase intentions only for the *Old Navy* brand. For the *Old Navy* brand, consumers' beliefs about online shopping at the website of the brand had a mediating effect on the relationship between prior in-store shopping experience with the brand and attitudes toward online shopping at the website of the brand. In addition, this finding is also supported by the results of Noh's Structural Equation Models developed for the three brands (Noh, 2008), which proposed that 1) brand attitude appeared to be a key predictor of indirect increases of consumers' online purchase intentions for each brand, and 2) consumers' online shopping beliefs at the website of each brand had a mediating effect on the relationship between brand attitude and online shopping attitudes at the website of each brand, separately.

## *5. Summary and Implications*

This research investigated the effect of brand difference on the path parameters in the Structural Equation Model developed by Noh (2008) in a multichannel shopping context. A measurement invariance test was conducted to make sure that items in the measurement instruments are equally reliable across the groups of three retail brands and multiple-group SEM was performed to examine three apparel retail brands' structural invariance in a multichannel shopping context.

The measurement invariance test revealed that the corresponding factor loadings between two models (i.e., base and constrained model) were equal. The multiple-group SEM showed that the path parameters in the conceptual model across the three brands were not equal. The results indicated that the Structural Equation Model developed by Noh (2008) needs to be applied to each brand separately.

Therefore, the findings of the current study can be used as a guideline to help researchers conduct multiple-group confirmatory factor analysis (measurement invariance test) and multiple-group SEM in research dealing with multiple-group causal models in retailing. The main conclusion suggests that multiple-group causal models need to be applied to research dealing with several groups, such as research regarding cross-national consumer behaviors that are important to global marketers.

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**Tables**

**Table 1. Measurement Equivalence Test Results**

| | $\chi^2$ *df* | IFI | CFI | RMSEA | $\Delta\chi^2$ $\Delta df$ | Sig. Difference |
|---|---|---|---|---|---|---|
| Unconstrained model | 771.3 327 | 0.914 | 0.913 | 0.061 | | |
| Measurement weight (constrained model) | 806.6 351 | 0.911 | 0.910 | 0.060 | 35.35 24 | No |
| Structural covariances (constrained model) | 868.5 381 | 0.905 | 0.904 | 0.059 | 97.25 54 | Yes |
| Measurement residuals (constrained model) | 1006.3 415 | 0.884 | 0.884 | 0.062 | 235.0 88 | Yes |

**Table 2. Multiple-brand Model Fit Comparison**

| Brands | | Model Description | $\chi^2$ | *df* | $\Delta\chi^2$ $\Delta df$ | Sig. | Invariance |
|---|---|---|---|---|---|---|---|
| Three-brand model comparison (Gap/Old Navy /American Eagle) | All paths assessed as equal | Base Model | 924.4 | 429 | 61.2 42 | 0.028 | No |
| | | Constrained Model | 985.6 | 471 | | | |

**Figures**

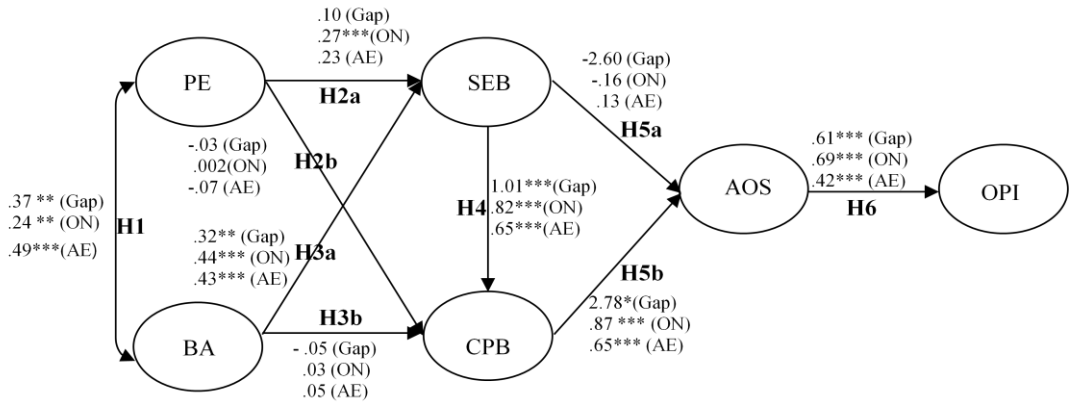


**Figure 1. Structural Equation Model (*Gap*, *Old Navy*, and *American Eagle* brands).**

PE = Prior In-Store Shopping Experience with a Multichannel Retailer, BA = Brand Attitude, SEB= Search and Evaluation Beliefs about Online Shopping, CPB= Choice and Purchase Beliefs about Online Shopping, AOS = Attitudes toward Online Shopping, OPI = Online Purchase Intentions, ON = *Old Navy*, AE = *American Eagle*, *** = $p<.001$ ** = $p<.01$ * = $p<.05$, CFI= 0.911, IFI= 0.912,

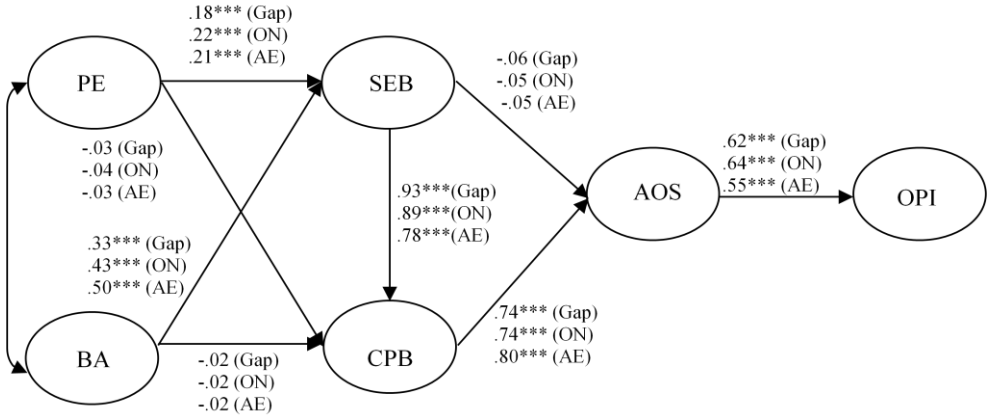


Figure 2. Constrained Model with Standardized Estimates across *Gap*, *Old Navy*, and *American Eagle* brands.

PE = Prior In-Store Shopping Experience with a Multichannel Retailer, BA = Brand Attitude, SEB = Search and Evaluation Beliefs about Online Shopping, CPB = Choice and Purchase Beliefs about Online Shopping, AOS = Attitudes toward Online Shopping, OPI = Online Purchase Intentions, ON = *Old Navy*, AE = *American Eagle*, *** = $p<.001$ CFI= 0.908, IFI= 0.908, RMSEA= 0.055