



Research Article

## Consumer Perception and Behavioral Intention in Apparel E-Shopping: A Study on Chinese College Students

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### Abstract

On the basis of technology acceptance model, the researchers examined the consumer's perception, perceived from their satisfaction and online shopping usefulness, and tested the behavioral intention on co-design and repurchase. The data was collected from 203 undergraduate students aged from 18 to 23 years old in Shanghai, China. The frequency analysis, the confirmatory factor analysis, and the structural equation modeling were used for testing structure modeling and data analysis. The researchers confirmed the validity and reliability of structure modeling which was supported by six factors. Secondly, individual-preference-based perception and the perceived price range on the website positively affected the consumers' satisfaction and experience on the usefulness of online shopping. Thirdly, the consumers' satisfaction positively affected online co-design intention and repurchase intention. Fourthly, the usefulness of online shopping significantly affected the repurchase intention but did not relate to the online co-design intention. The results provided a valuable reference for apparel brands to develop consumer-centered online shopping service.

### Keywords

Apparel online shopping; Consumer perception; Behavioral intention; Technology acceptance model

### Introduction

Nowadays, there has been a surge in online shopping. The Internet has been used by apparel companies to sell their products and promote their brands. In China, there were 674 million internet users at the date of 30 November 2015, which ranked as the second largest internet user group compared to other Asian countries (Internetworldstats.com 2015). As more and more people buy apparel online, there has been an increasing number of researchers who pay attention to the study in the related area which includes investigations into consumer satisfaction [1,2], consumer attitudes [3,4], consumer perception of online shopping risk [5], consumer intentions [6], online shopping behavior [3], and online shopping experiences for males and females [7]. This study aimed to test the factors in consumer perception and behavioral intention on the theoretical basis of the technology acceptance model. Researchers use the factors and items

in the hypotheses structural model so as to broaden the technology acceptance model, including consumer perception and behavioral intention, such as the factors of repurchase and online co-design. This study uniquely contributes to the literature and fills a void.

In this paper, we intend to report the relationship among the following items: individual-preference-based perception, perceived price range on the website, satisfaction at online shopping, usefulness of online shopping, repurchases intention, and co-design intention. The research model is tested by the confirmatory factor analysis in AMOS. The paper begins by discussing the theoretical review and research methodology. Following this review, there is a data analysis regarding current findings. Finally, the study concludes the result of the findings, including the discussion, implications, limitations, and future research. The results of the study offer some valuable suggestions regarding online shopping tendencies and their potential effects on apparel brand development.

In sum, this study makes four major contributions: (a) propose and test the TAM with extended factors, (b) derive the dimension of the proposed research model from the TAM, and modify the model following the literature review on consumer perception and behavioral intention, (c) determine the relationship among individual-preference-based perception, perceived price range on the website, satisfaction at online shopping, the usefulness of online shopping, repurchase intention, and co-design intention, (d) find the relationship among factors in online shopping behavior.

### Literature Review and Hypotheses

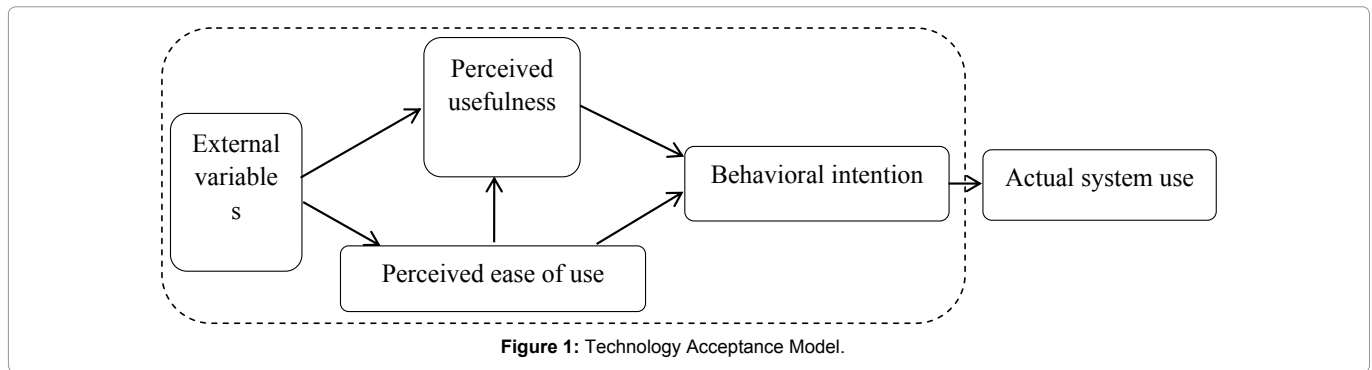
#### Technology acceptance model study

The study is based on the theory of technology acceptance model (TAM) as shown in Figure 1, which can be used to predict the users' behavioral and intention when they use information technology. "The TAM proposed by Davis and Davis et al. [8] is intended to explain the technological behavior of users by examining the effect of perceived ease of use and perceived usefulness" [5]. Fred Davis built the technology acceptance model, in order to predict the acceptance of new technology from the view of usefulness and ease of use. The two important parts in TAM were perceived usefulness and perceived ease of use, which were used to assess the individual acceptance of new technology and predict their using intention. Previous studies have shown that there were rich findings about TAM. In their studying papers published between 1986 and 2003, [9] indicated that large amount of variables have been introduced into TAM between 1986 and 2003. They also stated that experience had a significant relationship with behavioral intention and external variables. Their findings were useful for this study, especially on choosing external variables. Bagozzi [10] pointed that the limitation of TAM was that it was too simple and left important variables and processes, also suggest the core of users' decision-making with a new paradigm that consisted of goal desire, goal intention, action desire, and action intention. In the theoretical studies, the shortcoming of TAM theory could be concluded as follows, (a) the limitation of variables, (b) the simple structure of framework, (c) the insufficient studies on decision making processes.

The application of TAM was adopted to various subjects such as online apparel shopping [11,12], product e-shopping [13,14],

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service convenience [15], online airlines ticket purchasing [16], and so on. As the e-shopping application is uprising with the support of electronic technology, TAM became an approach for consumer online shopping and co-design intention studies. After several analyses by using structural equation modeling (SEM), Renny and Siringoringo [16] stated that the perceived usefulness played a strong role in online airlines ticket purchasing. Considering personality traits, Malaysian lifestyles, and preferences, Mohamed et al. [17] gathered 197 responses and developed the expectation confirmation theory (ECT) and TAM to study the individual online shopping continuance intention. The current study used the factors to broaden the technology acceptance model and extends the model in order to involve customer perception and behavioral intention, such as repurchase and online co-design. But there is no study on the variables relation of individual-preference-based perception, the perceived price range on the website, satisfaction at online shopping, usefulness of online shopping, repurchases intention, and co-design intention.

This study attempts to derive hypotheses by considering the TAM model, so as to examine the relation of customer perception and behavioral intention. The purpose of the study is to ensure the possibility of consumer online shopping tendency based on the relation of customer perception and e-shopping behavioral intention. It presents external factors for TAM: (1) individual-preference-based perception and perceived price range on the website. Both of the factors are included according to previous study review; (2) repurchase intention and co-design intention. The online shopping brings a novel commercial mode that offers an opportunity for users to change their role into co-designer.

### Individual-preference-based perception

Individual-preference-based perception is a major factor for the technology acceptance studies. Previous studies noted that the consumer preference perception involved the usage of new technology. To extended the research model of TAM, Ha and Stoel [11] tested service quality on the factor dimension: (1) web site design, (2) customer service, (3) privacy/security, (4) atmosphere/experient, by using TAM to analyze consumers' satisfaction, and predicted e-shopping perception and intention by the confirmatory factor analysis (CFA). On the basis of the theory of planned behavior (TPB) and TAM, Keen et al. [18] found five variables to identify the technology use: (a) subjective norms; (b) attitude; (c) perceived behavioral control; (d) ease of use; (e) price, and six attributes for each variable were retail format, price, control, ease of use, subjective norm, and attitude. They extended TAM variables and stated that the low-, medium-, or high-price of the product was a primary factor in consumers' decision-making process.

The individual-preference-based perception and perceived price range on the website are the factors in consumer perception that relate to one another. Through studying the research value dimension on utilitarian value, hedonic value, preference, and intentions, Overby and Lee [19] demonstrated that when consumers shopped online, they perceived service and product which was evaluated by self-preference and price-perception. Researchers also indicated that individual value was a strong predictor for future intention. On the relation among shopping orientations, gender, and online shopping frequency, Handa and Gupta [3] found that the college-going young adults' convenience-oriented behavior significantly influenced their online shopping frequency, and there was a significant relationship between shopping orientation and online shopping behavior. After group comparison, Fagerstrom et al. [20] suggested that perceived individual preference influenced consumers' online shopping decision-making and satisfaction intention. The preference-based web services were related to the perception of online shopping usefulness as has been shown in the study by Martin et al. [1]. Thus, with the support of the above theoretical studies, the hypotheses are as follows.

H1a. Individual-preference-based perception and perceived price range on the website have a significant correlation.

H1b. Individual-preference-based perception relates positively with satisfaction at the online shopping website.

H1c. Individual-preference-based perception relates positively with the usefulness of online shopping.

### Perceived price range on the website

Researchers indicated that the price was more important than any other related factors in online shopping [21]. Incorporating the price fairness, Xia et al. [22] found that consumers considered the price fair or not which directly associated with their feeling and intention in shopping experiences. Grewal et al. [23] who have studied the relation between Internet and the price-value-loyalty chain found that consumers' benefits impacted their perceived-value, loyalty and satisfaction. After examining the relation among consumer purchase preferences, perceived price and multi-level country of origin displays, Ha-Brookshire [24] stated that the unusual high-price would reduce consumers' purchasing preferences greatly. The price strategy should be applied carefully as it was a moderator for consumer online shopping behavior.

Adopted from TAM, Zhou et al. [12] put forward the online shopping acceptance model (OSAM). Researchers determined the relationship among factors of internet experience, consumer demographics, shopping motivation, innovativeness, perceived outcome, shopping orientation, normative beliefs, attitude, online

shopping intention, online experience, satisfaction and online shopping. Also, they found that consumers had different perceptions regarding internet shopping and preferred to buy apparel online with the lowest price and highest value. Ahmetoglu et al. [25] studied the price alone and indicated that price had a significant impact on consumers' perceptions and behaviors. Thus, the following hypotheses are used to investigate the effects of perceived price on the website, satisfaction, and usefulness of online shopping.

H2a. Perceived price range on website relates positively with satisfaction at the online shopping website.

H2b. Perceived price range on website relates positively with the usefulness of online shopping.

### Satisfaction at online shopping websites

Satisfaction at online shopping websites plays a significant role in consumers' online shopping perceptions. In the study of consumers' online shopping behavior, Park and Kim [26] found that purchasing online correlated to consumers' satisfaction which significantly affected their decision-making. Chang and Polonsky [15] organized consumers' satisfaction as a mediator between service convenience and behavioral intentions, and they also stated that behavior intention could be mediated by satisfaction. Researchers extended the service convenience to five factors: decision convenience, access convenience, transaction convenience, benefit convenience, and post-benefit convenience. On the theoretical foundation of TAM and the theory of reasoned action (TRA), Alam and Yasin [27] stated that website design, reliability, product variety, time saved and delivery performances were the key factors affecting consumers' online shopping satisfaction. Guo et al. [28] proposed a conceptual framework and found that the factors such as website design, security, information quality, payment method, e-service quality, product quality, product variety, delivery service were positively related to consumers' satisfaction. They extended the research model to eight factors. Shin et al. [29] stated that repurchase intention was indirectly affected by consumers' satisfaction but the site quality was positively associated with their satisfaction. Researchers found that the consumers who had repurchase intentions were the largely satisfied and happy ones [30]. Satisfaction also accelerated a customer's willingness to share their experiences and happiness with other potential customers. Studies confirmed that a positive relationship existed between online shopping satisfaction and repurchase intention [31]. Having identified the relationship among the factors such as satisfaction, adjusted expectation, trust, positive attitude and repurchase intention, Ha, Janda, and Muthaly [32] stated that satisfied consumers were more likely to be engaged in repurchases. However, Hellier et al. [33] found that consumers' satisfaction have slight effected on repurchase intention. The research scale consisted of the following dimensions: perceived quality, perceived value, perceived equity, customer satisfaction, repurchase intention, customer loyalty, expected switching cost, and brand preference. These inconsistent findings need further study. Therefore, this study proposed to examine the relation between satisfaction and repurchase intention.

By examining the collaborative customer co-design webistes (CCCWs) by TAM with external variables, Son et al. [34] indicated that the information value was added to apparel in co-design, meanwhile, the consumers took part in the design process and communicated with related individuals on the website. The extended TAM model was composed of perceived ease of use, perceived usefulness, perceived playfulness, intention to use a CCCW, mass confusion, and

perceived social risk. After a case study, Piller et al. [35] found that consumers shared their inspirations and feedbacks to designers in the co-design process. As the complexity of consumers' perception in co-design, the relation between satisfaction and co-design intention can be studied. Kang et al. [36] found that a user was provided with help to make a decision in online interaction and generated more profit for producers in the co-design process. Thus, the following hypotheses are proposed to investigate the effects of online shopping satisfaction on repurchase intention and co-design intention.

H3a. Satisfaction at online shopping website relates positively with repurchase intention.

H3b. Satisfaction at online shopping website relates positively with online co-design intention.

### Usefulness of online shopping

From the consumers' view, the usefulness of online shopping refers to a number of behavior intentions. Cho [37] summarized the research model including the repurchase intention, product type, order procedure quality perception, and order fulfillment quality perception; he suggested that the repurchase intention was created by e-shopping experiences and interaction. Renny and Siringoringo [16] extended the original TAM with external variables of perceived ease of use, perceived usefulness, trust, and attitude towards usability and found that the usefulness influenced online shopping attitude and repurchase intention directly. Cheng and Huang [38] extended the theory of planned behavior (TPB) and stated that service quality was positively associated with the potential consumer intention. Even after shopping online process, consumers could recalled the quality, usefulness, and convenience as has been shown in the findings of the researchers Grewal et al. [23].

Yoo et al. [39] proposed research model composed of factors: interactivity (controllability, synchronicity, and bi-directionality), perceived consumption value (utilitarian and hedonic values), and satisfaction on e-shopping, and found that synchronicity had a significant impact on perceived utilitarian value in e-tailing service. Liao [40] proposed a conceptual framework on independent self, interdependent self, user experience, personalize service, and willingness to use co-design, and found that user experience affected their willingness to use co-design. Thus, the following hypotheses are used to investigate the effects of the usefulness of online shopping on repurchase intention and co-design intention.

H4a. Usefulness of online shopping relates positively with repurchase intention.

H4b. Usefulness of online shopping relates positively with online co-design intention.

## Methodology

### Instrument and measures

There have been research investigations regarding online fashion clothing purchases which was supported the dependent variables for the current study as has been shown in the research by Nirmal and Dewi. According to the technology acceptance model, the current questionnaire was used to measure the relationship according to six factors: individual-preference-based perception, perceived price range on the website, satisfaction at online shopping, the usefulness of online shopping, repurchase intention, and co-design intention. The original TAM model did not cover the six factors as listed. The questionnaire design was adapted from previous research which can

be seen in Appendix A. According to the former research theoretical background, the evaluation used a seven-point Likert-type scale (1=strongly disagree, 7=strongly agree) on the questionnaire, adopted by Shin et al., Ha and Stoel and Lee and Lin [29,41,42].

The researchers selected university students in the study for three reasons. First, because as the older individuals showed less willingness to adapt new e-shopping channels as has been shown by Hernandez et al. [5], we did not take their responses into account in the current analysis. Furthermore, according to Riaz and Raman [43], the data was collected from university students because much younger people prefer shopping online, which was supported by Lee and Lin [42]. Finally, because married and/or pregnant college students displayed different daily purchasing behavior compared to unmarried students, researchers decided that unmarried college students aged between 19 to 24 years old were the ideal participants. As people in different age groups hold various ideas on purchasing clothes online [44], it is effective to improve brand value on the internet. Students who were older and had graduated from the universities were excluded so as to elevate the accuracy.

Convenience sampling was used to collect data. In the first part of the questionnaire, it asked the participants to fill in their age, gender, marital status and e-shopping experience. The data could be regarded as valid only if the participants had bought clothes on the internet in the past six months. All participants were university students studying design or design-related courses. The second part of the questionnaire was designed to assess six factors. All undergraduate students purchased apparel online in the past 6 months. There were no rewards for participants and all were volunteers. The proposed research model is shown in Figure 2.

The quantitative statistical analysis was conducted to the data derived from the questionnaire. First, the frequency analyses were used in the consumer demographic study. Second, an exploratory factor analysis was operated in SPSS to identify the factor structure and Cronbach's alpha. Third, the confirmatory factor analysis (CFA) and the structural equation modeling (SEM) were used to test the data in AMOS and test the proposed hypotheses that were presented in the proposed research model.

### Test procedure

A web-based questionnaire survey was issued to collect data and was delivered on an internet public platform (www.sojump.com). The link of this questionnaire address was sent to participants via Wechat and e-mail. The questionnaire consisted of 24 questions. The questionnaire was supposed to be completed by participants from five universities located in Shanghai on 24 June 2016. The data was collected over a one month period and 290 participants have finished the questionnaire, among which 203 were considered to provide valid data. The data from participants which met the requirements as follows were regarded as valid: (a) having bought clothing online in the past six months, (b) being university students, (c) studying design or design-related courses, (d) being unmarried or no pregnant female. The validity rate of the data used was 70.00%.

### Results

The data analysis was used to check the reliability and suitability of this study. The software of SPSS and AMOS was adopted to test the value and data reliability. Frequency analysis was taken in order to identify the characteristics of the demographic variables, and confirmatory factor analysis was used to test the research hypotheses.

Data were collected on-line through the website (www.sojump.com) from 24 June 2016 to 24 July 2016.

### Demographics

There were 73.4% female and 26.6% male participants after being analyzed by researchers who used the demographic frequency analysis. As the researcher focused on undergraduate students aged between 18 to 23 years (supported by the Compulsory Education Law of the P.R.China, that the children enroll primary school at six years old and regularly they have to spend at least 12 years in primary school, middle school and high school), any response from students out of this age range was regarded as invalid due to the fact that their experience might impact the result of the decision-making. All valid participants were those who had bought apparel more than one time in the past six months. The consumer's social orientation did not influence their online shopping preferences as has been shown before [45].

### Validity and reliability measures

**Measurement model:** The Cronbach coefficient was used to assess the variable reliability [17]. The researcher took a quantitative method. The variable Cronbach alpha was tested first. The variables' validity is shown in Table 1. The Cronbach Alpha values for the factors were: Individual-preference-based Perception (0.755), Perceived Price Range on the Website (0.812), Satisfaction at Online Shopping Website (0.669), the Usefulness of Online Shopping (0.782), Repurchase Intention (0.850), and Online Co-design Intention (0.795). The validity of Cronbach alpha was above 0.8. In the data analysis process, after testing the items within factors in order to improve the factor and structure model validity, researchers used AMOS to evaluate the items so as to get a reliable Cronbach alpha. In order to get the factors validity, the item of PRE2 in individual-preference-based perception, the item of SAT4 in satisfaction at online shopping website, the item of USE1 in the usefulness of online shopping, and the item of OCI3 in online co-design intention were dropped because they were directly affected by the factors' Cronbach alpha below 0.8. After mediating the relation in items and factors, the significant Cronbach alpha was achieved totally above 0.8.

Following the item validity analyses, the questionnaire had 15 items relating to six factors (Appendix B). The factor correlation was valid exceeding 0.7, confirming the validity of the measures. The results strongly confirmed the reliability of the factors. As such, the research model reliability was demonstrated.

The validity was confirmed by confirmatory factor analysis with the factor loading and the average variance extracted scores. The composite reliability scores exceeded 0.7. The good fitness of the data was supported by GFI: 0.885, AGFI: 0.83, CFI: 0.921, TLI: 0.897, IFI: 0.955, RMR: 0.121, RMSEA: 0.086. The average variance extracted (AVE) scores were shown in Table 2. The AVEs of the individual-preference-based perception, perceived price range on the website, satisfaction at online shopping, repurchase intention, and co-design intention surpassed 0.5. The AVE of the USE factor was 0.481 (as shown in Table 1, Cronbach alpha=0.810, C.R.=0.736) which was slightly below 0.5. The Cronbach alpha value in the construct exceeds 0.7, indicating the reliability of the structure as has been shown by Wu et al. [46]. The usefulness of online shopping factor was kept in the structural model.

The construct factor has a correlation with other factors as shown in Appendix C. The measurement was used to assess the constructs

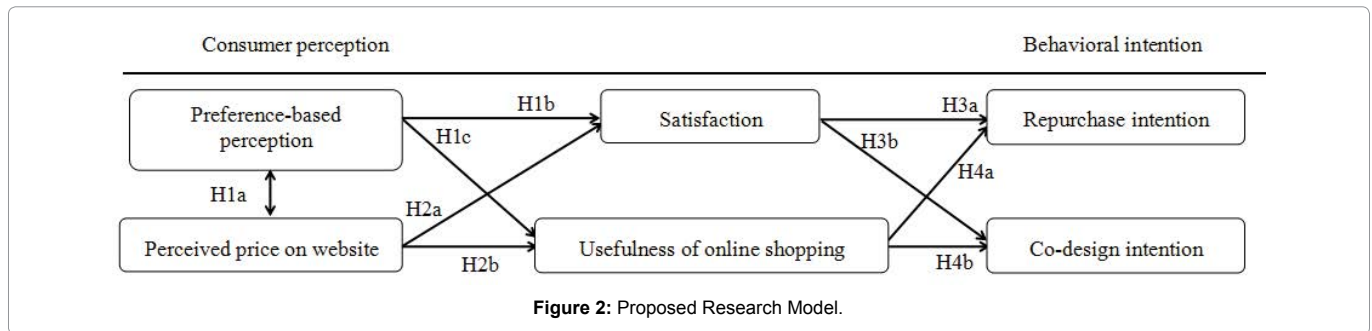


Figure 2: Proposed Research Model.

Table 1: Measure Factors and Items Validity.

Factors	Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Square Multiple Correlation	Cronbach alpha	Selected new items	New Cronbach alpha
PRE	PRE1	8.74	4.538	.670	.506	.577	0.755	PRE1	0.817
	PRE2	8.77	5.317	.447	.200	.817		---	
	PRE3	8.84	4.044	.653	.501	.588		PRE3	
PRI	PRI1	8.89	4.943	.565	.321	.850	0.812	PRI1	0.812
	PRI2	8.37	4.907	.731	.583	.678		PRI2	
	PRI3	8.58	4.760	.706	.567	.698		PRI3	
SAT	SAT1	12.43	7.632	.744	.695	.392	0.669	SAT1	0.860
	SAT2	12.26	8.241	.675	.711	.452		SAT2	
	SAT3	12.21	8.878	.506	.417	.565		SAT3	
	SAT4	12.62	12.406	.035	.081	.860		---	
USE	USE1	12.86	9.902	.440	.235	.810	0.782	---	0.810
	USE2	13.00	9.574	.580	.419	.733		USE2	
	USE3	12.74	8.936	.702	.498	.671		USE3	
	USE4	12.58	9.285	.655	.456	.696		USE4	
OCI	OCI1	7.37	4.759	.731	.608	.620	0.795	OCI1	0.867
	OCI2	7.62	4.664	.709	.597	.642		OCI2	
	OCI3	6.96	5.815	.490	.242	.867		---	
RPI	---	---	---	---	---	---	0.850	---	0.850

Note: PRE=preference-based perception; PRI=perceived price range on website; SAT=satisfaction at online shopping website; USE=usefulness; RPI=repurchase intention; OCI=online co-design intention; ---: the dropped items.

validity and reliability. The correlation ranges from 0.4 to 0.94, empirically supporting the validity of the measurement. According to the results in AVEs, as shown in brackets in Appendix B, the research structural model and hypotheses are of validity.

**Structural model:** The structural equation model and the path were presented in Figure 3. According to the previous study, the acceptable model was fit to the data: CFI ≥ 0.90, GFI ≥ 0.85, and RMSE ≤ 0.05 [47]. The structural model indicated that the reasonable model has acceptable fit: CMIN=201.106, df=81, CMIN/df=2.483, NFI=0.876, GFI=0.885, IFI=0.955, TLI=0.897, CFI=0.921, RMSEA=0.086. The structural model and its validity were supported by the results. The hypothesis testing is explained further in Table 3.

### Item and hypothesis testing

The confirmatory factor analysis was used to test the validity. The results were estimated as presented in Table 3. The SAT factor had a factor loading on the second-order factor PRE of 0.254, USE had a factor loading on PRE of 0.268, SAT had a factor loading on PRI of 0.613, USE had a factor loading on PRI of 0.226, RPI had a factor loading on SAT of 0.145, RPI had a factor loading on USE of 0.343, and finally OCI had a factor loading on USE of 0.182. OCI had a factor loading on SAT of -0.107.

The path relationship between factors was analyzed by the structural equation model (SEM) using AMOS. The fitness was shown in Figure 3 and Table 3. The hypothesis was confirmed by p-value. The results confirmed that the H1a (p<0.001), H1b (p<0.01) and the H1c (p<0.01) are significantly supported. The H2a (p<0.001) and the H2b (p=0.02<0.05) were positively supported. However, the H3a (p=0.143) and the H3b (p=0.052) showed no significant effects from satisfaction at online shopping to online co-design intention and repurchase intention. The H4a (p<0.001) was supported; the consumer usefulness of online shopping was positively related to repurchase intention but not to online co-design intention because the H4b (p=0.089) was not supported. Thus, it implied that the individual-preference-based perception and the experience for the usefulness of online shopping had indirect effects on online shopping behavioral intention.

### Discussions

In this section, researchers discuss the implication of findings in relation to undergraduate students in China. We also identify some limitations and implications in the following section. Based on the Technology Acceptance Model, we tested the consumer perception, experience, and behavioral intention. According to previous online shopping behavior, participants are asked to finish the questionnaire following their previous online shopping experience and perceptions.

Table 2: Dimensionality, Reliability and Validity Statistics.

First order	Path	Second order	Estimate	S.E.	Standardised estimate	C.R.	Composite reliability	AVE	P
PRE1	<---	PRE	1		0.887		0.742	0.591	
PRE3	<---	PRE	0.995	0.115	0.783	8.682			***
PRI1	<---	PRI	0.823	0.098	0.582	8.396			***
PRI2	<---	PRI	1		0.806		0.742	0.682	
PRI3	<---	PRI	1.201	0.095	0.92	12.596			***
SAT1	<---	SAT	1		0.879				
SAT2	<---	SAT	1.01	0.063	0.92	16.011	0.790	0.560	***
SAT3	<---	SAT	0.802	0.072	0.686	11.111			***
USE2	<---	USE	0.976	0.103	0.74	9.438			***
USE3	<---	USE	1.004	0.104	0.773	9.666	0.736	0.481	***
USE4	<---	USE	1		0.779				
RPI1	<---	RPI	1		1.009				0.803
RPI2	<---	RPI	0.802	0.162	0.735	4.949	***		
OCI1	<---	OCI	1.415	0.516	1.06	2.745	0.006		
OCI2	<---	OCI	1		0.723		0.838	0.728	

Note: \*\*\*p-value<0.001

GFI: 0.885, AGFI: 0.83, CFI: 0.921, TLI: 0.897, IFI: 0.955, RMR: 0.121, RMSEA: 0.086.

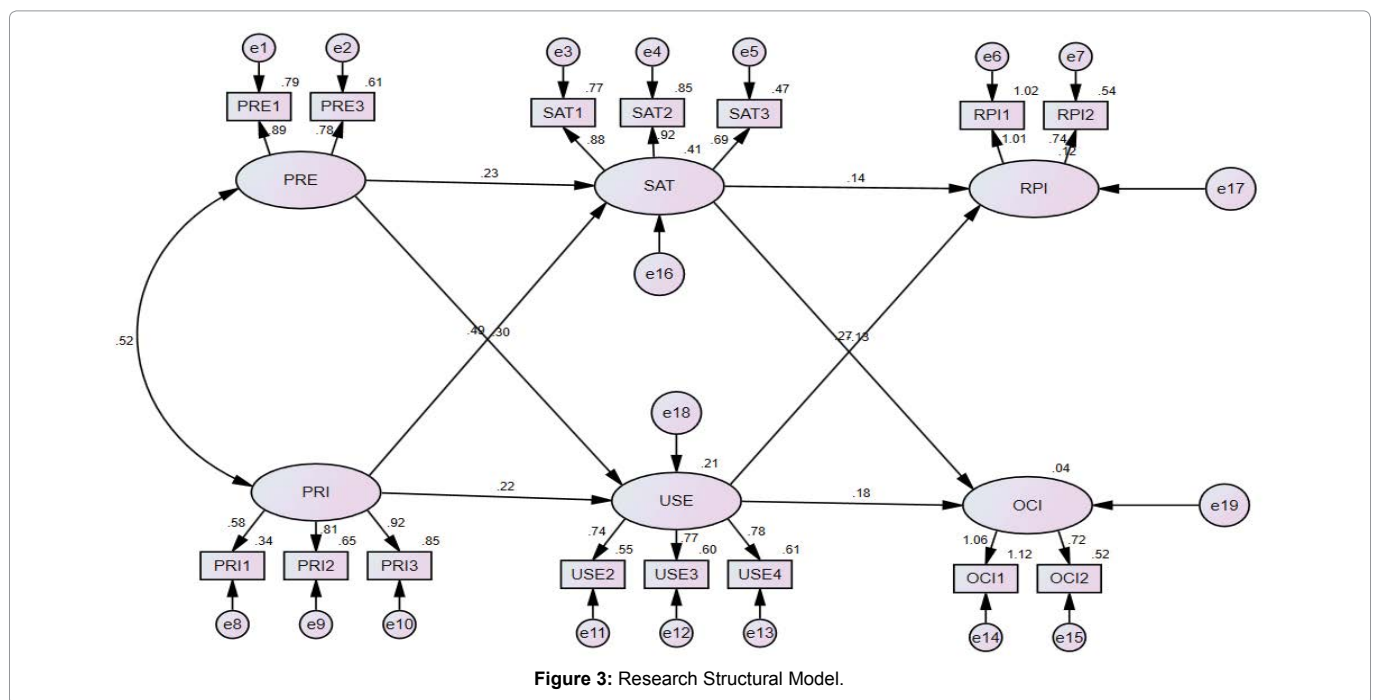


Figure 3: Research Structural Model.

The results contain the repurchase intention and probe for the perceptions of potential co-design possibility, which used to improve the variables in TAM theory.

The researchers' work contributes to online shopping research by examining the relationship among consumer perception, experience, and behavioral intention. The research on satisfaction with online shopping websites is limited by the numbers of participants and it does not involve participants of different jobs. Handa and Gupta [3] have found that chat rooms and bulletin boards are effective for online consumer communication. They suggest that the e-shopping may work on some co-design works influenced by factors of satisfaction at online shopping websites. These findings can be used to support the study of e-shopping marketing. The current research mainly focuses on consumers' purchase behavior. In contrast to previous research regarding

online shopping behavior, researchers consider that the development of consumers' behavior will accelerate collaborative design.

There are many findings that arise from this study. First, the technological acceptance model is enriched by focusing on the relationship among consumer perception, experience, and behavioral intention in online shopping. The previous study (considering reference publications) on the technological acceptance model did not include the study of consumers' perception and shopping behavioral tendencies. Consumer-centered studies are recognized as a crucial factor in e-shopping research. The effect of consumers' perception and their online shopping experience was examined in this study, which extended the factors in online shopping process. In the study, the results of the six factors shown that the experience relates to consumers' perception and online shopping behavioral intention.

Table 3: Results of Hypothesis Testing.

First order	Path	Second order	Hypotheses	Estimate	S.E.	C.R.	P	Result
PRI	<--->	PRE	H1a	0.607	0.107	5.662	***	Support
SAT	<---	PRE	H1b	0.254	0.094	2.703	0.007	Support
USE	<---	PRE	H1c	0.268	0.092	2.918	0.004	Support
SAT	<---	PRI	H2a	0.613	0.106	5.766	***	Support
USE	<---	PRI	H2b	0.226	0.097	2.327	0.02	Support
OCI	<---	SAT	H3b	-0.107	0.073	-1.465	0.143	Reject
RPI	<---	SAT	H3a	0.145	0.075	1.939	0.052	Reject
RPI	<---	USE	H4a	0.343	0.1	3.449	***	Support
OCI	<---	USE	H4b	0.182	0.107	1.698	0.089	Reject

Note: \*\*\*p-value<0.001

Second, individual-preference-based perception can be refined as self-perception for online shopping. The satisfaction at online shopping significantly impacts on the usefulness of online shopping and individual-preference-based perception, identified in the *H1b* ( $p < 0.01$ ) and the *H1c* ( $p < 0.01$ ). Meanwhile, the individual-preference-based perception and perceived price range of e-shopping relate to each other significantly, as identified in *H1a* ( $p < 0.001$ ), which supports the previous studies [18,20]. For the undergraduate student whose major is design or related to design, the findings are congruent to the previous studies [1]. In addition, the web services can influence the consumers' e-shopping experiences, including satisfaction at online shopping websites and the usefulness of online shopping, which was demonstrated in this study.

Third, the researchers find that consumers' perception of website prices impacts on their satisfaction at online shopping website and the usefulness of online shopping, as the *H2a* ( $p < 0.001$ ) and the *H2b* ( $p < 0.05$ ) are totally supported. The researchers indicate that consumers' perception of price is positively affected by their online shopping experiences [22,23]. This is consistent with the perception that price can positively influence the e-shopping behavior [12,21,25]. As shown in the results, the price-orientation in online shopping is a key factor for brand e-commerce.

Fourth, the *H3a* ( $p > 0.05$ ) shows the relationship between satisfaction at online shopping and repurchase intention is not supported. Partially supporting the previous study, there is some relationship between satisfaction and repurchase intention [28]. The results are opposed to the previous findings that satisfaction directly affects repurchase intention [31]. It supports the findings of Hellier et al., [33] and Shin et al., [29]. Meanwhile, the *H3b* ( $p > 0.05$ ) indicates that satisfaction at online shopping website is not significantly related to a consumer's behavioral intention on co-design. In this respect, the online co-design intention and repurchase intention should be studied deeply.

Fifth, the *H4a* ( $p < 0.001$ ) indicates that the usefulness of online shopping has a significant positive relationship with repurchase intention. The results indicate that usefulness positively influences repurchase intention directly [16,38,46]. However, the usefulness of online shopping has no significant influence on co-design intention, as illustrated by the finding *H4b* ( $p > 0.05$ ). Even though co-design can be used to improve apparel value, help the consumer make a decision, achieve information sharing, and communicate with experts, designers, and managers [34,36], it is not positively affected by usefulness of online shopping. Therefore, a detailed qualitative study should be undertaken to further investigate underlying factors for behavioral intention.

## Conclusion

### Theoretical contributions

This study enhances TAM theory by six external variables that drive consumer perception and behavioral intention in online apparel shopping. This study addresses three issues in e-shopping. The first are the six variables, especially the co-design intention and repurchase intention along with the rising technology development. The second is the TAM theory extended in the research structure. The third is the test of relationship between two variables. Importantly, repurchase intention are positively affected by the variables of satisfaction and usefulness of online shopping. The results describe how a research model, based on the TAM and confirmatory factor analysis, provides an insight into co-design intention and repurchase intention. This study examines the relationship between the two variables (satisfaction, usefulness of online shopping) and co-design intention. Although the results shown negative findings, a certain research still needs to be carried on. This model also explains the affective factors to consumers' repurchase behavior. It also offers better understanding for the two variables of satisfaction and usefulness of online shopping.

### Managerial implications

This study has a practical implication on consumer perception and behavior intention. The results show how to offer better services and products to consumers via online shopping. The e-shopping operators and owners should design the service and online shopping strategy following consumers' motivation. It can be used for understanding consumers' online shopping behavior. The research structure and hypotheses confirm the positive impact of individual-preference-based perception and perceived price range on the website. The findings of this study show that the online shopping satisfactions have considered relation with the apparel price online and consumer preference to increase consumers' behavior intention. The study also extends the usefulness of online shopping relationship by considering the variables of individual-preference-based perception and perceived price range on the website. The two variables have shown a positive effects on usefulness of online shopping. If the brand offers apparel with low price, it will attract more consumers' attention. In addition, the apparel perception on usefulness of online shopping can be improved if consumers' preference is considered in the apparel design process. In this way, apparel designers and managers will also be aware of the importance of consumers' role.

The results on the repurchase intention indicated a positive impact from the usefulness of online shopping and a negative impact for the satisfaction. Due to the condition of e-shopping, it is common for consumers to receive lots of apparel information on the website, to buy a cloth once does not necessarily mean the consumer will be

likely to buy again. In order to persuade consumers to repurchase online, the store operators need to offer more useful information to increase the utility of the online shop. This approach may leave the consumers with a good impression.

The findings on the co-design intention indicated a negative impact from satisfaction and usefulness of online shopping. This result is a double-edged sword for this study. First, the satisfaction and usefulness of online shopping are not important variables in apparel e-shopping. The designers and managers should provide more experiences and professional help for consumers in the apparel co-design process, because when consumers perform apparel co-design online, the limitation of their professional design knowledge may influence their perception. Second, online store owners should enhance the consumers' perception on the role changing, from a consumer to a co-designer. Once consumers realized they are co-designers, they will show more responsibility and share individual need in the apparel design process. To conclude, the online shop should be operated on a user-centered base. On one hand, the designers and brand managers has to increase the consumers' repurchase behavior, while on the other hand the online shop needs to find the consumers' preference in the co-design process so as to exaggerate the achievement in the interacting approach.

### Limitations and further research

There are some limitations in this study. First, this study survey the undergraduate students in the university located in Shanghai. The participants are young adult students who study design or design-related courses, and there are only a limited number of participants in total. The convenient sampling process limited the findings. Additionally, the number of the variables in the TAM research model is not studied adequately as the sample size affects the results. The questionnaire is based on six factors, such as individual-preference-based perception, perceived price range on the website, satisfaction for online shopping the website, the usefulness of online shopping, repurchase intention, and online co-design intention. The factor dimensions for TAM can be broadened. Lastly, though the authors confirmed the validity of the hypotheses, those variables still need further observation.

Future research needs to replicate this study by using TAM external variables to improve the theory application and technology acceptance model. Further investigation into the apparel online co-design variables and factors relation should be studied, as the co-design provided a service platform for stakeholders' interaction. This study focuses on the six variable related to online shopping intention and behavior. Further factors such as age, gender, income, personality, lifestyle and education background can be integrated into the future examination to foster the understanding of online shopping behavior. In addition, there still need more work on the reasons why the consumers like online shopping but are not interested in co-design. Thus, it may be useful to consider the consumers' perception and attitude for the co-design technology development. Also, the researchers could develop a deeper study after five years because the technology and economy will have greatly changed which will affect consumers' e-shopping behavior. Older and young adults should also be compared with respect to their online shopping intentions.

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