

Article

Developing More Insights on Sustainable Consumption in China Based on Q Methodology

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Abstract: Being an important aspect of sustainable development, sustainable consumption has attracted great attention among Chinese politicians and academia, and Chinese governments have established policies that encourage sustainable consumption behaviors. However, unsustainable consumption behavior still remains predominant in China. This paper aims to classify consumers with similar traits, in terms of the characteristics of practicing sustainable consumption, into one group, so that their traits can be clearly understood, to enable governments to establish pointed policies for different groups of consumers. Q methodology, generally used to reveal the subjectivity of human beings involved in any situation, is applied in this paper to classify Chinese consumers based on Q sample design and data collection and analysis. Next, the traits of each group are analyzed in detail and comparison analyses are also conducted to compare the common and differentiating factors among the three groups. The results show that Chinese consumers can be classified into three groups: sustainable (Group 1), potential sustainable (Group 2) and unsustainable consumers (Group 3), according to their values and attitudes towards sustainable consumption. As such, Group 1 cares for the environment and has strong environmental values. They understand sustainable consumption and its functions. Group 2 needs more enlightenments and external stimuli to motivate them to consume sustainably. Group 3 needs to be informed about and educated on sustainable consumption to enable them to change their consumption behavior from unsustainable to sustainable. Suggestions

and implications of encouraging each group of consumers to engage in sustainable consumption are also provided.

Keywords: sustainable consumption; consumer traits; Q method; China

1. Introduction

China is on the road to becoming a huge manufacturing and export nation, indicating that the Chinese economy is undergoing successful transformation and national power has been strengthened [1]. With rapid development of urbanization, industrialization and modernization, and ever-increasing living standards, traditional individual consumption patterns have exacerbated the problems of resource depletion, ecosystem deterioration and environmental pollution caused by industries in China [2]. Changing traditional consumption patterns into sustainable ones is a key initiative to achieving sustainable development [3].

Due to the severe challenges imposed by its huge population, China initiated sustainable consumption initiatives as early as 1992. In July 1992, the Environmental Protection Bureau, in conjunction with another 52 departments of State Council and 300 experts, wrote the report: 21st century agenda of China: Population, Environment and Development [4], which analyzed individual consumption in detail and found that individual consumption was unsustainable and sustainable consumption needed to be established according to the status quo of the population, resources and the environment. In 1999, the Chinese central government reemphasized in its working report that individual consumption played a very important role in promoting social and economic development; hence, transforming traditional consumption behaviors into sustainable consumption would benefit economic growth and relieve the environmental pressure on resources [5]. After 10 years, at the international conference of sustainable consumption co-hosted by Ministry of Environmental Protection, Ministry of Finance of China, United Nations Environmental Program and European Unions, the Vice Minister Wu Xiaoqing of the Ministry of Environmental Protection reemphasized that in order to construct an environmental friendly society in China, the fundamental tasks now are to promote sustainable production and consumption, which are useful to creating industrial structures, and growth and consumption models conducive to saving energy and protecting the environment [6]. The report of the Seventeenth National Congress of Central Committee of the Communist Party of China put forward clearly the goal of a national ecological culture, which was apt to energy saving and environmental protection, promoting sustainable consumption. The issues of environmental protection and sustainable consumption are often mentioned in reports and conferences of Chinese central or local governments.

However, China is far from achieving a sustainable consumption culture after more than a decade. Chinese current consumption patterns are detrimental to maintaining natural resources and the ecological environment, thereby producing a series of important problems such as resource depletion, energy crisis, environmental deterioration, ecological imbalance and so on [2,7]. Although unsustainable consumption patterns have brought human civilization to the brink of a global disaster [8], excessive consumption is still prevalent in China. Xu [9] found that the percentage of excessive-consumption consumers accounts for 13% of the total population in China and this figure is

still increasing rapidly. These unsustainable consumption modes will waste huge amounts of resources and produce considerable environmental pollution. Thus, inducing people to conduct sustainable consumption is a very important and necessary initiative [10,11].

With the in-depth research on sustainable consumption, many researchers agreed that because different people had different motivations to conduct sustainable consumption, the consumption traits of different consumer groups are worth studying. For example, Zhang [12] and Yang [13] focused on studying the consumption traits of young consumers and found that there were irrational consumption phenomena among young consumers, including conspicuous consumption, over-consumption, and extravagance and waste, and the issue of young consumption had an influence on their establishing positive values. Yang and Dong [14] studied the relationship between intention and behavior of the different consumption groups categorized by demographic variables. However, most studies on consumption groups are based on demographic variables, including sex, age, income, and so on.

Grouping those consumers with similar attitudes and values towards sustainable consumption, and then analyzing their traits, can help identify specific motivations of each group and accordingly make policies targeted to each group to encourage them to conduct sustainable consumption. The purpose of this paper is to categorize consumers with similar attitudes and values towards sustainable consumption into the same social groups by applying the Q methodology, a way of revealing patterns and connections by identifying individuals with the same attitudes, categorizing different opinions and uncovering insights into major social groupings' construction [15]. Then, this paper analyzes each group's traits and their differences, and puts forward suggestions for the transformation of unsustainable consumers into sustainable consumers. By doing so, a new and different perspective will be provided for academia as well as practitioners to study and understand sustainable consumption. To begin with, a literature review is conducted in Section 2. Then, the research methodology is explained, including questionnaire development and the sampling framework for this study. The empirical analysis and results are used to explain the research findings, and implications are put forward based on the discussion. Finally, the conclusion is presented, including a summary of the findings, limitations and future perspectives.

2. Literature Review

The idea of sustainable consumption was put forward firstly in *Our Common Future* by Brundtland in 1987 and its definition [16], proposed by the 1994 Oslo Symposium on Sustainable Consumption, was put forward as “the use of services and related products which respond to basic needs and bring better quality of life while minimizing the use of natural resources and toxic materials as well as emissions of waste and pollutants over the life cycle of the service or product so as not to compromise the needs of future generations” [17]. Sustainable consumption is not something between under-consumption and over-consumption, but a new consumption model, which includes meeting demand, improving life quality, improving resource utility efficiency, reducing waste, *etc.* [18].

Since then, many studies about sustainable consumption have been conducted. These studies mainly explored the factors affecting sustainable consumption behavior from different perspectives. Most studies on sustainable consumption behavior focused on constructing theoretical models of sustainable consumption and analyzing relationships among psychological factors, consumer traits, problem consciousness and behavior. Stern [19] developed a conceptual framework for advancing theories of

environmentally significant individual behavior and found that attitudinal factors, including norms, beliefs and values, affected environmentally significant behaviors like sustainable consumption. Bossel [20] put forward a conceptual model of sustainable consumption by analyzing the impact of sustainable consumption behavior on the environment based on economic and ecological models. By examining the influence of cultural and psychological factors on the green purchase/sustainable consumption behavior, Chan [21] proposed a theoretical model of green purchasing behavior, and, in the model, environmental attitude was the only factor indirectly influencing green purchasing intention. Some researchers found that environmental attitude and moral norms affected individuals in performing sustainable consumption behaviors. Bamberg and Moser [22] examined psycho-social factors of pro-environmental behavior and found that attitude and moral norms were the predictors of behavior. Gifford [23] found that psychological factors played a very important role in changing individual's behavior. Bret Leary *et al.* [24] found that environmental concern impacted sustainable consumption behavior. Nisbet and Glick [25] found the actions of initiating the individuals' internal power could drive individuals to perform environmental behaviors. Other researchers also conducted studies of sustainable consumption behavior from the perspective of behavior intervention. Bamberg and Moser [22] focused on the important impact of consumption policy on improving environmental behavior intention and changing non-environmentally friendly behavior. Wang *et al.* [26] revealed the current situation of Chinese urban residents' sustainable consumption behavior and the affecting factors. They found that environmental value, environmental knowledge, environmental responsibility, and response efficacy were the main factors influencing sustainable consumption behavior. Spargaren and Mol [27] studied the impact of consumption policy and environment organization on sustainable consumption behavior. Based on the above research, we can find that environmental attitudes, norms, values and policies are the main factors that affect individuals' sustainable consumption behavior.

Some researchers conducted research on sustainable consumption behavior from the perspective of consumer traits. For example, McCrubble [28] found—by examining the relationship between the two aspects—that although young consumers possessed very strong consumption values, they did not perform sustainable consumption behaviors. Bentley *et al.* [29] also found that young consumers could change their consumption behavior when they considered environmental factors but they did not reveal which factors impacted on young consumers' consumption behavior.

Meanwhile, although many countries and international organizations have initiated many actions since 1994, the development of sustainable consumption is still slow and its performance is also limited [9]. Some studies found that the main reason for the current environment deterioration and resource depletion is unsustainable consumption [30]. The Organization for Economic Co-operation and Development also reported that the main obstacle to achieving the environmental goals of its member countries is city consumers. Many studies have also found that although innovations in policy, law and regulation have been achieved, sustainable consumption would not be realized if consumers did not change their consumption behavior [31]. Pelletier *et al.* [30] found that in order to achieve sustainable consumption, efficient methods must be identified to encourage individuals to consume sustainably. Gifford [23], Veitch [32] and Buenstoy [33] assumed that changing consumers' consumption behaviors is very important for achieving sustainable consumption.

Behavioral change has strong potential to mitigate the consumption impacts on the environment [34,35]. Studies on consumption behavior and its environmental impacts have been conducted during the past

10 years [36]. The differences in consumption attitudes, motivation and behavior among consumers, however, are very significant [9], which has meant the existing sustainable consumption policies made by Chinese governments have been ineffective [2,7]. In China, the problems of resource depletion and ecological deterioration resulting from urban citizen's consumption have been paid much attention by academia and politicians. Hence, it has become a critical problem as to how to set up policies accepted or supported by different people so that they can change their unsustainable consumption behavior into sustainable consumption behavior [9]. Tukker *et al.* [37] noted that the studies on sustainable consumption from the perspective of internal factors like consumers' perceptions and attitudes are very limited. How to encourage consumers to consume sustainably is a current research focus and also a key point for future study [38].

3. Methodology

3.1. Q Methodology

Q methodology, invented by William Stephenson in 1935, is used to reveal the subjectivity of human beings involved in any situation [39] and to offer a way of revealing patterns and connections by identifying individuals who share attitudes, giving a structure to subjective opinion and uncovering insights into major social groupings' construction [15]. "In Q methodology, subjects are given a set of descriptions and asked to sort them using a predetermined pattern that approximates a flattened normal curve" [40]. Respondents are asked to express a preference for or agreement with one description over another on a scale from "strongly disagree" to "strongly agree" [41]. The conclusion based on Q methodology could assist environmental policy making in providing the ways environmental issues are perceived by various groups, as different groups have different perspectives for certain environmental concerns [42]. Meanwhile, with the aim of categorizing Chinese consumers based on their perspectives of value and attitude towards sustainable consumption, it is reasonable and suitable for our study to apply Q methodology to achieve this goal.

Usually, the Q methodology has clearly defined steps, including development of Q sample, identification of the study population, data collection, data analysis and production of factor identities [43], and this study also followed these steps.

3.2. Development of Q Sample

The objective of developing Q sample is to acquire every available description relating to sustainable consumption. Based on the literature review of sustainable consumption in journal articles [14,26,44–51], we developed the Q sample for this study, which contains individual's values, environmental attitudes and behavior attitudes of sustainable consumption, including green purchasing, green travel, resource saving and moderate consumption. Fifty items in total about sustainable consumption were selected in the original Q sample. In order to ensure the Q sample comprehensiveness and applicability, a preliminary investigation of 50 items was conducted in Dalian University of Technology. We asked 30 master students to fill in the original Q sample and then substituted some items they considered important and revised those they considered unreasonable. We perfected the original Q sample by deleting those items of low score and adding those important items the respondents substituted. In order

to make the items presented to respondents as clear, concise and comprehensive as possible, some items were refined and rephrased so that their essence can be retained and also made to be more readily understandable to research participants. Finally, 40 items are selected in the final Q sample for this study. This number was chosen on the basis of having a sufficient number of items in the Q-sorts so as to reflect the full spectrum of opinions collected from the focus groups, which avoided burdening participants with a prohibitive number of items to sort through [52]. The detailed information of the Q sample is presented in Appendix.

3.3. Data Collection

Based on the requirement of Q methodology, we write an item on one card, tap these 40 cards randomly and shuffle them. Watts and Stenner [53] highlight the benefits of working with smaller groups of people when using Q methodology when they mentioned that using large numbers of participants in a Q study can be problematic as it "...can easily negate many of the subtle nuances, complexities, and hence many of the essential qualities contained in the data".

With a smaller number of participants, it is more likely that quality and consistency may be maintained [15]. Raje [15] also stated that in order to generate diverse accounts, Q methodology does not require a large number of participants (P set). Because the participant structure of P set is not random, we chose those participants through interviews that took place in Dalian University of Technology in the wider qualitative research.

After understanding the study through our face-to-face explanation, participants are asked to rank in ascending or descending order of importance the 40 opinion items about sustainable consumption and their neighborhood within the context of impacts of sustainable consumption and individual connections. We provide each participant with a set of cards, each with one uniquely numbered item printed on it. As with other studies' procedure using Q methodology, we firstly asked the participants to read all the items and after reading, they placed the items into three piles: those they most agreed with, those they most disagreed with and those that they had no opinion on or are neutral about [15]. After they had classified all items into the three piles, we also asked them to decide where each item should be placed along a continuum moving from +4 most strongly agree through 0 no/opinion or neutral to -4 most strongly disagree using the quasi-normal distribution. Considering the number of items and requirements of Q methodology, we took a nine-level distribution shown in Figure 1. We also asked the participants to explain how they ranked the items with particular attention given to the item at 4, -4, 3 and -3, which is helpful for us to understand participant's views better. In total, we interviewed 40 participants and 36 provided clear justifications for their actions. So, the 36 P set, made up of a range of respondents from different socio-demographic background, is shown in Table 1.

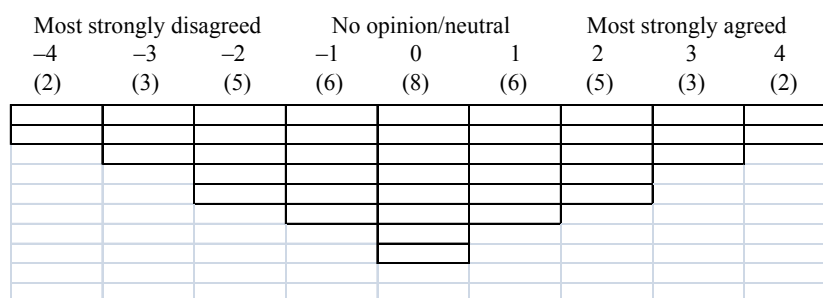


Figure 1. Nine-level quasi-normal distribution of opinion items.

Table 1. Demographic variables.

Demographic	Percentage	Number	Demographic	Percentage	Number
Gender			Age		
Male	36.1%	13	20–29	77.8%	28
Female	63.9%	23	30–39	8.3%	3
			≥40	13.9%	5
Education			Income		
Doctor	8.3%	3	≤\$450	27.8%	10
Master	41.7%	15	\$450–800	41.7%	15
Bachelor and below	50%	18	≥\$800	30.5%	11
Occupation					
student	47.2%	17			
employee	52.8%	19			

4. Data Analysis and Results

4.1. Data Analysis

PCQ software, a program used for implementing factor analysis for the Q-technique [54], was applied to perform correlations and factor analysis by using sorts completed by the P-set. If there are correlation relationships between Q-sorts, it is reasonable to conduct factor analysis. Factors are operant combinations of similar people [40].

After collecting the samples, correlation relationship analysis was conducted to compare the degree of agreement/disagreement among 36 Q sorts. Strong correlation relationship exists among those 36 Q sorts. So, the factor analysis conducted for these 36 Q sorts is reasonable. We conducted factor analysis using Principal Components Analysis to find associations among the different Q sorts. With the criteria of eigenvalue greater than or equal to one [55], four Q sorts are canceled because their eigenvalues are lower than one. The four Q sorts' details are as follows: two male and two female; three aged between 20–29, one aged over 40; one doctor, one master student and two bachelor students and below; two with income between \$450 and 800; one with income less than \$450 and one with income more than \$800, and two employees and two students.

The other 32 Q sorts are categorized into three groups, which means three factors are extracted for further analysis.

These three factors are subjected to Varimax rotation, ensuring that each factor only contained Q-sorts that were highly correlated with each other and that were uncorrelated with the remaining Q sorts [52,56], to identify significant orthogonal factors. The standard error (SE) for a factor loading is calculated by the expression $1/\sqrt{N}$, where N equals the number of items [15]. So, the SE for this study is 0.158 ($1/\sqrt{40} = 0.158$). Participants with factor loadings in excess of $2.58 \times \text{SE}$ are considered statistically significant at $p < 0.01$ [57] and, hence, “indicative of a meaningful relationship between the participant’s Q sort and the factor type” [55]. So, for this study, loading over 2.58×0.158 or 0.41 are statistically significant at $p < 0.01$. Based on this standard, an ideal Q sorts for each factor was identified by determining factor loadings (z score) of Q sorts participants associated with a factor (see Table 2). Factor 1 includes 18 Q sorts, factor 2 seven and factor 3 seven, which means that people can be classified into three different groups from the perspective of sustainable consumption.

Table 2. Factor loadings table.

P set	Factor Loadings			P set	Factor Loadings		
	1	2	3		1	2	3
P26	0.7829	0.1433	0.2148	P20	0.6426	0.0949	0.1058
P27	0.6238	0.0483	0.4520	P21	0.5119	0.0661	0.2727
P31	0.5023	0.1319	0.1102	P29	0.2185	0.7621	−0.0510
P23	0.4964	0.1069	0.1224	P30	0.2136	0.5293	−0.0847
P25	0.7521	0.0987	0.1452	P12	0.2216	0.6235	0.3734
P1	0.5534	0.2817	0.2863	P2	0.2920	0.5313	0.1650
P3	−0.6117	0.1968	0.2341	P16	0.2501	0.6025	0.4663
P7	0.7351	0.3521	0.0149	P22	−0.1910	0.5244	0.4621
P32	0.7470	−0.1209	0.2692	P17	−0.2552	0.4745	−0.0582
P5	0.5485	0.4284	0.0884	P18	0.4146	0.1920	0.5371
P8	0.6589	0.2318	0.0034	P4	0.1843	0.4629	0.6380
P28	0.6371	0.2445	0.0515	P6	−0.2110	−0.1021	0.5976
P9	0.4744	−0.0929	0.2463	P10	0.4071	0.1478	0.7253
P15	0.5722	−0.2210	0.3608	P11	0.2335	−0.0125	0.5665
P24	0.4946	0.0837	0.3875	P13	0.2084	0.2982	0.5178
P19	0.6966	0.2802	−0.0334	P14	0.0237	0.2351	0.4820

Extraction method: Principal component analysis; Rotation method: Varimax rotation; The numbers in bold are statistically significant at $p < 0.01$.

Meanwhile, for each group, their traits are developed by defining those items ranked at 4 and −4. The items and their standard scores for each group are shown in Table 3.

Table 3 shows that for those positive statements on sustainable consumption, item 17, 24, 21, 40 and 11, Group 1 marked them with positive scores, while for those negative statements, item 23, 10, 15, 4 and 13, Group 1 marked them with negative scores. Therefore, Group 1 can be deemed the sustainable consumption group. For Group 2, two positive statements (item 34 and 24) were marked with positive scores, two negative statements (1 and 26) with positive scores and five positive statements (7, 35, 25, 8 and 33) with negative scores. It is worth noting that those five positive statements with negative scores are all about sustainable consumption knowledge and information. Although Group 2 conducts sustainable consumption behavior to some extent, they lack adequate knowledge on it. Thus, Group 2

can be renamed as the potential sustainable consumption group. Similarly, based on the statements and their scores conducted by Group 3, this group can be renamed as the unsustainable consumption group.

Table 3. The +4/−4 items of the three groups selected by the participants.

Factor/group	item	Description	Standard score
Group 1: Sustainable consumption group	17	I would like to buy green food for the health of my family.	1.685
	24	I usually reuse reusable stuffs	1.606
	21	We should conduct sustainable consumption for the harmoniousness between human beings and the earth	1.394
	40	I am a moderate consumer.	1.386
	11	Sustainable consumption benefits environment and I will perform.	1.089
	23	I don't care the certificate marks of green product.	−1.065
	10	I would like to buy those products with perfect package in order to show my status and position.	−1.140
	15	I don't know the role of sustainable consumption in environmental protection.	−1.264
	4	It's inconvenient for me to reuse and I never reuse reusable stuff.	−2.178
Group 2 Potential sustainable consumption group	13	Sustainable consumption is nothing to do with me.	−2.260
	21	We should conduct sustainable consumption for the harmoniousness between human beings and the earth.	2.440
	31	I am sensitive to the prices of green products.	1.816
	19	The policies about sustainable consumption have impact on my life and consumption style.	1.316
	17	I would like to buy green food for the health of my family.	1.216
	3	I would like to consume sustainably if governments provide rewards.	1.153
	39	My personal consumption behavior has no impact on environment.	−1.120
	12	Green marketing has no impact on my consumption style.	−1.151
	15	I don't know the role of sustainable consumption in environmental protection.	−1.319
Group 3 unsustainable consumption group	35	I would like to understand laws and policies about sustainable consumption.	−1.722
	13	Sustainable consumption is nothing to do with me.	−2.280
	31	I am sensitive to the prices of green products.	1.807
	34	I am concerned about quality of products itself rather than package.	1.547
	24	I usually reuse reusable substances.	1.446
	26	I don't care about the government policies.	1.396
	1	I don't know what sustainable consumption behaviors are.	1.357
	7	I will behave sustainable consumption whatever others do or not.	−1.191
	35	I would like to understand laws and policies about sustainable consumption.	−1.339
	25	I know the positive role of sustainable consumption in environmental protection.	−1.342
	8	I understand what sustainable transport is about.	−1.837
	33	I know what sustainable consumption behaviors are.	−1.950

4.2. Results

According to Table 3, in Group 1, the highest positive scores belong to the items 17, 24, 21, 40, and 11, and the highest negative scores were items 13, 4, 15, 10, and 23. Item 24 (I usually use reusable stuffs) and item 4 (It's inconvenient for me to reuse and I never use reusable stuff) express the meaning of reuse from positive and negative view and they get the highest positive (+4) and negative (−4) scores, which also shows that the Q-sample used in this study is credible.

From those items with the highest positive and negative scores, we can see that Group 1 prefers to purchase green food for their health and try to use reusable stuff in their daily life. They think sustainable consumption is part of their lifestyle and benefits the environment. In fact, protecting the environment is one of the most important drivers for them to conduct sustainable consumption. They are against unsustainable consumption and hope to establish a harmonious relationship between human beings and nature.

Precisely, Group 1 knows what sustainable consumption is about. They care about the environment and show a positive attitude towards sustainable consumption. Day to day, they would like to gain knowledge about actively conducting sustainable consumption. So, Group 1 is considered to consist of sustainable consumers.

In Group 2, the highest positive scores belong to the items 21, 31, 19, 17 and 3, and the highest negative scores to items 13, 35, 15, 12 and 39. Group 2 think that sustainable consumption is a positive thing to protect the environment and they should conduct sustainable consumption for the harmony between human beings and the earth. They do not think sustainable consumption has nothing to do with them. They do not care about understanding the laws and policies about sustainable consumption although their consumption style could be impacted by those laws and policies. They are sensitive to the price of green products and would like to consume sustainably if the government provided rewards.

From the items with the highest scores, we can see that Group 2 has a better environmental attitude and some knowledge about sustainable consumption, and they think personal consumption behavior is closely interconnected with the environment. However, whether or not they conduct sustainable consumption is influenced by many factors. Firstly, price is a key factor that determines how they consume. Secondly, they will adjust their consumption style according to policies or laws. If rewards are provided by governments, they are more likely to conduct sustainable consumption. Thirdly, the green marketing conducted by enterprises also impacts on their consumption behavior. Group 2, with some degree of environment attitude and awareness, would conduct sustainable consumption if some external incentives are provided. Therefore, Group 2 is considered to consist of potential sustainable consumers.

In Group 3, the highest positive scores belong to the items 31, 34, 24, 26 and 1, and the highest negative scores belong to items 33, 8, 25, 35 and 7. From those items with high scores, we can see that Group 3 is not aware of what sustainable consumption behavior is and what sustainable consumption is about. They are very sensitive to product price, which indicates if green product prices are more expensive than that of the corresponding products, they would not buy them. Meanwhile, they are not concerned about the product quality or the product packaging. They seldom use reusable substances, and they do not care about the result of their consumption behavior. They also would not want to understand the government policies on sustainable consumption.

The information collected about Group 3 indicates that they know little about sustainable consumption and its role and, therefore, are not sensitive to sustainable consumption policies. Meanwhile, price has a strong impact on their consumption behavior. Hence, Group 3 is considered to consist of unsustainable consumers.

To understand the differences and similarities of these three groups distinctly, we first collected the same items the three groups chose. Then, different items between each two groups were identified. The same items chosen by the three groups are item 3, 10 and 20. The contents of those three items and their scores are presented in Table 4.

Table 4. The consistent items among the three groups and their scores.

Item	Description	Factor		
		1	2	3
3	I would like to consume sustainably if governments provide rewards.	0.645	1.106	1.153
10	I would like to buy those products with over packaging in order to show my status and position.	−1.140	0.793	−1.055
20	I know what can be reused in our daily life	0.842	0.899	0.400

The Table 4 indicates that the three groups understand what can be reused in their daily lives although the scores for the item are different, from 0.842 for Group 1 to 0.400 for Group 3. The rewards provided by governments have a stronger effect on Group 3 (the score is 1.153, the highest among the three groups). Of course, Group 1 prefers to buy products without over-packaging (with the lowest negative score of −1.140) whereas Group 2 would like to buy products with over-packaging to show their status and position. It is interesting that Group 3 also does not like to buy over-packaged products. The reason may be that the prices of over-packaged products are usually more expensive than those of the corresponding conventional ones, as Group 3 is very sensitive to price.

The different items for each combination of two of the three groups are shown in Table 5.

Table 5. The different statements for each two groups and their scores.

Item	Description	Score		
		Group1	Group2	difference
24	I usually reuse reusable stuff	1.606	−0.401	2.006
35	I would like to understand laws and policies about sustainable consumption.	−0.060	−1.722	1.662
Group 1 and Group 2	40 I am a moderate consumer.	1.386	−0.263	1.649
	19 The policies about sustainable consumption have impact on my life and consumption style.	0.006	1.316	−1.310
	2 I don't care whether or not the enterprise conducts sustainable production when I buy its products	−0.480	0.935	−1.415
	31 I am sensitive to the prices of green products.	0.281	1.816	−1.536

Table 5. *Cont.*

	Item	Description	Score		
			Group1	Group3	difference
Group 1 and Group 3	33	I know what sustainable consumption behaviors are.	0.684	−1.950	2.634
	8	I understand what sustainable transport is about.	0.527	−1.837	2.364
	25	I know the positive role of sustainable consumption in environmental protection.	0.888	−1.342	2.229
	26	I don't care about the government policies.	−0.625	1.396	−2.021
	29	I don't consider environment when I consume	−0.958	1.136	−2.094
	1	I don't know what sustainable consumption behaviors are.	−0.889	1.357	−2.246
Group 2 and Group 3	1	I don't know what sustainable consumption behaviors are.	−0.883	1.357	−2.240
	15	I don't know the role of sustainable consumption in environmental protection.	−1.319	0.552	−1.871
	13	Sustainable consumption is nothing to do with me.	−2.280	−0.414	−1.866
	30	My sustainable consumption behavior is important to environment protection.	0.904	−0.875	1.778
	25	I know the positive role of sustainable consumption in environmental protection.	0.585	−1.342	1.927
	19	The policies about sustainable consumption have impact on my life and consumption style.	1.316	−0.676	1.992

Group 1 and Group 2 have similar attitudes (either positive or negative values) towards items 35, 19 and 31, although the scores of each item for the two groups rated are different. For example, both two groups think that government policies have an effect on them but they would not like to understand those policies actively. Moreover, they are both influenced by price, whereas Group 2 is more sensitive to price than Group 1. Hence, it can be assumed that external factors such as policy and price have a stronger effect on Group 2 than Group 1. However, Group 1 is more concerned about enterprise sustainability and they usually use reusable substances. Thus, it can be assumed that they have stronger environmental awareness than Group 2.

The different items for Group 1 and Group 3 provide two major insights. Based on the items 33, 8, 25 and 1, and the scores given by the two groups, Group 1 can be considered to have much more knowledge, and understand the roles of sustainable consumption much better than Group 3. Meanwhile, Group 3 seldom considers external factors such as policies and the environment when compared with Group 1.

The differences between Group 2 and Group 3 are as follows: Group 2 is aware of what sustainable consumption behavior is and its importance. They believe sustainable consumption is important to environmental protection and are positively influenced by sustainable consumption policies. Group 3 gives opposite answers to the aforementioned aspects compared with Group 2. Although Group 3 also disagrees on item 13, “sustainable consumption is nothing to do with me”, its degree of disagreement (the score is 0.414) is much lower than that of Group 2 (the score is 2.28).

5. Discussion and Implications

The Q study has provided new insights into the ways in which participants' subjectivity is structured [15]. This study indicates that with regard to sustainable consumption, consumers can be

categorized into three groups, namely: sustainable, potential sustainable and unsustainable consumers. Sustainable consumers, Group 1, possess the value of pro-humanity and common. They care about the environment and have strong environmental values. They know very well what sustainable consumption is and its role. When they consume, personal needs and environmental factors are both their concern. Group 2, although performing sustainable consumption to a certain degree, needs more encouragement and external stimuli to inspire them to consume sustainably. Tseng *et al.* [58] suggested that to maintain sustainability, governments should work on developing more sustainable transport systems by introducing sustainable modes of transport, and designing and enforcing economic policies and incentives. In order to encourage Group 2 to be involved in sustainable consumption, schools, environmental organizations and local governments need to do more in facilitating sustainable consumption. At schools, relevant courses should be taken by students to help younger generations form sustainable consumption behaviors. For environmental organizations, sustainable consumption campaigns should be carried out to guide consumers to choose eco-friendly products through distributing leaflets on sustainable consumption and demonstrating some recycling methods for turning waste into treasures, such as animal paintings made from cans. For local governments, firstly, they need to establish relevant regulations to encourage consumers to conduct sustainable consumption. For example, economic subsidies can be provided for sustainable consumers and green product producers. Specifically, providing subsidies for small engine cars would stimulate consumers to buy one when they decide to buy a car [59]. Also, providing subsidies to green product producers so that the prices of green products are acceptable to most people is a good way to encourage consumers to buy green products. Secondly, local governments should improve public transport systems to stimulate consumers to choose public transport for travel instead of driving cars. Thirdly, local governments can also take advantage of mass media, like TV, newspapers, magazines and the Internet, to publicize environmental measures such as buying green products and giving back second-hand electronic wastes.

Kletzan *et al.* [60] found that “people with little environmental concern are more likely to be motivated by local environmental issues; having a connection to something near to them can be more motivating than a distant issue, so bringing the messages back home can be a helpful way to stimulate action”. Group 3, having very little environmental concern, needs to be educated on sustainable consumption first in order to change their consumption behavior from unsustainable to sustainable. Thus an information-rich learning environment needs to be established by governments to motivate and enable sustainable consumption. Governments can organize more local initiatives or projects to educate on the impact of consumption on resource depletion and environmental pollution. For example, governments can introduce local TV programs about sustainable consumption and its benefit in saving the limited resources and protecting the environment and ecosystem. Furthermore, also painting a picture of the difference between the environmental impacts of Group 3’s current consumption and the “desired” sustainable consumption may also be a good way to encourage Group 3 to shift to sustainable consumption patterns.

6. Conclusions

It is recommended by the Sustainable Consumption Roundtable that greater efforts should be made by governments to better understand people and to more effectively influence people’s behavior [61].

Introducing a new perspective, this paper studied sustainable consumption based on consumer categories using Q methodology and analysis of the common and exclusive characteristics among consumer groups. Based on the literature review of sustainable consumption, the Q sample was developed and it consisted of 40 items. The statistical analysis indicates that three groups are identified based on consumers' perspectives and behaviors on sustainable consumption. These three groups share a common understanding of reusable stuffs. Additionally, as for the main traits of these three groups, Group 1, the sustainable consumers, consists of environmentally friendly consumers with strong environmental values. They know very well sustainable consumption and its role. Group 2, the potential sustainable consumers, would become sustainable consumers with some encouragement and the manipulation of a number of external factors. For example, governments can set up policies to provide subsidies to sustainable consumers, or fine or tax unsustainable consumers. For Group 3, the unsustainable consumers, training and education are required to change their behaviors from unsustainable to sustainable ones. For example, governments can conduct more initiatives or projects on sustainability to help them understand the existing and potential impacts of unsustainable consumption on resources and the environment.

This paper applied the Q methodology to categorize Chinese consumers according to their perspectives on sustainable consumption. The statistical results show the implication of sustainable consumption and suggest how governments can inspire potential sustainable consumption. However, several limitations and future research directions exist. First, sustainable consumption involves many aspects including purchasing green products, reusing substances in daily life, saving energy and so on. The items in this study, 40 in total, could not cover all aspects of sustainable consumption. It is necessary to also study the specific aspects of sustainable consumption, for example, green product consumption. Second, we identify the traits of the three groups and also provide implications for governments to inspire different groups to conduct sustainable consumption. However, in this study, most respondents are female (63.9%) and young people (86% less than 40 years old), and nearly half of the respondents are students, so additional respondents are required in the future to more precisely reflect Chinese consumers and their characteristics. Meanwhile, the factors influencing potential sustainable consumers and non-sustainable consumers need to be identified. The relationships among influencing factors, intention and actual practice, especially how to promote and transform intention into real action, must be studied. Finally, how potential sustainable and non-sustainable consumers may be transformed to become sustainable consumers is also worthwhile of in-depth study.

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Author Contributions

Ying Qu designed the research and wrote the sections of Introduction, Methodology, Data analysis and Conclusion of this paper. Mengru Li developed the questionnaire and analyzed the data. Han Jia collected data and wrote the section of Literature review, Results and Discussion. And Lingling Guo collected the data.

Conflicts of Interest

The authors declare no conflict of interest.

Appendix

Table A1. The descriptions of the 40 items.

Item	Description
1	I don't know what sustainable consumption behaviors are.
2	I don't care whether or not the enterprise conducts sustainable production when I buy its products
3	I would like to consume sustainably if governments provide rewards.
4	It's inconvenient for me to reuse and I never reuse reusable stuff.
5	I will purchase unnecessary products under the promotion of the producers
6	I will buy unnecessary products for pursuing fashion.
7	I will behave sustainable consumption whatever others do or not.
8	I understand what sustainable transport is about.
9	Green marketing will push me to buy green products.
10	I would like to buy those products with over packaging in order to show my status and position.
11	Sustainable consumption benefits environment and I will perform.
12	Green marketing has no impact on my consumption.
13	Sustainable consumption is nothing to do with me.
14	The publicity and education will push me to perform sustainable consumption
15	I don't know the role of sustainable consumption in environmental protection.
16	I prefer green products if their prices are just little higher than the conventional ones.
17	I would like to buy green food for the health of my family.
18	Other's consumption behavior has impact on me
19	The policies about sustainable consumption have impact on my life and consumption style.
20	I know what can be reused in our daily life.
21	We should conduct sustainable consumption for the harmoniousness between human beings and the earth
22	I wouldn't buy those products produced by unsustainable producers
23	I don't care the certificate marks of green product.
24	I usually reuse reusable stuffs
25	I know the positive role of sustainable consumption in environmental protection.
26	I don't care about the government policies.
27	I would like to get the knowledge of green food certificate in order to buy green food.
28	I would like to buy environmental friendly product to protect environment
29	I don't consider environment when I consume
30	My sustainable consumption behavior is important to environment protection.
31	I am sensitive to the prices of green products.
32	I don't know what can be reused in daily life.
33	I know what sustainable consumption behaviors are.
34	I am concerned about quality of products itself rather than package.
35	I would like to understand laws and policies about sustainable consumption.

Table A1. Cont.

Item	Description
36	I try to take public transportation although I have a car.
37	For convenience I always drive my own car.
38	I know nothing about green transportation.
39	My personal consumption behavior has no impact on environment.
40	I am a moderate consumer.

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