

Fashion Consumption of Naturally Dyed Products: A Cross-Cultural Study of the Consumption of Blue-Dyed Apparel Between China and Japan

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Abstract

To compare the different motivation, intention and behaviour between Chinese and Japanese consumers in naturally dyed fashion consumption we collected 301 Chinese samples and 302 Japanese samples and used a structural equation model (SEM) to analyse the consumption behaviour of naturally dyed apparel based on the planned behaviour theory (TPB) and cross-cultural sustainable consumption framework (CCSC). The results indicate that attitude, social norms and perceived behaviour control (PBC) impact naturally dyed fashion consumption intention and behaviour. Among these relations, intention has a controlling influence on the relationship between subjective factors and actual consumption behaviour. PBC directly affects consumer behaviour. Moreover, the belief system and material source have a significant influence on all TPB constructs, wherein material source has more influence. Comparing China and Japan, attitude has a stronger impact on intention for Chinese than Japanese, but PBC influences Japanese intention more. Theoretically, this paper analyses the factors forming the difference in the strength of the TPB model from a cross-cultural perspective. The differences in Chinese and Japanese consumption behaviours also offer practical insights for the industrial development of natural dyeing.

Keywords

Naturally dyed fashion consumption, theory of planned behaviour, cross-cultural research, belief system, material source.

1. Introduction

The use of natural dyes in the textile industry dates back hundreds of years. With the development of synthetic dyes in the 19th century, the use of plant dyes were gradually reduced; however, with the advent of the sustainable fashion boom in the 21st century, plant dyes have gained new attention [□]. During the Qing and Han dynasties, Chinese textile manufacturers began to develop plant dyes, and some ethnic minorities continue to maintain traditional customs of printing and plant dyeing [1]. Blue dye is the most representative type of plant dye, with maximum production potential, and with the longest and most widely spread history; it is also part of China's intangible cultural heritage [2]. Blue dyeing technology spread to Japan during the Tang Dynasty, which is also when Japanese artisans created the characteristic plate printing technology [3]. Both China and Japan have contemporary fashion brands that use natural blue dyeing, such as *Indigo Hood* in China and *Visvim*, *Kuon* in Japan, that are gradually becoming popular among young adults [4]. Notably, although the

blue dyeing process originated in China, it does not appear to create as much fashion value as in Japan, where the consumer market differs.

Natural dyeing brings both challenges and opportunities to sustainable fashion. The process is environmentally friendly and has an added healthcare effect of insect-proofing [5]. Conversely, the manual requirements of the processes of natural, wax, twist and pinch dyeing are artisanal and complex, resulting in higher prices than other fashion products, and hindering its market development [6]. Although states attach great importance to the market activation of intangible cultural heritage, handicraft industry artisans often lack market management strategy, efficient operations and reasonable distribution channels, which limits the development of the blue-dyed fashion industry in China [7].

To analyse the differences in consumption of naturally dyed fashion among consumers in China and Japan, this research utilises Ajzen's theory of planned behaviour (TPB) while referring to Ceglia's cross-cultural sustainable

consumption framework (CCSC) [8]. TPB [9] is one of the most widely used theories in social science research, specifically in 10 domains, including health science, environmental science, business & management and educational research [10]. In sustainable fashion behaviour research, TPB is also applied to independently predict consumption intention [11]. In addition, research concerning cross-cultural consumption has been based on TPB [12]. However, sustainable consumption research based on TPB has mainly focused on collaborative fashion consumption or on the emergence of sharing, trading, swapping and renting options, thus there is a lack of research on sustainable and naturally made fashion consumption. Natural dyeing processes, such as plant dyeing, typically represent the development of sustainability in the fashion industry and, hence, should be fully investigated from multiple perspectives. In terms of cross-cultural research focused on values and beliefs, some studies have focused on national ideology [13,14], whereas others are based on the dimension of personal values [15,16]. Ceglia developed CCSC based

on TPB, combining aspects of the value system, material culture and language system [9]; however, it has not yet been empirically applied to the analysis of a market segment.

In the following sections, the influence of attitude, subjective norms and perceived behaviour control (PBC) as well as the that of cultural factors regarding the consumption of naturally dyed fashion are discussed. Using a structural equation model (SEM), the influence of cultural differences between China and Japan and the effect on blue dyeing consumption have been analysed.

2. Theoretical background

2.1. Naturally blue-dyed fashion in China and Japan

Consumers' preference for blue-dyed products embodies natural feelings and aesthetics; it is inseparable from the development of a country's traditional handicrafts and a deep reflection on the pollution of printing and dyeing water [17,18]. In China, naturally blue-dyed apparel can be divided into tradition and ethnic styles. This clothing is represented by brands such as *NAMSAN*, *Indigo hood* and *A Life On The Left*, which emphasise the authenticity of the handwork, based on ancient dyeing techniques, and are committed to promoting traditional culture. However, Chinese consumers' acceptance of natural blue dyeing remains limited, and is manifested in a lack of a mature brand design and operational system. Current consumers are also limited to high-income earners [19,20]. Compared to blue-dyed garments, the blue dye industry in ethnic minority areas is more systematic, but mainly focuses on producing ethnic apparel [21,22].

Japanese natural blue-dyed brands have formed a symbolic feature that uses natural blue dyeing craftsmanship as a selling point. It also combines blue dyeing with contemporary and trendy lifestyles [20].

Japan's industrialisation of natural blue products predates that of China and

South Korea. Most Japanese natural blue-dyed product stores are located in Tokushima, where indigo plants are commonly grown and the production, research and sales are integrated, and its neighbouring regions Kyoto, Osaka and Okayama. Unlike Chinese brands, Japanese blue-dyed product stores do not focus on distributing clothing products in urban high-end shopping malls and on e-commerce platforms. Moreover, in Japanese shopping malls, natural dyed products account for 89.1% of available clothing, which is higher than that of China and South Korea. The price range is diversified and the product categories are rich, from initial retro tannins to t-shirts, sweaters and dresses [18,20]. Nevertheless, the popular patterns of blue-dyed products in China and Japan are similar [23].

Generally, China's natural blue dye industry adheres to historical traditions and national culture, whereas Japan to the current lifestyle. Differences remain in the development of the trend of natural blue dye between the two countries.

2.2. Applying TPB to natural blue-dyed fashion consumption

TPB examines consumer intentions, attitude, subjective norms and PBC to make inferences pertaining to actual conduct [10]. It is an extension of the theory of rational behaviour (TRA) [24]. TPB incorporates measures to control beliefs and PBC. In TRA, behavioural intention is predicted through attitude and social norms [25,26]. Attitude refers to the evaluation of a specific behaviour; the more positive the consumers' attitude, subjective norms and PBC, the more willing they will be to implement the behaviour [27]. In terms of sustainable fashion consumption, the impact of positive attitude on intentions has been fully demonstrated as an important predictor of purchase behaviour [28]. Attitude formation includes recognition of sustainable fashion ethics, brand culture recognition and the evaluation of brand ecological value. Among them, inner emotional value impacts attitude the

most [29,30]. Natural blue-dyed fashion has ecological value, reflecting cultural concepts of harmonious coexistence and eliciting a strong value of craftsmanship emotion [22]. Therefore, in accordance with the logic of TPB, consumers' moral and emotional recognition of ecological protection contribute to a positive attitude and lead to a higher intention to pay product premiums [31].

H1: The more positive the attitude toward natural blue dyeing, the stronger the intention to consume such fashion products.

Subjective norms, the second construct of TPB, is defined as the personal mandate to 'perform or not to perform a certain behaviour because of social pressure perceived' [32,25]. Subjective norms indicate consumer intentions derived from self-references to certain groups or individuals [33]. They also represent a dominant factor in the formation of consumers' ethical purchasing intentions vis-à-vis fashion products [30]. Subjective norms emerge from two aspects of social pressure, namely, the construction of identity to meet the requirements of social life and an intrinsically motivated rationale to follow trends. The positive impact of subjective norms on sustainable consumption intentions has also been confirmed by many studies [34,35]. Given the external characteristics of fashion, consumption decisions are not only based on life needs but even more so on self-expression. Consumers insinuate tastes, values and social recognition through the cultural symbol of personal outerwear [36,37]; hence, compared to attitude, the perception of social pressure may have a stronger influence on consumption intentions [38]. Therefore, the generation of consumers' intention to consume natural blue-dyed apparel is inseparable from the influence of social factors.

H2: The stronger the awareness of subjective norms, the stronger the intention to consume natural blue-dyed fashion products.

The third factor of TPB, that is PBC, has an impact on both consumption intention

and actual behaviour. PBC can predict conduct that is not completely subject to volition and explain how individuals perceive their ability to engage in certain behaviours based on the discernment of constraints or favourable conditions that inform consumption behaviour [10]. PBC reflects consumers' actual purchasing power, consumption resources and opportunities, as well as other actual control conditions. Therefore, when there are more convenient access opportunities and purchase conditions to buy natural blue-dyed fashion products, both consumption intention and actual purchase behaviour will be stronger. If the attitude and subjective norms belong to a consumer's personal ideology, PBC is a factor of influence on consumer self-confidence through both internal experience and external conditions. PBC promotes the transformation of attitude into consumer intention and directly into enacted consumption behaviour [39]. Thus, we developed two hypotheses for PBC as follows.

H3: The stronger the PBC regarding natural blue dyeing, the stronger the intention to consume natural blue-dyed fashion products.

H4: PBC positively affects consumption behaviour directly regarding natural blue-dyed fashion consumption.

Since actual behaviour occurs under various circumstances, it would be difficult to assert that a single subjective identity-related factor, such as inner identity or self-image enhancement, solely promotes actual consumption outside of considerations of economic capacity, consumption inertia, resources and environment along with other factors [40,38]. Intention includes internal subjective and external objective factors, and evidently it is a critical controlling factor affecting the formation of consumer behaviours [41]. Although the performance of intent comprises the generation of behaviour, this transformation is affected by multiple factors, including economic standards, knowledge and lifestyle [42]. Subjective norms, behaviour attitudes and PBC also explain intention. Therefore, value

recognition, belief norms and strongly identified self-concept regarding natural blue-dyed fashion products can only contribute to the formation of intention, but not to actual behaviour directly. Thus, intention could contribute as the complete mediator of such subjective factors to ensure purchase behaviour. However, PBC differs from attitudes and subjective norms that only represent consumers' internal consciousness. It is affected by a wider range of factors and could become the only variable in TPB with a direct influence on behaviour, possibly regulating the shift from intention to behaviour [43]. Therefore, intention could contribute to behaviours by partially mediating PBC [26], from which the following hypotheses can be made:

H5: The higher the intention towards natural blue-dyed clothing consumption, the stronger the actual consumption behaviour.

H6a: Intention has a completely mediating role in the relationship between attitude and natural blue-dyed fashion consumption.

H6b: Intention has a completely mediating role in the relationship between subjective norms and natural blue-dyed fashion consumption.

H6c: Intention has a partially mediating role in the relationship between PBC and natural blue-dyed fashion consumption.

2.3. Cross-cultural literature on sustainable fashion

Cultural values are considered to be some of the most powerful factors influencing consumption motivation behaviour [44]. In fashion consumption, cultural values play a role that must be considered. As a social phenomenon, fashion can be an expression of traditional culture and novel concepts, which is entirely separate from the basic practical function of clothing itself [45]. Cultural values are affected by factors such as country size, population density, average education level, and per capita income, with various influential elements. Craig and Douglas identified

three factors that influence cross-cultural consumption, namely, values and belief systems, material culture and artefacts, as well as language and communication systems [46]. Ceglia presented the CCSC framework combined with TPB [9]. All of these factors influence TPB constructs as well as influencing one another. Among them, values and belief systems are the basic elements which reflect national ideology and policies, as well as material consumption sources for sustainable fashion [10,13,30]. There is a clear relationship between beliefs, material culture and TPB. Attitudes are based on past personal experiences involving emotional issues and guided by the value of universalism [47]. Subjective norms are affected by the influence of social groups on individuals and the belief in a collectivist spirit. PBC reflects the convenience of resources for sustainable consumption and is affected by the availability of material cultural resources. Various cultural bases render different TPB constructs [9,48].

H7: Differences exist regarding all factors of the TPB between two samples with differing cultural backgrounds.

2.3.1. Value and belief systems in TPB

Cross-cultural differences in values are greatly reflected in the national culture, which can be described by four dimensions of individualism/collectivism, power distance, masculinity/femininity and uncertainty avoidance [49]. National ideologies such as individualism/collectivism deeply affect consumption patterns and behaviour [50]. The concepts of individualism and collectivism are used to describe the degree of individual integration into society, and have been demonstrated in a multitude of cross-cultural consumption research. In individualistic cultures, one's self-concept is considered more important, whereas in collectivist cultures, people's values and attitudes are based on the social system in which they live and the need to maintain a social image [51]. In an individualistic culture, attitude has the strongest influence on consumption

intentions, whereas in collectivist culture, the influence of subjective norms is stronger than attitude [52]. The social systems of China and Japan differ; China is considered a collectivist culture and Japan an individualist culture. As such, Japanese consumers are more subjective regarding the consumption of natural blue-dyed apparel, and their consumption intention is influenced by personal attitude. In contrast, Chinese consumers' consumption of blue-dyed apparel is more concerned with the social value of traditional handicrafts and sustainable fashion, and subjective norms are more influential than attitude.

H8a: Attitude has a stronger positive influence on Japanese consumers' intention towards blue-dyed apparel consumption than on Chinese consumers.

H8b: Subjective norms have a stronger positive influence on Chinese consumers' intention towards blue-dyed apparel consumption than on Japanese consumers.

2.3.2. Material culture and communication systems in TPB

Material culture and artefacts are tangible elements that offer material resources and set norms for consumer behaviour [9]. The existence of a rich material foundation and consumption environment creates better conditions for sustainable fashion consumption, making it easier for consumers to access and consume blue-dyed fashion products [48]. The resources of material culture are also a key factor in the formation of similarities and differences between societies [53]. Material culture resources might be a significant cultural influence factor of the TPB construct between China and Japan. In terms of the sources of material consumption of blue-dyed apparel, the Japanese fashion industry started earlier than in China, and now boasts a wider variety of blue-dyed fashion brands with more mature distribution mechanisms than China [18].

Regarding communication systems, when the state of communication is controlled,

sustainable information can be distorted or absent if misaligned with national policy, as shared knowledge through pictures and graphs has an important influence on cognitive factors [9]. China and Japan also differ in this regard. Although China is a broadly Internet-connected country, with the Internet penetrating deeply into people's daily lives, residents' networks are restricted and they do not have permission to browse many international websites. Japanese consumers have access to more convenient consumption conditions for purchasing blue-dyed fashion products, meaning that the Japanese benefit from more shopping resources for natural blue-dyed apparel than the Chinese.

H8c: There is a stronger positive relation of PBC to behaviour for Japanese consumers than Chinese consumers.

H9: Material culture resources might be the most significant cultural factor of influence in the TPB construct.

3. Methodology

3.1. Questionnaire design and measurement development

This research applied quantitative methods to analyse the relationships between attitude, subjective norms, PBC, natural blue-dyed apparel consumption intention and actual behaviour. It also analyses the differences of natural blue-dyed clothing consumption in relation to culture differences. A preliminary questionnaire was developed comprising 24-Likert scale questions with 4 items for each TPB construct.

The questionnaire was divided into three parts. The first includes demographic questions of age, gender, income and education level. The second examines cultural value orientation based on Ceglia's CCSC [9], including belief orientation, blue-dye material culture and communication orientation. The third covers the TPB measures. All TPB measures were based on Ajzen's research in 2002 [34] and adopted from relevant previous research [30,54]. The nouns were

changed to natural blue-dyed apparel and items were answered on a 7-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. Questionnaire items for TPB are presented in *Table 1*. The questionnaire was conducted with 50 students in both countries as a pre-test to verify whether the items were well-designed and understandable.

In the next step, English questions were translated into both Chinese and Japanese, and then scholars majoring in English in both countries were invited to back-translate the questions into English to reconcile any post-translation deviations in the articulation of the questions.

Moreover, to strengthen the respondents' understanding of natural blue-dyed fashion products, pictures from relevant national brands in both countries, such as *Visvim* and *A Life On The Left*, were included.

3.2. Data collection

The questionnaire was placed on the *wenjuanxing* (<http://www.wjx.com>) website, one of the leading online survey agencies in mainland China. The main survey was conducted online in mainland China in early February in 2021, followed by a survey in Japan in March 2021. Each of the participants received 5 RMB for their effort. To reduce the influence of common method bias, the order of questions in the online survey was randomly reversed, and there was no hint of construct connotation.

Overall, 301 effective Chinese questionnaire responses and 302 effective Japanese responses were collected. Among the samples, the major age in the Chinese sample was 25–35 and in the Japanese the same, 25–40; 56% men in China and 54% men in Japan; 55% of the respondents were married in the Chinese sample and 50% in the Japanese. In addition, the majority of the respondents in both countries were at the bachelor's degree level. In summary, the samples share common characteristics that allow for the study of consumption differences from differing cultural backgrounds.

Constructs	Measurements	Item	Sources References
Attitude (Cronbach's alpha = 0.947)	I consider that buying natural blue-dyed apparel goods is positive	ATT1	[30] [34]
	I consider that buying natural blue-dyed apparel goods is beneficial	ATT2	
	I consider that buying natural blue-dyed apparel goods is worthwhile	ATT3	
	I consider that buying natural blue-dyed apparel goods is wise	ATT4	
PBC (Cronbach's alpha = 0.911)	I have the resources to buy natural blue-dyed apparel goods	PBC1	
	I have the capacity to accept the premium from natural blue-dyed apparel goods	PBC2	
	Buying natural blue-dyed apparel is easy for me	PBC3	
	I have complete control over buying natural blue-dyed apparel	PBC4	
Subjective norms (Cronbach's alpha = 0.932)	I feel important people in my life want me to buy natural blue-dyed apparel	SN1	
	The people who I listen to could influence me to buy natural blue-dyed apparel	SN2	
	The use of natural blue-dyed garments by my family and friends will also encourage me to buy natural blue-dyed garments on my own initiative	SN3	
Intention (Cronbach's alpha = 0.955)	I'm willing to buy natural blue-dyed apparel in the coming year	INT1	[34] [56]
	If prices are not significantly different from others, I may purchase natural blue-dyed apparel	INT2	
	If quality is not significantly different from others, I may purchase natural blue-dyed apparel products	INT3	
Behaviour (Cronbach's alpha = 0.939)	I have bought natural blue-dyed apparel in previous years	BEH1	
	I have bought natural blue-dyed apparel even paying more	BEH2	
	I have bought natural blue-dyed apparel and it has the same quality compared to other apparel	BEH3	

Table 1. Questionnaire items

4. Results

4.1. Confirmatory factor analysis

This study used SEM to demonstrate the latent variables. Before presenting the results of the TPB model, confirmatory factor analysis (CFA) was performed with AMOS21.0 to test whether each factor in the five constructs satisfied the correspondence between items. The model fit indices (CHI/DF = 1.970, CFI = 0.983, GFI = 0.932, AGFI = 0.919, RMSEA = 0.028) suggest an acceptable fit. Composite reliability (CR) estimates were between 0.802–0.863, exceeding the recommended threshold of 0.70 [55]. The average variance extracted (AVE) ranged from 0.757 to 0.875, above the recommended value of 0.5 [56]. These values indicate that the measures within the construct are consistent. The results of the CFA for all scale items are presented in Table 2.

Discriminant validity testing was also performed. Discriminant validity indicates that each latent variable represents a different construct [57]. This distinction was determined by comparing the item loadings associated with one factor and its cross-loading on other factors. Each load on the related factor must be greater than the cross-loading on other factors [58]. Table 3 presents the discriminant validity testing results, showing that all respective square roots of the AVEs were greater than the correlations between factors [59]. Therefore, the five variables in this research demonstrate acceptable discriminant validity.

4.2. Common method bias analysis

Common method bias (CMB) primarily arises in survey research. It is caused by response tendencies, such as social

desirability, dispositional mood states, similarities or the time and location of data collection [60]. CMB can also be affected by the structure of a questionnaire [61]. Although we reordered all the questions, we also applied CMB testing to ensure minimal impact.

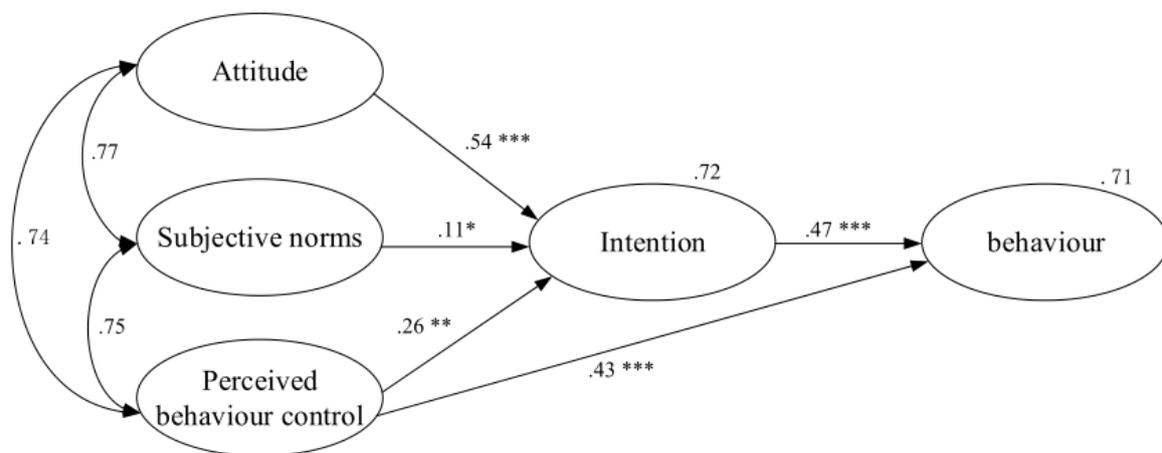
The unmeasured latent method construct (ULMC) was used to test whether CMB existed in this sample data. ULMC was used to detect and eliminate variances in substantive indicators that could not be attributed to their substantive constructs or random errors [62]. The testing result is presented in Table 4. The variance of the indicators was computed at 0.781, while the average method-based variance was 0.038. The ratio of substantive to method variances was approximately 21:1. Additionally, all the method factor loadings ranged from 0.08 to 0.829 and were all above the 0.05 level, being not significant. All the variance inflation

Latent variables	Indicators	Loadings	SMC	CR	AVE
Attitude	ATT1	0.908	0.824	0.802	0.82
	ATT2	0.902	0.814		
	ATT3	0.907	0.823		
	ATT4	0.905	0.819		
Subjective norms	SN1	0.881	0.776	0.827	0.786
	SN2	0.889	0.79		
	SN3	0.898	0.806		
	SN4	0.878	0.771		
PBC	PBC1	0.884	0.781	0.835	0.757
	PBC2	0.838	0.702		
	PBC3	0.888	0.789		
	PBC4	0.936	0.876		
Intention	INT1	0.936	0.876	0.863	0.875
	INT2	0.935	0.874		
	INT3	0.921	0.848		
Purchase behaviour	BEH1	0.925	0.856	0.851	0.85
	BEH2	0.919	0.845		
	BEH3	0.908	0.824		

Table 2. Results of the confirmatory factor analysis for all scale items used for hypothesis testing

Constructs	MEANS	SD	PBC	SN	ATT	INT	BEH
PBC	4.74	1.522	0.87				
Subjective norms	4.68	1.540	0.741	0.886			
Attitude	4.92	1.435	0.755	0.775	0.905		
Intention	5.07	1.500	0.749	0.723	0.822	0.935	
Purchase behaviour	4.80	1.534	0.785	0.661	0.713	0.794	0.921

Table 3. Discriminant validity testing results



Notes: *p ≤ .05, **p ≤ .01, ***p ≤ .001

Fig. 1. TPB for pooled data model

Constructs	Indicator	Substantive factor loading (R1)	R1 ²	Method factor loading (R2)	R2 ²	P
Attitude (VIF = 4.399)	ATT1	0.897	0.805	0.153	0.023	0.402
	ATT2	0.882	0.778	0.165	0.027	0.368
	ATT3	0.891	0.794	0.178	0.032	0.326
	ATT4	0.889	0.790	0.134	0.018	0.469
PBC (VIF = 3.696)	PBC1	0.898	0.806	0.319	0.102	0.094
	PBC2	0.853	0.728	0.273	0.075	0.166
	PBC3	0.845	0.714	0.239	0.057	0.229
	PBC4	0.811	0.658	0.069	0.005	0.736
Subjective norms (VIF = 3.453)	SN1	0.895	0.801	0.304	0.092	0.080
	SN2	0.839	0.704	0.163	0.027	0.356
	SN3	0.843	0.711	0.128	0.016	0.491
Intention (VIF = 6.045)	INT1	0.931	0.867	-0.043	0.002	0.829
	INT2	0.932	0.869	-0.130	0.017	0.525
	INT3	0.932	0.869	-0.127	0.016	0.535
Behaviour (VIF = 4.601)	BEH1	0.894	0.799	0.222	0.049	0.224
	BEH2	0.895	0.801	0.220	0.048	0.234
	BEH3	0.884	0.781	0.189	0.036	0.306
Average		0.883	0.781	0.144	0.038	0.402

Table 4. Common method bias analysis

factors (VIFs) were in the range of 3.69–6.05, within the acceptable range of 1–10. Therefore, the model can be considered free of CMB.

4.3. SEM assessment and hypotheses testing for pooled-data

After accomplishing CFA, the latent model for pooled-data (N = 603) was specified and indicated good fit: CHI/DF = 1.58, Comparative Fit Index (CFI) = 0.991, Goodness-of-fit Index (GFI) = 0.951, Adjusted Goodness-of-fit Index (AGFI) = 0.933, Root Mean Square Error of Approximation (RMSEA) = 0.022. These results were congruent with values (i.e. GFI > 0.90, AGFI > 0.90, CFI > 0.90, RMSEA < 0.06) recommended by Fornell and Larcker [60]. Figure 2 presents the results.

The results of pooled-data hypotheses testing are presented in Tables 5 and 6. Attitude, subjective norms and PBC were shown to significantly influence natural blue-dyed fashion consumption, thus H1–H3 are verified (H1: $\beta = 0.585$, $t = 10.970$, $p < 0.001$; H2: $\beta = 0.114$, $t =$

2.384 , $p = 0.017 < 0.05$; H3: $\beta = 0.267$, $t = 5.696$, $p < 0.001$). PBC was also found to have a positive influence on blue-dyed apparel consumption behaviour, confirming H4 ($\beta = 0.486$, $t = 11.049$, $p < 0.001$). Although the conversion of intention into actual behaviour is affected by many complex factors, H5 is also confirmed ($\beta = 0.465$, $t = 10.005$, $p < 0.001$), reflecting previous sustainable fashion consumption results based on TPB, e.g. [13,63,30].

The results of pooled-data mediation testing are shown in Table 7. Since bootstrapping has proved more powerful than the Sobel test in testing the effects of intervening variables [64], this study used the AMOS bootstrap operation to analyse the total, indirect and direct effects. Because the variable subjective norms cannot lead to consumption intentions, it also cannot contribute to purchase behaviour through intention, and an insignificant result ($Z = 0.413 < 2$, $P = 0.232$) was rendered for the total effect; H6b was rejected. The two remaining mediation hypotheses were confirmed. Attitude had significant data on indirect and total effects; yet, it did not have direct effects on actual behaviour

($Z = 0.193 < 2$, $P = 0.804$); therefore, intention mediates the relationship between attitude and behaviour, and H6a was accepted. PBC had significant results in all the three paths ($Z = 5.408 > 2$, $P = 3.433 > 2$, $P = 0.001$; $Z = 4.464 > 2$, $P = 0.002$). Therefore, intention partially mediates the relationship between PBC and behaviour; thus, H6c was accepted.

4.4. Intercultural descriptive results for TPB constructs

To assess whether there are significant differences between Chinese and Japanese consumers (regarding their attitude, subjective norms, PBC and intention towards engagement in consumption of natural blue-dyed fashion), we performed a multivariate analysis of variance. The results revealed that blue-dyed apparel material culture and national belief orientation exerted significant effects on all TPB constructs (material culture: all the F-values were significant at $p < 0.001$; values and belief orientation: all the F-values were significant at $p < 0.05$). However, communication systems presented an insignificant effect on all the TPB constructs (F-values significant at

Hypotheses	Variable relationship	Estimate	S.E.	CR	P	Result
H1	ATT→INT	0.585	0.053	10.970	***	Accepted
H2	SN→INT	0.114	0.048	2.384	0.017	Accepted
H3	PBC→INT	0.267	0.047	5.696	***	Accepted
H4	PBC→BEH	0.486	0.044	11.049	***	Accepted
H5	INT→BEH	0.465	0.046	10.005	***	Accepted

Note: **p* < 0.05, ***p* < 0.01, ****p* < 0.001.

Table 5. Hypotheses testing using the conceptual model

Hypotheses		Point estimate	Product of coefficients		Bootstrapping (95% CI)	Two-tailed significance	Result
			SE	Z			
H6(a) ATT→BEH	Total effects	0.23	0.088	2.614	0.05–0.392	0.015	Accepted
	Indirect effects	0.213	0.052	4.096	−0.175–0.176	0.001	
	Direct effects	0.017	0.088	0.193	−0.037–0.59	0.804	
H6(b) SN→BEH	Total effects	0.033	0.08	0.413	0.183–0.494	0.232	Rejected
	Indirect effects	0.037	0.026	1.423	−0.009–0.099	0.108	
	Direct effects	0.096	0.07	1.371	0.172–0.444	0.102	
H6(c) PBC→BEH	Total effects	0.411	0.076	5.408	0.257–0.57	0.002	Accepted
	Indirect effects	0.103	0.03	3.433	0.072–0.423	0.001	
	Direct effects	0.308	0.069	4.464	0.175–0.449	0.002	

Table 6. Direct, indirect and total effects of the hypothesised model

Model	P	CMIN/DF	GFI	AGFI	RMSEA	CFI	Model fit Bias testing						
							△-CMIN	△-DF	P	△-GFI	△-AGFI	△-RMSEA	△-CFI
Unconstrained	***	1.58	0.951	0.933	0.022	0.991	△-CMIN	△-DF	P	△-GFI	△-AGFI	△-RMSEA	△-CFI
Measurement weights	***	1.538	0.949	0.935	0.021	0.991	22.801	24	0.532	-0.002	0.002	-0.001	0
Structural weights	***	1.627	0.944	0.931	0.023	0.99	70.924	34	***	-0.007	-0.002	0.001	-0.001
Structural covariances	***	2.417	0.925	0.909	0.034	0.976	390.017	46	4.909	-0.026	-0.024	0.012	-0.015
Structural residuals	***	2.755	0.916	0.899	0.038	0.97	529.175	50	3.028	-0.035	-0.034	0.016	-0.021
Measurement residuals	***	2.852	0.904	0.894	0.039	0.966	663.029	84	7.914	-0.047	-0.039	0.017	-0.025

Note: **p* < 0.05, ***p* < 0.01, ****p* < 0.001.

Table 7. Model fit in multi-group analysis

P ≥ 0.159). Therefore, two intercultural characteristics have significant effects on differences in blue-dyed fashion consumption; H7 was confirmed.

Figure 2 presents the sample differences. Generally Chinese consumers rate all TPB factors more highly, particularly in ATT and INT, indicating that Chinese

consumers have more emotion identity and higher intention to consume natural blue-dyed apparel than Japanese consumers. However, the bias between the actual consumption and intention of Japanese consumers was smaller to that of Chinese consumers, indicating that the intention conversion rate of Japanese consumers is higher. This might be a

result of the higher economic standard of Japanese consumers, as economic factors could be a main obstacle to actual sustainable behaviour.

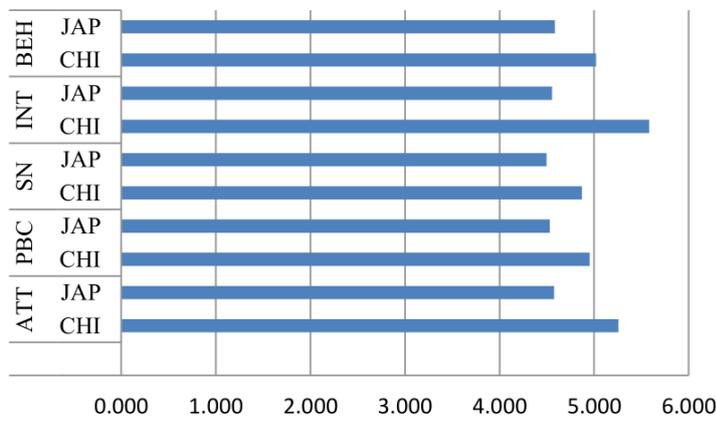
4.5. Intercultural differences in TPB model

To test whether the TPB model is stable in multi-group samples, a multi-group analysis was conducted. Table VII presents the model fit applying four different constrained conditions. All the bias between?? the model are below the level 0.05, thus TPB model 1 is not affected by various sample factors in the study of blue dye consumption behaviour.

TPB models for two group samples are presented in Figure 3. In China, attitude is the most influential factor for intention towards the consumption of natural blue-dyed fashion, followed by PBC, which was found to exert effects on both intention and actual behaviour. However, subjective norms have no influence on intention towards actual consumption, thus H8b was not supported.

In Japan, PBC was the most influential factor towards actual behaviour, and the impact was stronger than for Chinese consumers; thus, H8c was confirmed. However, attitude has less effect on intention towards behaviour than for Chinese consumers. Subjective norms have a higher impact than on the Chinese, but it also the weakest impact on intention; therefore, H8a was rejected.

The differences between the two sample groups are presented in Table 8. Z-scores were used to test the significance. The results indicated that all five paths differed in each culture. Among them, the effect of attitude and PBC in leading to intention elicits the most significant differences, whereas the contribution of subjective norms to intention showed a relatively small difference.

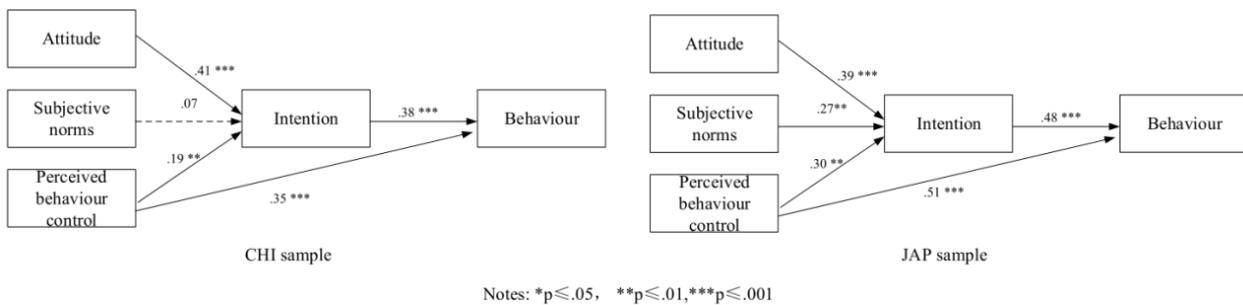


Note : Chinese-CHI, Japanese-JAP

Fig. 2. Intercultural descriptive results for the TPB construct

5. Discussion and conclusions

Based on TPB and factors in CCSC, this study explored the motivation, intention and consumption behaviour of naturally dyed fashion products, taking natural blue dyeing, which is the most common type of natural dyeing, as an example, to investigate consumption differences



Notes: *p≤.05, **p≤.01,***p≤.001

Fig. 3. Model for CHI and JAP

Hypothesis	Path	Estimate		P		Z-score	Results
		JAP	CHI	JAP	CHI		
H8a (JAP>CHI)	ATT→INT	0.393	0.405	***	***	11.038	Rejected
H8b (CHI>JAP)	SN→INT	0.27	0.071	0.008	0.284	2.375	Rejected
H8c (JAP>CHI)	PBC→INT	0.303	0.187	0.007	0.004	5.681	Accepted
	PBC→BEH	0.505	0.35	***	***	11.045	
/	INT→BEH	0.484	0.378	***	***	10.68	

Note: *p < 0.05, **p < 0.01, ***p < 0.001.

Table 8. Cross-cultural differences

in China and Japan. As an alternative to planned behaviour, which is most used in the assessment of circular fashion consumption, such as sharing, trading, swapping and renting, we focused on eco-friendly material used in apparel and its consumption, aiming to promote a segmented study in sustainable fashion consumption research. The results demonstrated that attitude, social norms and PBC have an impact on the intention and behaviour of purchasing naturally dyed fashion. Among them, intention has a completely mediating role in the relationship between subjective factors and actual consumption behaviour, and PBC can directly affect consumer behaviour. All the factors in TPB were shown to contribute to naturally dyed fashion consumption in pooled-data; however, differing motivations between Chinese and Japanese consumers were revealed, reflecting the impact of cultural differences on consumer behaviour. Comparing the factors in CSCC, the material culture resources were shown to have the most significant impact on differences in naturally dyed fashion consumption, followed by the value system. In terms of Chinese consumers, positive attitude towards blue-dyed apparel is the most influential factor in consumption intention and behaviour, followed by PBC, whereas subjective norms do not affect consumption intention. For Japanese consumers, PBC is the primary condition that affects actual behaviour, with an intensity that is higher than all other factors, reflecting the abundance of resources for Japanese consumption of blue-dyed apparel. Thus, attitude is an important factor for Chinese consumers, whereas for Japanese consumers it is PBC.

5.1. Theoretical implications

5.1.1. Cultural factors in TPB

Cultural factors have significant effects on consumption differences. Regarding the consumption of eco-friendly fashion products, the availability of material cultural resources has the greatest influence. This might be due to the basic influence of material culture on consumer

behaviour. Material culture affects the formation of values and the ways of communicating in daily life [9,48]. Thus, it can be inferred that material culture is the basis for the formation of cross-cultural consumption differences and affects the other two aspects in CCSC. The concept of value is contained in the object itself, for example, marketing strategies and retail space design concepts are based on products' characteristics and consumer lifestyles [65]. From a broad perspective, the development of social material foundations, such as economic changes, affects the formation of macroscopic social values. For example, traditional Chinese values are often negatively correlated with socioeconomic status [66]. In terms of the essence of values, the formation of concepts is also based on the knowledge and understanding of material and cultural resources; that is, values are generated in society and culture [67]. Hence, material culture could be the foundation of CCSC factors. According to Murakami's [69] refinement and summary of material cultural value, resources of material cultural consumption hold production, economic, cultural-meaning, aesthetic and practical value. Thus, all five aspects of the blue dyeing production process: market operation, cultural heritage, aesthetic style and practical characteristics are intensified through consumer attitudes. The blue-dyed fashion available in China and Japan has many differences, including the basis of production, market circulation, products' aesthetic characteristics and product categories. For example, natural blue dyeing in Japan is mainly based on stencil printing, whereas Chinese products are characterised by traditional wax valerian, twisted valerian and clipped valerian. Blue-dyed apparel in Japan focuses on fashionable lifestyle, whereas in China it is based more on national customs. These differences have resulted in differences in consumption behaviour regarding blue-dyed fashion between the two nations, making blue-dyed material resources a significantly influential factor in the differences in consumption, restricted by the guiding effect of values on fashion consumption and overall consumption behaviour [68].

5.1.2. The particularity of naturally dyed fashion consumption in TPB

In the field of naturally dyed fashion, predicting consumption intention and behaviour based on subjective norms is not applicable to all groups. Social pressure from the consumption environment does not promote the natural blue-dyed fashion consumption of Chinese consumers. This result contradicts the assumed prominent role of social identity psychology in fashion consumption, e.g. [69,70]. However, the result was similar to other sustainable fashion consumption research using TPB, e.g. [13]. There are two potential reasons for this. First, different from traditional handicrafts and luxury brands with dominant characteristics, naturally dyed clothing is difficult to intuitively identify, hence it is difficult to highlight consumers' social status, superior taste and cultural literacy. Second, in the traditional Chinese colour class system, blue is the colour used by the civilian class [71]. It is also typically representative of popular fashion culture and one of the clothing colours most used [72]. Therefore, blue apparel has a stable popularity and may not be affected by pressures of social popularity or the need for identity recognition. Hence, the influence of subjective norms on consumption intentions varies according to consumption categories, and its performance on fashion consumption behaviour cannot be generalised.

Different from the research on circular fashion consumption behaviour, PBC can directly influence actual behaviour in the consumption of naturally dyed fashion. This result is consistent with the association path established by the TPB model [10]. PBC includes subjective attitudes as well as objective consumption resources and conditions, which can directly contribute to consumer behaviour [41]. However, this result is contrary to existing research on ethical fashion consumption. Ethical fashion includes a sustainable supply chain, ethical strategies in the marketplace and human-based management. In Liu's research [30], PBC does not appear to lead to the intention to purchase ethical

fashion; however, natural dyeing is part of the sustainable supply chain. Thus, the influence mechanism of ethical fashion consumption cannot be generalised because differing results may be a result of differences in consumers' perceptions of products, since few consumers clearly know about a brand's supply chain and management strategy, and they might have different perceptions of ethical fashion. When consumers are asked whether they 'have the resources, knowledge and capacity to buy ethical fashion goods', they can be easily confused by the abstract concept of ethical fashion. However, most consumers are able to intuitively understand product characteristics, and natural dyeing is clear to understand. This could be why consumption intention towards naturally dyed products is affected by PBC, whereas ethical fashion is not. This deviation implies that the study of ethical fashion requires further exploration and refinement.

According to research regarding the relationship between ideology and consumption behaviour in TPB, a strong spirit of individualism increases the influence of attitudes on intention, and the spirit of collectivism causes the influence of subjective norms to be stronger [73]. However, this logical relationship does not appear to be applicable to the field of naturally dyed fashion consumption. First, China and Japan have different ideologies, but the influence of attitudes on intentions is higher than that of subjective norms in both. Second, China is a collectivist country, wherein subjective norms do not affect consumption intentions. This seemingly contradictory conclusion primarily lies in the particularity of naturally dyed

products. As mentioned above, naturally dyed products are not easily identified, making it difficult for consumers to reflect social identity and consumer demands. Moreover, PBC reflects the convenience of resource acquisition and affects the formation of social consumption values; thereby affecting subjective factors [70]. Naturally dyed brands in China are relatively limited, and the categories do not meet the various needs of daily life. These limited material resources also restrict the influence of subjective norms.

5.2. Practical implications

Our research results could bring inspiration to the development direction of naturally dyed apparel brands. Judging from the research data from China and Japan, the influence of subjective norms is relatively weak. Therefore, the promotion of naturally dyed fashion consumption should neither focus on the consumption environment nor social policy, but should pay more attention to education and training consumer attitudes as well as the strategic reform of product categories.

For the promotion of naturally dyed fashion consumption in China, consumers' love of traditional dyeing should continue to be strengthened. In addition, adjusting the strategy to promote the creation of more naturally dyed brands, including high-, mid- and low-end brands, will construct a differentiated and positioned??? naturally dyed fashion consumption material resources to reach a wider range of consumer groups. Furthermore, these brands need to create products that are more practical and more in touch with fashion trends.

As for the Japanese market, many natural blue-dyed brands have become quite well-known and cover a wide range of naturally dyed products. However, consumers are less emotional about natural dyeing than in China. Therefore, the Japanese brand can delve deeper into Japanese traditional cultural heritage, strengthen the education of traditional material culture, and enhance consumers' enthusiasm for traditional handicrafts.

6. Limitations and future research

The first limitation is the process of data collection. All the samples were collected online. The agency provided a link to respondents, and they could make a choice to select the questionnaire they favoured; therefore, interviewees' self-selection bias is inevitable. The second limitation is the unknown economic standards of the respondents in the two countries. Due to differences in salary standards between China and Japan, this is difficult to compare and unify; therefore, the research did not restrict the economic conditions of the survey samples. Subsequently, economic level is an important factor that affects whether consumers can afford sustainable product premiums. In future research, we will further combine TPB to explore the mediating factors between intention and behaviour in natural material fashion consumption, discussing subjective and objective reasons in the relationship.

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