

Research on the Relationship between Bamboo-Based Product Design Attributes and Consumer Satisfaction

Yun Xue

Khairul Aidil Azlin Abd Rahman

Noor Fazamimah Binti Mohd Ariffin

Noor Azizi Bin Mohd Ali

Abstract

Sustainable low-carbon design is actively guiding the public's green consumption and use of forest resources. With the slogan of replacing plastic with bamboo and the optimization of bamboo's organizational structure and processing form, bamboo is becoming more and more designable. However, we found that there are still many views expressing dissatisfaction with bamboo products, among which homogeneity and insufficient design differentiation are the most frequent. On the basis of this, we obtained attributes for measuring bamboo product satisfaction through literature review, conducted a questionnaire survey of 463 customers to obtain data, and empirically analyzed attributes such as product creativity (PC), product quality (PQ), product fashion (PF), soft added value (SV), and shopping convenience (SC). We assessed the impact on consumer satisfaction (CS), as well as the impact on satisfaction under the moderating effect of brand image (BI). The results show that PF, BI, PC, and PQ positively affect CS; PF, PQ, and SV positively affect the BI; PF, SV, and PQ positively affect CS through the intermediary effect of BI. SV has an insignificant effect on CS, but can positively affect CS through BI, indicating that there is a partial mediating effect of BI. However, the mediating effect of BI on PC, SC, and CS has not been verified. Finally, on the basis of the conclusions, several countermeasures and suggestions for bamboo product innovation are put forward.

Bamboo resources are an important part of forest resources. Judging from the total area of bamboo forests and the number of bamboo species, the Asia-Pacific bamboo region is the distribution center of bamboo resources for the world (Li and Hu 2021). In the past 10 years, the export demand for bamboo products has been on an upward trend. In addition, the International Bamboo and Rattan Organization has attached great importance to the "Double Carbon Plan." As a green, low-carbon, fast-growing, easily renewable and degradable biomass material, bamboo is facing several global challenges. "In recent years, China's export trade volume of bamboo products has a clear advantage in the total international trade volume of global bamboo and rattan products, and it is tending to grow. Not only that, as the country with the richest bamboo resources in the world, China's bamboo industry spans the first-, second-, and third-world countries. This industry, with its wide range of products, also plays an important role in promoting the construction of ecological civilization." (National Forestry and Grassland Administration, China 2021). To effectively

leverage the ecological and economic advantages of China's bamboo resources and comprehensively consider the ecological value of bamboo products and the current status of global bamboo product trade, China plays an irreplaceable key role in promoting innovative design and sustainable development of bamboo products. It also plays

The authors are, respectively, Yun Xue, Faculty of Design and Architecture, Univ. Putra Malaysia, Selangor, Malaysia, 43400 and Baise University, Baise 533001, China (xueyun.july.design@gmail.com); Khairul Aidil Azlin Abd Rahman (Prof Khairul - Professor), Noor Fazamimah Binti Mohd Ariffin (Dr NorFazamimah - Senior Lecturer), and Noor Azizi Bin Mohd Ali (Dr Azizi - Senior Lecturer), Faculty of Design and Architecture, Univ. Putra Malaysia, Selangor, Malaysia, 43400 (drkhairulazlin@upm.edu.my [corresponding author]; fazamimah@upm.edu.my; nooraz@upm.edu.my). This paper was received for publication in August 2023. Article no. 23-00049.

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an important role in sustainably exerting the economic value of bamboo materials, increasing the market demand for bamboo products, and enhancing the stability of the supply of bamboo products. However, we reviewed the literature and found that there are still many bottlenecks and obvious problems in the development of bamboo products and supply-and-demand imbalance factors.

First, most of the production units are small-scale workshop style, with contract processing as the main business direction. The market for bamboo products is single and lacks brand design (Guo et al. 2012; Zhang and Cheng 2017; Zhang and Zhang 2017; Mi 2018; Li and Guo 2019; Zhu et al. 2019). Second, bamboo enterprises have weak new-product design and development capabilities, low innovation, and serious homogeneity. Third, the quality, processing technology, and production efficiency of bamboo products do not match the level of modern industry (Chen 2016; Liu and Pan 2016; Jin 2017; Liu and Guo 2019). Fourth, the types and varieties of bamboo products lag behind wood products (Li et al. 2005; Sun and Fei 2019), and the competitiveness of bamboo products is weak. Fifth, public awareness of bamboo products is not high. At present, bamboo products are mostly traditional styles and there are few new design products, which cannot meet consumers' needs for modern life (Xue et al. 2022). Moreover, the regional characteristics of the products are not obvious and the cultural added value is low (Liu et al. 2019). Therefore, the domestic market consumption atmosphere has not yet formed (Chen 2016).

On the basis of the above problems, many local governments have issued documents to support the transformation and development of the bamboo products industry, including improving the market system. The document emphasizes, "In accordance with the laws of market economy, we must strengthen market demand research, timely collect and analyze bamboo product market information, and accurately grasp industry and market development trends . . ."; "increase policy guidance for bamboo product consumption and actively cultivate domestic market demand"; and other policy points.

Koren (2010) pointed out in his research that the target consumers of new bamboo products are global urban consumers, whereas bamboo products in the mass market are mostly traditional and are at a disadvantage in market competition. The difficulties faced by the development of bamboo products are mostly reflected in insufficient branding and publicity, insufficient innovation, low design intervention, and low added value; traditional products flood the market with few types and styles, and consumers' product needs in the context of modern life have not been met. The processing quality, design level, brand promotion, and demand matching of bamboo products are some of the main challenges currently faced by bamboo products. Therefore, it is useful to investigate and understand consumer satisfaction (CS) with bamboo products and the relationship between related factors.

Literature Review and Hypothesis Formulation

Product satisfaction has always been one of the most important goals in the product life cycle. CS with products and services of a company is considered a most important factor leading toward competitiveness and success (Hennig-Thurau and Klee 1997). Deng et al. (2009) argue that the ability to create high levels of satisfaction is critical to product differentiation and building strong relationships with

customers. It is also a management tool, ingrained in the business environment, for identifying required changes in production processes to achieve better performance (Kärnä et al. 2009). The higher the CS, the higher the value of customer loyalty, and the greater the company's profits (Romdonny and Rosmadi 2019).

Wang et al. (2016) took cultural products as an example and proposed that the brand culture of the product is also an important dimension of satisfaction. A well-managed brand can generate CS and customer value (Macdonald and Sharp 2000). A brand image that produces results (shaping, reputation, loyalty) will also have a positive impact on consumer loyalty (Romdonny and Rosmadi 2019). Ilyas et al. (2020) demonstrated that branding has a positive impact on consumer satisfaction. The development of brand image (BI) as a mature stage of product design is an important factor for product development. With a more comprehensive display, although the comprehensive competitiveness of the product is improved, it also needs the support of the BI to be more easily accepted and trusted by consumers. On the basis of the above discussions, we propose the following hypotheses:

Hypothesis 1 (H1): BI has a positive impact on CS

Lowe and Alpert (2015) believe that product innovativeness perception includes creative novelty perception, technological novelty perception, and relative advantage perception. Among them, creative novelty refers to the novelty and originality of product ideas and uses perceived by consumers. Product brands will be more easily accepted when they innovate (Jin et al. 2022). Peng (2023) believes that innovative design can improve product quality (PQ) and market competitiveness and enhance consumers' purchase intention and loyalty, thereby enhancing the brand's relationship value. Product creativity (PC) is important in brand building. Product innovation will enhance CS (Xu et al. 2015). CS can be divided into two aspects: satisfaction with the process and satisfaction with the results. Satisfaction with the process (participation) refers to satisfaction with innovative products (Wang et al. 2008). Tsang et al. (2022) emphasized that PC has a direct impact on CS. BI innovation can be perceived by consumers and will also significantly affect consumers' purchase intention (Wei 2001; Rahil et al. 2017; Jin et al. 2020). Liu et al. (2020) showed that higher consumer perception of innovative BI will increase their willingness to purchase brand products. Jiang et al. (2010) also found that when consumers have a higher degree of accumulation of brand knowledge, the brand will be more easily accepted when it innovates. The improvement of BI on the basis of product innovation is conducive to meeting customer needs and improving satisfaction. On the basis of this, the following hypotheses are put forward:

Hypothesis 2 (H2): PC has a positive impact on BI

Hypothesis 3 (H3): PC has a positive impact on CS

Mediation: BI has a significant mediating effect on PC and CS.

The hexagonal prism model of brand identification proposed by Kapferer (2008) shows that reflecting consumer image has a great relationship with the personality and innovativeness of the product (Feng 2022). The fashionability of the product is one of the important factors in brand design;

this helps brand products to be active at the forefront of trends. This kind of innovation helps consumers perceive the BI more quickly and accumulate brand emotions (Tang et al. 2015). Building good brand emotions is one important way to achieve satisfaction.

Fashion is an indispensable consideration in design (Wu et al. 2023). The research of Ling and Zhang (2015) pointed out that users' personal choices for home life make the fashionable appearance design of products an important factor, in addition to function. The second major selection factor is that the new generation of users prefers fashionable and technological products, which is an important incremental market (Zuo 2016). The fashionable design of a product is related to the satisfaction brought by the product's interactive operation and functional realization.

Fashion can stimulate consumption and guide product design. Products are the carrier of fashion communication (Wu et al. 2023.). The fashionability of branded products can bring cutting-edge experience to customers. Through BI promotion, product fashionability (PF) helps to bring product satisfaction to consumers.

Hypothesis 4 (H4): PF has a positive impact on BI

Hypothesis 5 (H5): PF has a positive impact on CS

Mediation: BI has a significant mediating effect on PF and consumer satisfaction.

Kobthongsirichok (2020) and Nona et al. (2021) agree that product quality is a variable that has a positive impact on satisfaction. Gandhi and Kang (2011), Kobthongsirichok (2020), and Tsang et al. (2022) also emphasize PQ (craftsmanship, material, durability). They believe that CS will be affected by factors such as perceived PQ. The China Macro Quality Level Evaluation Index System Research Group (2009) designed a weight distribution table for quality competitiveness evaluation indicators and their observation variables. Among them, standards and technical levels, technology research and development, and core technologies account for 50% of the weight of quality competitiveness. Huang et al. (2012) pointed out that technology and process level are the core factors for industrial enterprises to ensure PQ. Wang and Li (2021) used Python text mining analysis to verify that the quality level of product materials and processes is an influencing factor on consumer satisfaction with furniture products. From the perspective of building a brand, Jin et al. (2022) believe that the design of improving the BI includes a high-quality product that exceeds peers, and a high-quality product requires mature BI design expression, so managers need to implement improvements from aspects such as PQ (Feng 2022) to increase consumer stickiness and satisfaction. On this basis, the following hypotheses are put forward:

Hypothesis 6 (H6): PQ has a positive impact on BI

Hypothesis 7 (H7): PQ has a positive impact on CS

Mediation: BI has a significant mediating effect on PQ and CS.

Feng (2022) believes that in terms of BI design expression, managers need to improve product marketing and shopping convenience (SC) to increase consumer stickiness. By maintaining the original consumer groups, one can gradually

convert the customers of competing companies to one's own (Zhang 2021).

Liu et al. (2019) believe that the current rise of e-commerce platforms, compared with traditional shopping forms, SC (Kim et al. 2011), and information acquisition convenience (CI; Li et al. 2023), is also very important; all directly affect CS. Consumers will be exposed to the brand's market, marketing, corporate background, and other related knowledge in their lives, and use this knowledge as a source to build brand prototypes (Nedungad and Hutchinson 1985). Brand prototype is the standard source of product information for consumers. The easier it is for consumers to understand BI activities, the higher their perception of the brand, and the more brand prototype knowledge they accumulate (Mao and Shanker 2006), which helps to improve CS in the shopping experience. On this basis, the following hypotheses are put forward:

Hypothesis 8 (H8): SC has a positive impact on BI

Hypothesis 9 (H9): SC has a positive impact on CS

Mediation: BI has a significant mediating effect on SC and CS.

Wu et al. (2009) once discussed that brand community is the intermediary variable and that brand experience affects brand loyalty. Brand community is not bounded by geographic areas and uses soft values such as the emotional value of the brand as a link to connect consumers, a kind of social relationship. It reflects the charm of emotional value in brand design in addition to functional value and helps to accumulate brand emotions such as trust, dependence, identity, and belonging (Ma and Li 2008). Bamboo has obvious regional culture, historical culture, spiritual culture, and other characteristics in China. In the field of bamboo product design, it has been widely publicized as a cultural medium with soft added value (SV). After the release of "China Bamboo Industry Development Plan (2013–2020)," Zhejiang, Fujian, Sichuan, and other major bamboo industry provinces, on the basis of a comprehensive analysis of their region's resource situation, location advantages, and industry status, deeply realized that one of the main problems and shortcomings of current bamboo products is "regional characteristics." "It is not obvious, the degree of homogeneity is high, and the competitiveness is not strong." Therefore, bamboo products can be approached from the perspective of SV to enhance the recognition and design competitiveness of bamboo products in various places or at different times (Liu et al. 2019). The more emphasis a BI places on SV, the higher consumers' loyalty and satisfaction with products will be. On the basis of the above discussion, the following hypotheses are put forward:

Hypothesis 10 (H10): SV has a positive impact on BI

Hypotheses 11 (H11): SV has a positive impact on CS

Mediation: BI has a significant mediating effect on SV and CS.

Research Method

This study adopts quantitative analysis methods and uses questionnaire surveys to obtain empirical data to study the factors of CS with bamboo products and the correlation between

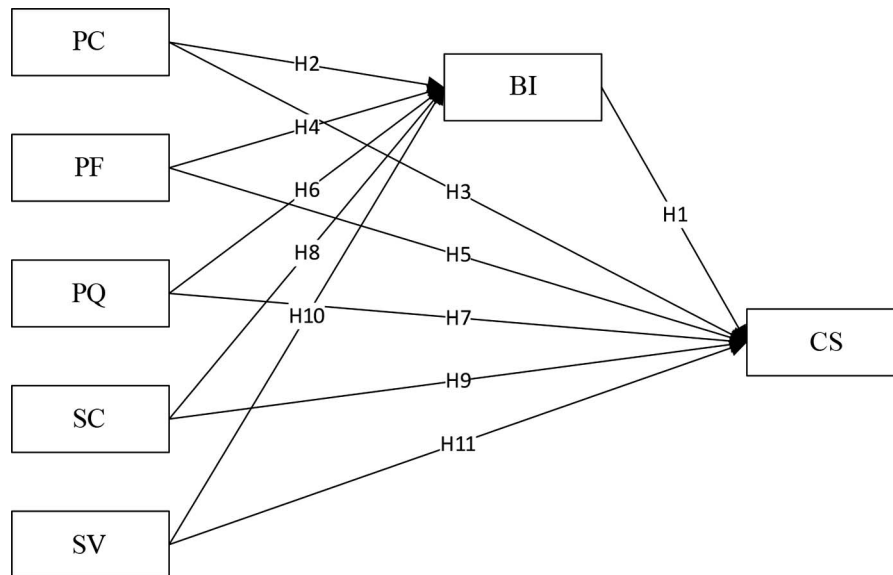


Figure 1.—Theoretical model framework diagram. CS = customer satisfaction; BI = brand image; PC = product creativity; PF = product fashion; PQ = product quality; SC = shopping convenience; SV = soft added value.

each factor and satisfaction. In the following sections, the sampling and data collection procedures are described, along with measurement instruments and measures and data analysis techniques.

Semistructured interviews and questionnaire generation

On the basis of the literature review, taking into account the purpose of this study and the key issues faced by bamboo

products, five dimensions of CS with bamboo products were initially extracted (Fig. 1): PC, PQ, BI, SC, and CI. On the basis of these, semistructured interviews were conducted with subjects who met the requirements to extract the influencing factors of CS with bamboo products (Balch 1974).

Five designers with relevant design and market experience were selected to conduct semistructured interviews face to face and through Tencent meetings. After the interview, two researchers immediately transcribed the interview

Table 1.—Scale items and reference sources.

Dimension nos. ^a	Measurement item	Source
PQ1	I think the bamboo products on the market are very exquisite in their material and craftsmanship.	Zhou et al. (2023)
PQ2	I am very satisfied with the level of material design of bamboo products on the market.	Li et al. (2023)
PQ3	I think bamboo material is very durable.	Zhang (2020)
PQ4	I am very satisfied with the quality of bamboo products on the market.	
PC1	I am very satisfied with the style of bamboo products.	Kobthongsirichok (2020)
PC2	I think the functional design of bamboo products is unique.	
PC3	I think bamboo products are very attractive as a material.	Zhou et al. (2023)
PC4	I am very satisfied with the level of creative design of bamboo products.	Tsang et al. (2022)
SC1	I can easily buy my favorite bamboo products on the shopping platform.	Li et al. (2023)
SC2	I can easily see bamboo products in the live broadcast room.	Li et al. (2023)
SC3	I can easily get real-time information on bamboo products in the live broadcast room.	
SC4	I can easily learn more about bamboo products on the website.	Li et al. (2023), Li (2022)
SC5	I am very satisfied with the convenience of purchasing bamboo products.	
SV1	Bamboo products have cultural added value.	Semistructured interview
SV2	Bamboo products have emotional (belonging) added value.	Ma and Li (2008)
SV3	Bamboo products have high-tech added value.	Ma and Li (2008)
SV4	Bamboo products have service-added value.	Semistructured interview
SV5	I am very satisfied with the added value of bamboo products.	Semistructured interview
PF1	Bamboo products have a strong sense of modern form.	Semistructured interview
PF2	Bamboo products have a strong sense of color design.	Semistructured interview
PF3	Bamboo products have a very fashionable material combination.	Semistructured interview
PF4	I think bamboo products have a strong sense of fashion.	
BI1	I can recognize this bamboo product brand through the logo system design	Feng (2022)
BI2	I agree with the design concept of this bamboo product brand	Feng (2022)
BI3	This bamboo product has rich promotional display forms.	Chen et al. (2023)
BI4	I have high demand for branded products.	
BI5	I am very satisfied with the brand design of bamboo products on the market.	

^a PQ = product quality; PC = product creativity; SC = shopping convenience; SV = soft added value; PF = product fashion; BI = brand image.

Table 2.—Description of demographic variables (N = 463).

Variables	Frequency	Percent	Variables	Frequency	Percent	Variables	Frequency	Percent
Sex: Male	252	54.4	PhD and above	19	4.1	Electronics/Industrial Automation	19	4.1
Female	211	45.6	Work (Education/training/research/college)	23	5.0	Wholesale/Retail/Trade/Import and Export	11	2.4
Age (yr): Under 18	22	4.8	Design/Real Estate Development/Construction Engineering/Decoration	28	6.0	Transportation/Transportation/Logistics	45	9.7
18–30	132	28.5	Institutions (enterprises and institutions)	5	1.1	Aviation/Energy/Chemical/Machinery	13	2.8
31–40	98	21.2	Art/Advertising/PR/Media	32	6.9	Agriculture/Fisheries/Forestry	23	5.0
41–50	79	17.1	IT/E-commerce	48	10.4	other industry	44	9.5
51–60	91	19.7	Apparel/Textile/Leather)	33	7.1	Income (More than 50,000)	4	.9
Over 60	41	8.9	Manufacturing industry	36	7.8	20,000 to 40,000 RMB	6	1.3
Education level: No college	97	21.0	Medical/Hygiene/Pharmaceutical/Bioengineering/Medical Equipment	24	5.2	10,000 to 20,000 RMB	28	6.0
Junior college	129	27.9	Dining/Entertainment/Tourism/Hotel/Life Services)	46	9.9	5,000–10,000 RMB	162	35.0
Undergraduate	181	39.1	Communication/Telecom Operations/Network Equipment)	19	4.1	3000–5000 RMB	165	35.6
Graduate	37	8.0	Banking/Insurance/Accounting/Auditing/Legal	14	3.0	Below 3,000 RMB	98	21.2

content. A text manuscript of 8,796 words was obtained. According to the grounded theory, the interview information was coded step by step in Nvivo12 text analysis software and two categories of influencing factors of CS were obtained, namely product SV and PF. We can delete one category, that is, CI, and use BI as a mediating variable to understand the relationship between these six dimensions and the dependent variable of satisfaction, as well as the moderating effect of the mediating variable. Therefore, according to interviews and literature the research constructs an index system consisting of 27 measurement questions and 7 measurement dimensions. The final questionnaire included a total of 32 measurement items including demographics, among which the measurement items all used a 5-point Likert scale (Table 1).

Sampling and data collection

Questionnaires (589) were distributed online. Some (126) were eliminated on the basis of contradictory items, and 463 valid questionnaires were recovered, with an effective rate of 78.6%. From the perspective of sample characteristics, the male:female ratio is 54.4%:45.6%. The sample size between 18 and 30 years old accounts for 28.5%, the sample size between 31 and 40 years old accounts for 21.2%, and the sample size between 51 and 60 years old accounts for 19.7%. All age groups are involved in the survey sample, and the overall population is slightly younger; in terms of academic

qualifications, the survey groups are mainly concentrated in junior colleges and undergraduates, accounting for 27.9% and 39.1%, respectively. According to the traditional design characteristics of bamboo products, it is reasonable that the audience group has a large proportion of middle-aged and elderly people, so the structural distribution of the samples in this survey is reasonable. Specific descriptive statistics are shown in Table 2.

Statistical Analysis and Results

Questionnaire overall reliability test

The overall Cronbach's alpha value of the questionnaire is 0.966, which is greater than 0.9, indicating that the overall reliability of the questionnaire is high. Exploratory factor analysis was conducted on the questionnaire through SPSS. The Kaiser–Meyer–Olkin) value was 0.964, which is greater than 0.80, and the significance is 0, indicating that it is suitable for factor analysis (Tables 3 and 4).

Validity test—Confirmatory factor analysis

Convergent validity.—The convergent validity and discriminant validity of the questionnaire were tested through smartpls. The results showed that the Cronbach's alpha value of each variable was 0.839 to 0.908, all greater than 0.75; the combined reliability value was 0.903 to 0.983, all

Table 3.—Reliability statistics.

Reliability statistics		
Cronbach's alpha	Cronbach's alpha on the basis of standardized items	N (items)
0.966	0.966	28

Table 4.—Kaiser–Meyer–Olkin (KMO) and Bartlett test.

KMO and Bartlett test		
KMO		0.964
Bartlett's test of sphericity	Approx. chi square df	8,624.881 300
	Significance	0

Table 5.—Convergent validity.

Constructs	Items	Loading	Cronbach's alpha	Composite reliability	Advertising value equivalency
BI ^a	BI1	0.866	0.845	0.907	0.764
	BI2	0.884			
	BI3	0.873			
CS	CS1	0.837	0.908	0.928	0.684
	CS2	0.816			
	CS3	0.833			
	CS4	0.817			
	CS5	0.833			
PC	PC1	0.875	0.839	0.903	0.756
	PC2	0.879			
	PC3	0.855			
PF	PF1	0.903	0.877	0.924	0.802
	PF2	0.880			
	PF3	0.904			
PQ	PQ1	0.913	0.896	0.935	0.827
	PQ2	0.903			
	PQ3	0.912			
SC	SC1	0.861	0.884	0.920	0.743
	SC2	0.830			
	SC3	0.888			
	SC4	0.868			
SV	SV2	0.877	0.858	0.914	0.779
	SV3	0.882			
	SV4	0.889			

^a BI = brand image; CS = customer satisfaction; PC = product creativity; PF = product fashion; SC = shopping convenience; SV = soft added value.

greater than 0.7, indicating that this scale has good internal reliability. Second, the factor loading coefficient values of each measurement item are greater than 0.70, indicating high reliability. The advertising value equivalency (AVE) value of each factor is 0.684 to 0.827, all greater than 0.5, indicating good convergent validity (Table 5).

Discriminant validity (Fornell–Larcker).—The results show that the square root of AVE is greater than the correlation coefficient between this factor and other factors, indicating that it has good discriminant validity (Table 6).

Discriminant validity (heterotrait–monotrait).—The results show that all heterotrait–monotrait ratio of correlations values are less than 0.85, indicating that each factor has good discriminant validity (Table 7).

Table 6.—Discriminant validity.

	BI ^a	CS	PC	PF	PQ	SC	SV
BI	0.874						
CS	0.637	0.827					
PC	0.561	0.669	0.870				
PF	0.641	0.687	0.720	0.896			
PQ	0.615	0.630	0.686	0.675	0.910		
SC	0.571	0.582	0.679	0.747	0.694	0.862	
SV	0.656	0.601	0.689	0.735	0.712	0.725	0.883

^a BI = brand image; CS = customer satisfaction; PC = product creativity; PF = product fashion; PQ = product quality; SC = shopping convenience; SV = soft added value.

Note: Data in bold are the square values of advertising value equivalency.

Table 7.—Heterotrait–monotrait.

	BI	CS	PC	PF	PQ	SC	SV
BI							
CS	0.725						
PC	0.662	0.763					
PF	0.743	0.767	0.836				
PQ	0.707	0.698	0.791	0.760			
SC	0.658	0.647	0.786	0.848	0.779		
SV	0.769	0.680	0.811	0.848	0.812	0.831	

^a BI = brand image; CS = customer satisfaction; PC = product creativity; PF = product fashion; PQ = product quality; SC = shopping convenience; SV = soft added value.

Variance inflation factor.—As shown in Table 8, the variance inflation factor of each factor is less than 5, indicating that the multicollinearity problem between variables can be ignored.

Model's explanatory power.—The R^2 values of the endogenous variables BI and CS are 0.506 and 0.589, respectively, both greater than 0.5, indicating that the model has good explanatory power. Similarly, the BI calculated by Stone–Geisser Q^2 is 0.483 and the CS is 0.589, both greater than zero, indicating that the structural model has good predictive ability. As shown in Table 9, the standardized root mean squared residual value is 0.042, less than 0.08; and the normed fit index value is 0.871, indicating that the model fits well.

Regression analysis mediation analysis (smartpls)

Correlation analysis.—The study calculated the Pearson correlation coefficient between each variable, with values ranging from 0.525 to 0.747, indicating that there is a positive relationship between each variable (Table 10).

Hypothesis testing and bootstrapping mediation test.—This model puts forward 16 hypotheses, of which 11 are direct relationships and 5 are indirect relationships (Table 10, Fig. 2). The partial least-squares results show:

Direct effect test: PF, PQ, SV positively affect BI: PF ($\beta = 0.312$, t value = 3.147, $P < 0.01$); PQ ($\beta = 0.147$, t value = 2.033, $P < 0.01$); SV ($\beta = 0.297$, t value = 3.59, $P < 0.001$); therefore H4, H6, and H10 are established. The impact of PC

Table 8.—Variance inflation factor (VIF).

	VIF
BI > CS ^a	2.024
PC > BI	2.605
PC > CS	2.606
PF > BI	3.112
PF > CS	3.259
PQ > BI	2.585
PQ > CS	2.675
SC > BI	2.92
SC > CS	2.92
SV > BI	2.962
SV > CS	3.141

^a BI = brand image; CS = customer satisfaction; PC = product creativity; PF = product fashion; PQ = product quality; SC = shopping convenience; SV = soft added value.

Table 9.—R², Q², and model fit.

Factors	R ²	Q ²
BI ^a	0.506	0.483
CS	0.589	0.533
Model fit indices	SRMR	NFI
	0.042	0.871

^a BI = brand image; CS = customer satisfaction; SRMR = standardized root mean squared residual; NFI = normed fit index.

on BI is not significant: PC ($\beta = 0.022$, t value = 0.293, $P = 0.77$); the impact of SC on BI is not significant: SC ($\beta = -0.008$, t value = 0.099, $P = 0.921$); therefore, hypotheses H2 and H8 are not true. BI, PC, PF, and PQ positively affect CS: BI ($\beta = 0.263$, $t = 4.417$, $P < 0.001$); PC ($\beta = 0.272$, $t = 4.147$, $P < 0.001$); PF ($\beta = 0.282$, $t = 3.602$, $P < 0.001$); PQ ($\beta = 0.147$, $t = 2.033$, $P < 0.05$); therefore, H1, H3, H5, and H7 are established. The impacts of SC and SV on CS are not significant: SC ($\beta = -0.030$, $t = 0.379$, $P = 0.705$); SV ($\beta = -0.050$, $t = 0.612$, $P = 0.54$); therefore, H9 and H11 are not established.

Mediation effect test: The study used bootstrapping to test the mediating effect of BI. The results showed that PF, SV, and PQ positively affected CS through the mediating effect of BI. Therefore, hypotheses H12, H14, and H16 were established. Among them, BI plays a mediating role in the relationship between PF and SV and PQ and SV; SV has an insignificant effect on CS, but SV can positively affect CS through BI, indicating that BI has a partial mediating effect. However, the mediating effect of BI on PC and SC has not been verified ($\beta = 0.006$, $t = 2.286$, $P = 0.775$); SC and CS ($\beta = -0.002$, $t = 0.096$, $P = 0.923$). Therefore, hypotheses H13 and H15 are not established.

Discussion

From a consumer perspective, the relationship between factors influencing bamboo product satisfaction and their impact on satisfaction were studied. First, on the basis of the key issues encountered in the development of bamboo products, combined with the satisfaction measurement indicators of products in the design field, six dimensions of bamboo product design satisfaction were constructed, and then the impact of the six dimensions on CS was analyzed. Second, BI is introduced into the model as a mediating variable to explore the promoting role of brand design in bamboo product development. By conducting a questionnaire

survey on 463 consumers to obtain data, we empirically analyzed the impact of PC, PQ, PF, SV, and SC on CS and the moderating role of BI. First, the relationship between each variable and satisfaction: BI, PC, PF, and PQ have a significant impact on CS; PF, PQ, SV positively affect the BI, whereas SC and SV have no significant impact on CS; SC and PC have no significant impact on BI; the mediating effect of BI, PF, sex, SV, and PQ have a positive impact on CS through the intermediary role of BI. Among them, SV has an insignificant effect on CS, but SV can be affected by BI. Image positively affects CS, indicating that BI has a partial mediating effect. However, the mediating role of BI on PC, SC, and CS has not been verified.

Conclusions

Previous research on bamboo products has mainly focused on the fields of design methods and material innovation research, lacking systematic market-based empirical research. This article draws on the product satisfaction model and combines the characteristics of the bamboo product research field to derive six dimensions. The empirical analysis yielded the above results.

On the basis of the above research, to promote the healthy development of bamboo industry and improve CS, three aspects of design measures and team building strategies are proposed for reference.

Optimize the design process and use design thinking to develop products

Drawing on cognitive psychologist Donald A. Norman's three-level stages of the design process: instinctive, behavioral, and reflective (Norman 2005). Analyze the ideas for improving the design process of bamboo products. First, at the instinctive level, give users the initial impression and intuitive effect. From the design of bamboo products, we can reflect the excellent texture, as well as the appearance of both fashion and creativity, mainly involving the appearance of the product: color, craftsmanship, material texture, structure, and other characteristics. The physical properties of these products can convey and stimulate the user's physiological and psychological feelings. Second, in view of the interaction between the product and the user, the quality and creative design should be further strengthened. For example, in terms of functional design and operation, the design should be more humane to enhance the user's experience satisfaction when using bamboo products. Finally, reflect on market feedback and image construction, further strengthen bamboo product brand building and the dissemination of

Table 10.—Mean, SD, and correlations (spss).

	Mean	SD	BI	CS	PC	PF	PQ	SC	SV
BI	2.002	0.710	1						
CS	1.654	0.691	0.576***	1					
PC	1.708	0.745	0.525***	0.666***	1				
PF	1.732	0.808	0.600***	0.685***	0.717***	1			
PQ	1.771	0.841	0.571***	0.630***	0.685***	0.673***	1		
SC	1.691	0.740	0.535***	0.580***	0.677***	0.747***	0.693***	1	
SV	1.896	0.688	0.551***	0.544***	0.632***	0.672***	0.649***	0.675***	1

^a BI = brand image; CS = customer satisfaction; PC = product creativity; PF = product fashion; PQ = product quality; SC = shopping convenience; SV = soft added value.

*** $P < 0.001$.

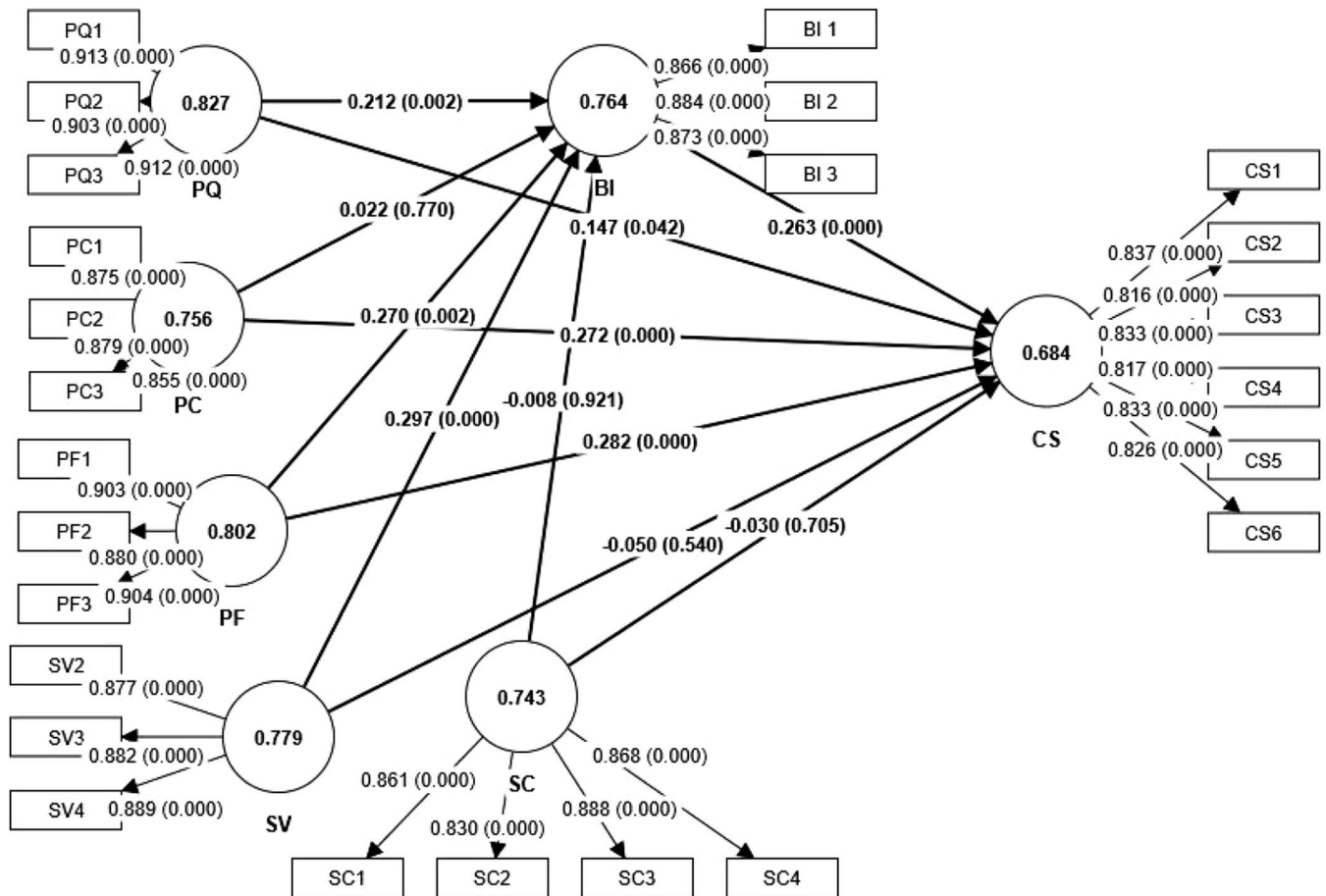


Figure 2.—Analysis of the structural equation model. CS = customer satisfaction; BI = brand image; PQ = product quality; PC = product creativity; PF = product fashion; SV = soft added value; SC = shopping convenience.

cultural connotations, and increase the SV of bamboo products. On the basis of market feedback and research, users are segmented to meet consumers' individual needs.

Update the team organization and strengthen the cooperation between designers and craftsmen

PC and PF are subjective judgments and evaluations of CS with bamboo products. This poses a survival challenge to traditional enterprises that rely on bamboo product processing and traditional workshop-style operators. Such enterprises and groups should start to pay attention to design. First, in the organizational structure, the design department should pay attention to injecting new generation forces, introducing professional design talents, and strengthening the leading role of design capabilities in product development and design. Second, organize designers and craftsmen to cooperate on projects. The design team should focus on the use of design thinking in the product development process, and the craftsmen should use their traditional craftsmanship to produce bamboo products that are both fashionable and high quality.

Strengthen BI design

In this study, PQ, product value-added design, and PF design will positively affect CS through the improvement of BI. The leading role of the brand should be strengthened, and attention should be paid to the promotion

of bamboo products to attract customers and eliminate some prejudices and inherent traditional stereotypes about bamboo products to enhance customers' brand perception and product satisfaction.

The results of this study on the influencing factors of bamboo product satisfaction will help industry designers or other scholars explore the influencing mechanism and boundary issues of bamboo product satisfaction in more detail, thereby enriching related theoretical research. The conclusion of this study gives certain enlightenment and guidance for bamboo product manufacturers and the human resource management of some enterprises.

Limitations

This study discusses the relationship between the satisfaction factors of bamboo products at a macro level without conducting research on specific products. Thus this study has certain limitations in the application of satisfaction factors for different types of bamboo products. In the follow-up work, we plan to conduct a more detailed demonstration on certain types of bamboo products to further improve the tests and conclusions of this research.

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support the findings of this study are available on request from the corresponding author. The data are not publicly available because they contain information that could compromise the privacy of research participants. Additional informed consent was obtained from all individual participants whose identities were included in this article.

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