



# Consumer Perceptions of Imported Apples Influence on Consumer Purchase Behaviors in China

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## Authors' contributions

This work was carried out in collaboration between both authors. Author SJ designed the study, wrote the protocol and wrote the first draft of the manuscript. Author SJ managed the literature searches, analyses of the study and author HX guided the writing process. Both authors read and approved the final manuscript.

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## ABSTRACT

The paper is to examine determines of imported apples consumer behaviors, and to interpretate comparative advantages between domestic and imported apples in China. It employs Structural Equation Model to estimate the effects of consumer perception on consumer behaviors, including imported apple price perception, attributes perception, advertising perception, quality perception and nutrition perception, using 400 survey data of imported apple consumers in China. The results indicate that consumer price perception plays negative roles on consumer behaviors, whereas consumer perception on attributes and quality, and consumer purchase evaluation, positively affect consumer behaviors.

**Keywords:** Consumer perception; purchase behavior; imported apples; influences; structural equation model.

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## 1. INTRODUCTION

The average annual demand for domestic apples will reach the record high of 28.00 million tons from 2010 to 2015 as China Apple Industry Economic Research Institution predicts. The high-end market demand will be about 3.50 million tons among them. The major consumers are administration, institutional officials and managers in companies, whose average annual income is over 50.00 thousands yuan. On the other hand, the middle-end market demand will be about 6.00 million tons. The main consumers are urban residents, whose average annual incomes are between 20.00 thousands yuan and 50.00 thousands yuan. In the foreseeable future, the proportion will reach 33.91 percent for the demand for high-end and middle-end apple compared to the total demand as the increasing of residents' income [1]. While China still gives priority to the low-end apple market now and the apple production cannot satisfy the consumer diversified demand. As the United Nations Commodity Trade Statistics Database reported, the quantity and amount of fresh apple imports increased an average 21.12 percent and 32.03 percent a year from 2006 to 2011, respectively. The stable increase of fresh apple imports indicates the diversified demand tendency of Chinese consumers in terms of apple varieties, quality and flavor. Therefore, as the rising of both apple production and logistics costs, it's essential to research the consumption characteristics and influence factors of imported apples.

A variety of researches on apples consumption have been proposed in the past few years. They can be categorized into two aspects: those which concentrate on macroscopic perspective and those which concentrate on microscopic perspective. While in china, the analyses mainly focus on macroscopic perspective, such as apple consumption status, consumption characteristics, the demand elasticity and the equilibrium of supply and demand [2,3]. Nevertheless, only several researchers have focused on consumer behaviors and influencing factors [4,5]. Although foreign researches mainly base on social and cultural conditions of Europe and the United States, the conclusions are still valuable for us.

The purpose of the paper is to evaluate impacts on imported apples consumer behaviors, using the survey data in four cities, including Beijing, Shanghai, Guangzhou and Xi'an, and to analyze the imported apple demand, consumer behavior characteristics and comparative advantage between domestic apples and imported apples, as well as to provide several advances for apple industry development and trade in China.

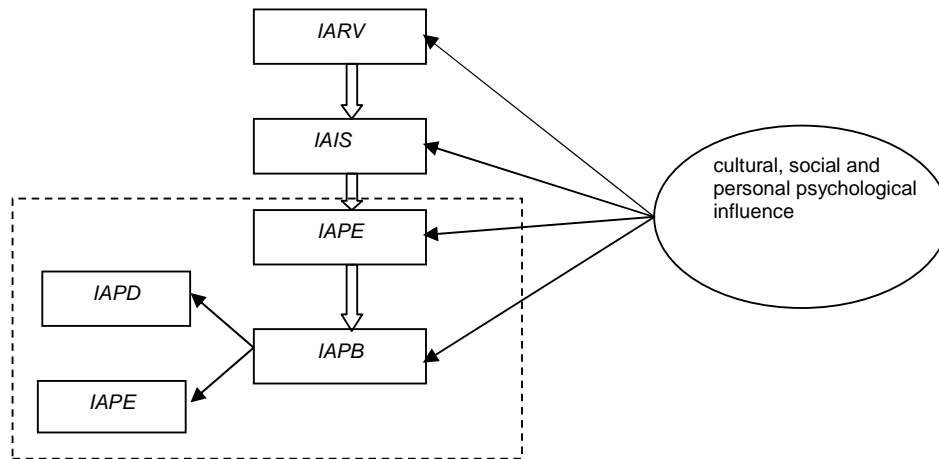
## 2. Methodology

### 2.1 Conceptual Model

Consumer behavior is the processes involved when individuals or groups select, purchase, use, or dispose of products, services, ideas, or experiences to satisfy needs and desires [6]. Behavior psychologists in the United States take the view that much of the individual consumer behavior resembles externalization results of a certain psychological phenomenon, and consumer behavior is affected by the social and cultural conditions. Therefore, the study of consumer behaviors should be combined psychological process with physiological process, social psychology and communication theory to explore the influence factors of consumer behavior [7]. Lamb et al. conduct a 5-step process in making purchasing decisions, involving requirement validation, search, evaluation of alternatives, purchase decision and post purchase evaluation. Each step is influenced by social and cultural conditions and consumer personal determinants [8].

As the connotation of consumer behaviors, combined with the purchase decision theory [8], consumer behaviors of imported apples can be divided into four stages, involving Imported Apple Requirement Validation (IARV), Imported Apple Information Search (IAIS), Imported Apple Purchase Evaluation (IAPE) and Imported Apple Purchase Behavior (IAPB) (see Fig. 1). In the first stage, consumers conduct imported apple requirement validation through interpersonal and personal determinants. In the second stage, consumers try to establish an appropriate products set after collection of internal and external sources<sup>1</sup>.

<sup>1</sup>An internal search is a mental review of stored information relevant to the problem situation. Maybe the consumer recalls past experiences with or observations of a certain type of product. Or perhaps it is the recollection of a commercial or magazine advertisement. On an external search, the consumer gathers information from outside sources, which may include family members, friends, associates, store displays, sales representatives, brochures, and product-testing publications such as consumer reports.



**Fig. 1. Conceptual model for consumer behaviors of imported apples**

In the third stage, consumers integrate the information to evaluate the evoked set of apple products based on his or her personal set of evaluative criteria. Consumers make purchase behavior in the final stage, composed of purchase decision (IAPD) and post purchase evaluation (IAPE)<sup>2</sup>.

Since subjects for the study are imported apple consumers. According to the consumer survey, we found that the imported apple consumers knew very well about the information of imported apples in wholesale markets, supermarkets and retail stores. Thus, we assume that consumers have completed the first two stages of the consumer behavior process, including Requirement Validation and Information Search. Therefore, the paper intends to investigate the cultural, social and individual psychological influences on the next two stages of evaluation and consumer behavior in the dotted line box of Fig. 1.

## 2.2 Literature Review and Hypotheses

Based on our observation and intensive literature review, there are six crucial factors determining the consumption of imported apples.

### 2.2.1 Consumer purchase behaviors (CPF)

In this paper, imported apple consumer purchase behaviors can be defined as the processes involved when the consumer make purchase decisions and postpurchase evaluation, undertook by the imported apple desire motivation, after confirming a variety of imported apple attributes and information. Relevant literatures always utilize the purchase quantity, purchase intention, willingness to pay, and purchase frequency [9,10,11,12]. Wadolowska et al. report that the purchase frequency can be the representative of consumer postpurchase evaluation, and verify that consumers generally intend to increase the purchase quantity if the purchases evaluation satisfies their expectations [13]. Therefore, this study uses the average monthly imported apple purchase quantity and the imported apple purchase frequency to measure the consumer imported apple purchase behavior.

### 2.2.2 Consumer purchase evaluation (CPE)

Consumer purchase evaluation refers to the process of assessing the apple products with the evaluative criteria, which can either be objective facts (brand, price, government tests) or

<sup>2</sup>The purchase act produces one of two results. The buyer feels either satisfaction at the removal of the discrepancy between the existing and desired states or dissatisfaction with the purchase. Consumers are generally satisfied if purchases meet their expectations. Sometimes, however, consumers experience some postpurchase anxieties called cognitive dissonance. This psychologically unpleasant state results from an imbalance among a person's knowledge, beliefs, and attitudes. A consumer may experience dissonance after choosing a particular automobile over several other models when some of the rejected models have desired features that the chosen one does not provide. Dissonance is likely to increase (1) as the dollar values of purchases increase, (2) when the rejected alternatives have desirable features that the chosen alternatives do not provide, and (3) when the purchase decision has a major effect on the buyer.

subjective impressions (social class and culture). Lamb et al. recognize that consumers' evaluation on products will affect their purchase behaviors directly. Therefore, the following hypothesis is proposed [8].

H1. CPE has a positive effect on CPF.

### **2.2.3 Consumer price perception (CPP)**

Generally, consumers' willingness to buy the product will intend to go down and their purchase quantity will reduce meanwhile as the price of a particular product rising. For instance, Behe et al. [14] taking geranium flower as an example, assess the influence of cultivar, price, color, leaf variegation and longevity on consumer behavior, the results show that price has negative effect on consumer behaviors. Landes [15] finds that the high apple price caused by high internal marketing costs reduces the apple consumptions in Indian. Chang analyzes the acceptance factors of apples in Shandong, Shaanxi and other three provinces. The results show that the higher price compared that of residents' income imposes restriction on apple purchase. On the other hand, according to the consumer survey, the wholesale and retail prices of imported apples reach 116.67 and 157.14 percent higher than those of domestic apples, respectively. 58.25 percent of respondents perceive that the high prices limit the consumption of imported apples [4]. Therefore, consumers' perception on price may limit their behaviors. Under the aegis of the prior literatures, this study selects consumer perception on sales price, promotion price and relative prices of other fruits as indicators to represent CPP. Hence, the following hypotheses are proposed.

H2. CPP has a negative effect on CPE.

H3. CPP has a negative effect on CPF.

### **2.2.4 Consumer attributes perception (CAP)**

The bulk of studies indicate that product attributes, including color, product size, variety, container size, region of origin, mature season and so on, are the significant factors on consumer preference and behaviors [16,17]. Manalo evaluates consumer preferences for size, color, crispness, and flavor in apples [9]. Townsley-Brascamp and Marr analyze consumer behaviors for characteristics of outdoor ornamentals, such as plant health, bushiness, height, suitability for growing conditions, shape, flower color, and leaf color [10]. Bonany et al.

[18] uses sensory evaluation methods to examine the influence of consumers apple size preferences on the purchasing decision. Jaeger et al. investigate sensory preference for three apple varieties among British and Danish consumers. The results show that apple flavor, shape, color and degree of mealiness have significant effect on consumer purchase decision [19]. Liu analyzes apple mature seasonal difference influence on consumer behaviors and points out that consumers purchase more apples in boom-season than off-season [5]. Therefore, this study selects consumer perception on flavor, varieties, appearance, original source and seasonal characteristic as indicators to represent CAP. Hence, the following hypotheses are proposed.

H4. CAP has a positive effect on CPE.

H5. CAP has a positive effect on CPF.

### **2.2.5 Consumer advertising perception (CDP)**

Consumers often collect sufficient information, which make them feel confident, to reduce the uncertainty and risk of buying products [20]. From the perspective of Marketing, advertising, as the communication strategy between producers and consumers, is the primary factor on positive attitude and acceptance of products [21]. Leonard and Wadsworth point out that the advertising and promotion program have positive effect on the consumer preferences and purchase decisions in Connecticut of The United States [22]. Xia and Li, taking mutton as an example, applies Logistic model to estimate brand trust effect on the urban consumers. The results show that brand trust promotes consumers to buy brand mutton [12]. Therefore, consumer perception on advertising, package, brand and other people's evaluation are as indicators to represent CDP. Hence, the following hypotheses are proposed.

H6. CDP has a positive effect on CPE.

H7. CDP has a positive effect on CPF.

### **2.2.6 Consumer Quality Perception (CQP)**

Food quality is one of the important attributes of agricultural products, but also the main basis for consumers to purchase produces [23]. A number of efficiency studies about food quality can be categorized into two aspects: those which concentrate on studying consumers' willingness to pay and those which concentrate on studying consumers' purchase decision. The results

indicate that consumers perception on safety food, confidence in food quality supervision institution, attention to significant food safety incidents, as well as possessions of food safety information, play important roles on consumers' willingness-to-pay, evaluation and purchase choices for pollution-free products [24-26]. For instance, Luo, taking pollution-free pork as an example, applies contingent valuation method to evaluate various factors effect on consumer willingness to pay for pollution-free products and finds out consumer food quality perception affect it positively [11]. Buzby et al. and Fu et al. address that consumers are willing to pay more for products produced by safety methods [27,28]. Therefore, this study selects consumer perception on quality and getting authentication as indicators to represent CQP. Hence, the following hypotheses are proposed.

- H8. CQP has a positive effect on CPE.
- H9. CQP has a positive effect on CPF.

**2.2.7 Consumer nutrition perception (CNP)**

With the development of agricultural products market segmentation, nutrition content, brand and security authentication of agricultural products have been noted with great interest by the academics. Christie et al. suggest that beneficial nutrition change on the food package label will attribute to a clear positive purchase direction [29]. Frank, taking bell pepper as an example, researches how vitamin C content influence consumers preferences and purchase decisions [30]. The results indicate that promotion of increased vitamin C content would be most effective. Wu et al. evaluate the impact of protein, fat and micronutrients declaration on liquid milk composition label on purchase intention of 1301 consumers in Beijing. The data shows that the consumers generally have positive intention to purchase milk products with high nutrition value claimed [31]. Therefore, the following hypotheses are proposed.

- H10. CNP has a positive effect on CPE.
- H11. CNP has a positive effect on CPF.

**2.3 Empirical Model**

Structural equation model (SEM) has been widely employed in psychology, sociology, the biological sciences, educational research, political science and market research [32]. Based on the forgoing theory and evidence discussions, the study puts forward the empirical model

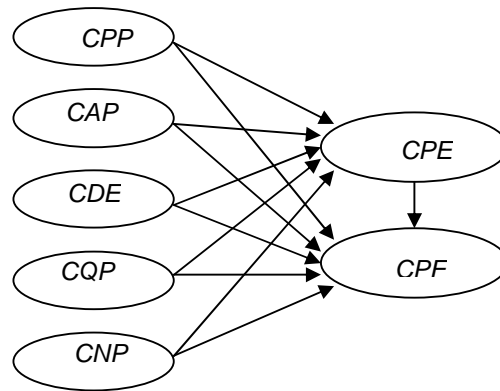
depicted in Fig. 2. The SEM is used to capture the causal influences of exogenous latent variables, composed of CPP, CAP, CDP, CQP and CNP, on the endogenous latent variables, including CPE and CPF. The equation errors of the structural equation model are denoted by  $\zeta_i$  ( $i=1,2$ ).

The structural equation model of Fig. 2 can be expressed as:

$$CPE = \gamma_{11} CPP + \gamma_{12} CAP + \gamma_{13} CDP + \gamma_{14} CQP + \gamma_{15} CNP + \zeta_1 \quad \text{Eq. (1)}$$

$$CPF = \gamma_{21} CPP + \gamma_{22} CAP + \gamma_{23} CDP + \gamma_{24} CQP + \gamma_{25} CNP + \beta_{21} CPE + \zeta_2 \quad \text{Eq. (2)}$$

Eq. (1) and Eq. (2) are called the latent variable model and expresses the hypothesized relationships in imported apple consumer behavior theory. The coefficient  $\gamma_{ij}$  ( $i=1,2; j=1,2,3,4$ ) signifies the effects of CPP, CAP, CDP, CQP and CNP on CPE or CPF. The coefficient  $\beta_{21}$  shows the effect CPE on CPF. The vector of disturbances  $\zeta_1$  and  $\zeta_2$  represent errors which capture random influences on this relationship in Eq. (1) and Eq. (2), respectively.



**Fig. 2. Empirical model for consumer behaviors of imported apples**

**3. DATA AND MODEL**

**3.1 Questionnaire Design and Variables Description**

The questionnaire has three parts. The first part is composed of seven questions which capture the demographics of subjects, involving subjects' address, family background, education, income, job, gender and age. The second part recorded subjects' perception about each item affecting imported apple consumption. The last part

recorded subjects' perception of purchase evaluation and decision. The bulk of the information was collected using a five point Likert-type scale, from one, being "not agree, trust or consider at all", to five, being "agree, trust or consider completely".

Two questions were developed to indicate purchase evaluation. These are: (1) What do you think of the level of imported apple on apple market in china? (1=low-end market, and 4=high-end market); (2) Whether you are willing to purchase imported apples or not? (1=yes, 0=no). And two indicators measured purchase decisions were as follows: (1) How many imported apples do you purchase monthly? (2) How often do you purchase imported apple? (1=at least once half a year, 2= at least once a month, 3= at least once half a month, 4= at least once a week)

The questionnaire consisted of 20 items measuring the seven latent variables finally (see Table 1).

Guangzhou and Xi'an. A total of 408 respondents were distributed randomly in the four cities. Of the 408 questionnaires received, 400 were fully completed and useable for purposes of the study. The 400 useable ones lead to a 98.04% useable response rate.

### 3.2 Reliability and Validity of the Measurement Model

In order to ensure the credibility and effectiveness of the research conclusion, reliability and convergent validity coefficients of the constructs were estimated by reliability coefficients, factor loadings, Measurement errors, composite reliability and average variance extracted of the measurement model, using multiple regression techniques supported by AMOS7.0 (see Table 2). All of the factor loads for items in the research model were greater than 0.62, which fall well within the recommended range of 0.50–0.95 [33,34]. The composite reliability was estimated to evaluate the internal consistency of the measurement model and produced very similar results (ranged from 0.68 to 0.83). All were greater than the benchmark of 0.60 recommended [35]. As displayed in Table 2, the average variance extracted for all measures exceeded the recommended 0.5 level (ranged from 0.50 to 0.60), which meant that more than one-half of the variances observed in the items were accounted for by their hypothesized constructs. These results illustrated that all measures had strong and adequate reliability.

**Table 1. Variables used in empirical model**

Latent variables		Observed variables definition	
Sign	variables	Sign	Item definition(description)
CPP	Consumer price perception	Sprice	consumer perception on sales price
		promot	consumer perception on promotion price
		compric	consumer perception on other fruits
CAP	Consumer attributes perception	taste	consumer perception on imported apple flavor
		specie	consumer perception on imported apple varieties
		appear	consumer perception on imported apple appearance
		yield	consumer perception on imported apple original source
CDP	Consumer advertising perception	Season	consumer perception on seasonal characteristic
		adver	consumer perception on imported apple advertisements
		pack	consumer perception on imported apple package
		brand	consumer perception on imported apple brand
CQP	Consumer quality perception	evalu	consumer perception on other people's evaluation
		qimak	confidence in imported apple quality
CNP	Consumer nutrition perception	qcmak	confidence in imported apple quality getting authentication
		ianh	agreement to imported apples have more nutrition
CPE	Purchase evaluation	iahf	agreement to imported apples are helpful to human health
		grade	What do you think the grade of imported apple on apple market in china?
CPF	Purchase behavior	want	Whether you are willing to purchase imported apples or not?
		buyn	How many imported apples do you purchase monthly?
		buyf	How often do you purchase imported apple?

*Data was collected from imported apple consumers with face to face interview in Beijing, Shanghai*

**Table 2. Standardized indicator loadings and item reliability**

Latent variables	Observed variables	Factor loadings	Reliability coefficients	Measurement errors	Composite reliability	Average variance extracted
CPP	Sprice	0.79	0.62	0.38	0.76	0.51
	promot	0.69	0.48	0.52		
	compric	0.66	0.44	0.56		
CAP	taste	0.73	0.53	0.47	0.83	0.50
	specie	0.68	0.46	0.54		
	appear	0.83	0.69	0.31		
	yield	0.62	0.38	0.62		
CDP	Season	0.64	0.41	0.59	0.82	0.54
	adver	0.67	0.45	0.55		
	pack	0.78	0.61	0.39		
	brand	0.73	0.53	0.47		
CQP	evalu	0.75	0.56	0.44	0.75	0.60
	qimak	0.83	0.69	0.31		
	qcmak	0.71	0.50	0.50		
CNP	ianh	0.75	0.56	0.44	0.68	0.52
	iahf	0.69	0.48	0.52		
CPE	grade	0.68	0.46	0.54	0.70	0.54
	want	0.78	0.61	0.39		
CPF	buyn	0.84	0.71	0.29	0.73	0.58
	buyf	0.67	0.45	0.55		

The discriminant validity among latent variables refers to correlations between measures of different constructs, and should be much lower than the average variance extracted coefficients [36]. In this paper, the discriminant validity coefficients are examined by "each latent variable average variance extracted "and" the square of correlation coefficient of one latent variable and another" [37], and the numbers on the diagonal of Table 3 are average variance extracted and the numbers under diagonal of Table 3 are the square of correlation coefficient of different constructs. As depicted in Table 3, the numbers on the diagonal of Table 3 are all above the numbers under diagonal of Table 3, which illustrates that all measures had strong and adequate discriminant validity. As a result, all the constructs exhibit adequate reliability and validity.

**Table 3. Validity of the measurement model**

Latent variables	CPP	CAP	CDP	CQP	CNP	CPE	CPF
CPP	0.51						
CAP	0.02	0.50					
CDP	0.07	0.03	0.54				
CQP	<0.01	0.03	0.08	0.60			
CNP	0.07	0.06	0.02	0.22	0.52		
CPE	0.08	0.07	0.09	0.06	0.04	0.54	
CPF	0.06	0.02	0.05	0.01	0.03	0.12	0.58

## 4. RESULTS

### 4.1 Parameters Rationality Test

As presented in Table 2, all of the factor loadings for the items in the mode are greater than 0.62, which fall well within the recommended range of 0.50–0.95, whereas all of the measurement error various are positive, and all of the correlation coefficients of covariance are within the range of 0.11 and 0.51, below the critical value 1.0. As a consequence, the rationality of all the parameters indicates that the covariance matrix is a kind of positive matrix. Therefore, goodness-fit test for the whole model can be undertaken on the bases of no illegal estimation about measurement model [34].

### 4.2 Model Fit Tests

The evaluation criteria used in this article is based on the chi-square statistic, and classified into three categories: Absolute fit measures, Incremental fit measures and Parsimonious fit measures [38]. Maximum likelihood estimation is used to assess goodness-of-fit indices for the model.

The various goodness-of-fit statistics are shown in Table 4 and present a reasonable goodness-fit for the initial model excepting  $\chi^2$ . For instance, the  $\chi^2$ /d.f. equals to 1.75, which falls well within

the recommended range of 1.0–2.0 by Anderson et al. [33]. RMSEA value of 0.06 and RMR value of 0.04 are below 0.08 and 0.05, respectively, which indicate a reasonable fit [39], and GFI, GFI, NFI, NNFI, CFI, IFI and RFI are all above the recommended range of 0.90. Moreover, AIC and CAIC value of default model are both over those of independence model and saturated model. Since the significant probability value of  $\chi^2$  (P) is 0.03, below the minimum threshold value of 0.05 [34], so refuses the initial conceptual model fit. However, the Chi-square ( $\chi^2$ ) is thus likely to be influenced by samples size, perhaps performing more poorly in large samples than small samples [40]. In fact, the relationship between sample size and fit index has long been recognized, such that Bearden et al. find that the mean of NFI is positively related to sample size and the value of NFI tends to be far less than 1.00 when the sample size is very small [41].

Bollen also notes that it may be important to determine whether the sample size directly enters the calculation of a fit index [42]. Therefore, after consulting all of fit indexes comprehensively, we conclude that the external quality of the structure equation model is good.

### 4.3 Structural Model Tests

Table 5 depicts the standardized regression weights that refer to the significant structural relationship among the tested variables. Most of the paths in our main structural model are significant except for H7, H10 and H11. The data indicates that the latent variables in the hypothesized model are appropriate and effective, since in the measurement model, the weights of some indicators to some latent construct are not significant (recall its low reliability).

**Table 4. Goodness -of-fit indices for the model**

Fit indices	Recommended value	Value	Judgment
<b>Absolute fit measures</b>			
Chi-square ( $\chi^2$ )	P>0.05	0.03	No
Root mean square residual (RMR)	<0.05	0.04	Yes
Root mean square error of approximation RMSEA	<0.08	0.06	Yes
Goodness-of-fit index (GFI)	>0.90	0.94	Yes
Adjusted goodness-of-fit (AGFI)	>0.90	0.91	Yes
<b>Incremental fit measures</b>			
Normed fit index (NFI)	>0.90	0.92	Yes
Relative fit index (RFI)	>0.90	0.91	Yes
Incremental fit index (IFI)	>0.90	0.96	Yes
Non-normed fit index (NNFI)	>0.90	0.96	Yes
Comparative fit index (CFI)	>0.90	0.96	Yes
<b>Parsimonious fit measures</b>			
Parsimony goodness-of-fit index (PGFI)	>0.50	0.74	Yes
Parsimony-adjusted normed fit index (PNFI)	>0.50	0.72	Yes
Parsimony Comparative fit index (PCFI)	>0.50	0.75	Yes
Critical number(CN)	>200	278	Yes
Ratio of $\chi^2$ to degrees-of-freedom ( $\chi^2$ /d.f.)	<2.00	1.75	Yes
Akaike information criterion (AIC)	Default model <Independence model; Default model < Saturated model	311.64<342.00 311.64<2722.50	Yes
Consistent akaike information criterion(CAIC)	Default model <Independence model; Default model < Saturated model	393.35<431.56 393.35<2804.21	Yes



As presented in Table 5, CPE has a positive significant direct effect on CPF (H1:  $\beta= 0.73$ ,  $p < 0.001$ ), supporting H1. CPP has a negative significant direct influence on CPF (H3:  $\gamma= -0.47$ ,  $p < 0.001$ ). It also has an indirect influence on CPF through the mediator of CPE, with the regression weight is  $-0.54$  (H2:  $\gamma= -0.54$ ,  $p < 0.01$ ), supporting H2 and H3. Consistent with our hypotheses, CAP and CQP have positive significant direct impacts on CPF (H5:  $\gamma= 0.31$ ,  $p < 0.05$ ; H9:  $\gamma= 0.27$ ,  $p < 0.01$ ), and they also have positive significant indirect effects on CPF through CPE, with the regression weights are  $0.43$  (H4:  $\gamma= 0.43$ ,  $p < 0.05$ ) and  $0.39$  (H8:  $\gamma= 0.39$ ,  $p < 0.001$ ), respectively, supporting H4, H5, H8 and H9. Worth noticing is that although CDP has no direct effect on CPF (H7), it has a significant indirect impact on CPF through CPE (H6:  $\gamma= 0.21$ ,  $p < 0.05$ ), supporting H6. Yet unfortunately, inconsistent with our hypotheses, the data shows that CNP has no significant effect on both CPE (H10) or CPF (H11).

**Table 5. Results of testing hypothetical model**

Hypotheses	Regression weights	T-value	Conclusions
H1: CPE → CPF	0.73***	8.42	significant
H2: CPP → CPE	-0.54**	2.60	significant
H3: CPP → CPF	-0.47***	-3.53	significant
H4: CAP → CPE	0.43*	2.19	significant
H5: CAP → CPF	0.31*	2.15	significant
H6: CDP → CPE	0.21*	2.32	significant
H7: CDP → CPF	0.15	1.63	not significant
H8: CQP → CPE	0.39***	3.79	significant
H9: CQP → CPF	0.27**	3.11	significant
H10: CNP → CPE	-0.07	-1.24	not significant
H11: CNP → CPF	0.16	1.42	not significant

Note: \* represents  $p < 0.05$ , \*\* represents  $p < 0.01$ , \*\*\* represents  $p < 0.001$

The comparison of regression weights of all independent variables in Table 5 shows that CPP(-0.54) is the most important determinant for CPE, followed by CAP(0.43), CQP(0.39) and CDP(0.21) orderly, while the most important determinant for CPF is CPE( $\beta= 0.73$ ), followed

by CPP(-0.47), CAP (0.31) and CQP(0.27) orderly. The influence of CDP on CPF is not significant, recall that there is no positive correlation relationship between CDP and CPF on china imported apple market. It may be associated with lacking of marketing and promotional activities about imported apples currently in China. Meanwhile, imported apple consumers pay less attention to the brand of imported apples, evidenced by 72.50 percent of respondents cannot recognize the brand. As discovered in the field survey, 78.75 percent of respondents distrust the declaration made by vectors that imported apples contain more nutrition and vitamin than domestic apples. Therefore, CNP is not an effective factor for CPF.

## 5. CONCLUSION

The paper primarily estimates the influence factors of imported apples with structural equation model, using 400 survey data of imported apple consumers in Beijing, Shanghai, Guangzhou and Xi'an. The results indicate that Consumer Price Perception is the most important negative determinant for Consumer Purchase Evaluation and Consumer Purchase Behaviors, while Consumer Attributes Perception, Consumer Quality Perception and Consumer Advertising Perception have positive effect on Consumer Purchase Evaluation and Consumer Purchase Behaviors.

The testing results show that consumers are most sensitive to the effects of imported apple prices, which implies that price of the domestic apple does have a comparative advantage compared to that of imported apple. The results of the proposed model have implications for the success of apple market development. In order to protect domestic apple market effectively and improve the development of high-end and advantages apple in two main apple production areas, Bohai Gulf area and Loess Plateau area, fruit enterprises in china must consider to apply price strategy to carry out effective competition with imported apples. In order to keep and enhance low-cost competitiveness of domestic high-end apples, technological innovation in variety and cultivation mode should be allocated and delivered to apple growers to compensate the labor-intensive nature of apple production and cost rising.

The testing results also show that consumers are sensitive to the effects of attributes, quality and advertising factors of imported apples. It implies

that Chinese apple consumers have preferences for imported apples in terms of quality, flavor, credit and fashion, in addition to the seasonal variations of global apple production and marketing. These preferences have positive relationship with the imported apple demand increase and market growth. Consequently, apple consumption characteristics and preferences should be paid more attention and researched in the apple industry to adjust industrial development strategy according to characteristics of market segments.

Overall, local government should consider creating a kind of market for market participants. On the market, apples with high quality sale at low price. This indicates that the local governments should, on the one hand, focus on apple industry development, including organization cultivation, structure optimization, distribution adjustment, technical progress, and market resources. On the other hand, local governments should further enhance the level of orchard management, including promoting good varieties, integrating techniques for saving labor, and upgrading apple cultivation and orchard management mode.

Excepting for promoting technological and variety innovation, as well as improving productivity index, local government should also carry out public services for fruit enterprises and intermediary organizations. Media, network, documentaries and other means should be made best use to improve and sustain market competitiveness. Besides of all, quality-supervision agencies should attach importance to strengthen information disclosure mechanism to reverse consumers' recognition and approval for domestic high-end apple brand and quality reputation.

In addition, with the growing of import apple market, as well as consumers' preference of imported apples, it makes more sense to research the consumer behavior of different consumer groups. Therefore, future research will divide the whole market into six market segments, based on the consumer demographics, including gender, age, level of education, monthly income, work type, and consuming countries preference of consumers, to analyze the consumer behavior of each imported apple market segment and its influence factors, using the several groups structural equation model. The evaluation results will provide useful references for apple production

and trade reform in China. The analysis method can be further applied to evaluate other agricultural products.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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