



Research on the impact of consumers' product knowledge and environmental awareness on consumers' perceived value

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Abstract

In this paper, we explore whether green marketing can effectively enhance consumers' perceived value. We also analyze how product knowledge and environmental awareness enhance the role of green marketing behavior on consumers' perceived value. Through online and offline questionnaire surveys, combined with SPSS for empirical analysis, we find that for consumers who have a better understanding of product knowledge, can obtain stronger consumer perceived value through green marketing behavior, because such consumers know what products they need and what green products can meet their green consumption needs. On the other hand, for consumers with stronger environmental awareness, obtain stronger consumer perceived value through green marketing. This is because consumers prefer to consume green products to meet their own consumption effectiveness and maximize their own consumption effectiveness.

Keywords : product knowledge, environmental awareness, consumers' perceived value, green marketing, integrated marketing communication

1. Introduction

1.1 Research background

Against the background of deteriorating global environmental problems, the concept of green development is deeply rooted in the hearts of the people, and green products are increasingly favored by consumers. Whether the concept of green development is recognized and implemented by enterprises determines whether the economy and society can achieve sustainable development. Enterprises need to change the traditional development concept and establish a green marketing concept in order to achieve the sustainable development of the enterprise and help the enterprise maintain its competitive advantage under the wave of economic globalization.

The enterprise practices the green development concept of "green water and green mountains are golden mountains and silver mountains", implements green marketing to respond to the call of the public for the enterprise to assume environmental protection responsibilities, conforms to the mainstream values of the public, so as to gain support

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and trust from the masses, help the enterprise establish a good image of green development, establish and maintain high-quality consumer relations, obtain the continuous favor of consumers, and form a competitive advantage. More importantly, green marketing can refine and preserve the green information of products for consumers, reduce decision-making time, and reduce decision-making risks. The green attributes of products can make consumers feel the value beyond the product functions. Consumer perceived value is one of the key influencing factors in consumer purchasing decisions, ultimately affecting consumer purchasing behavior. At the moment when "green development" has become the theme of the times, we can improve the perceived value of consumption through green marketing, so as to gain more consumers.

Throughout the research on consumer perceived value at home and abroad, this paper finds that the theory is gradually being analyzed and deepened. Some scholars have found that consumer perceived value is determined by consumers themselves, not by businesses or others [1]. The focus of integrated marketing communication should change from customer purchase behavior to consumer perceived value [2]. Other scholars believe that consumer perceived value is a branch of consumer value research [3]. The implementation of integrated marketing communication guided by consumer perceived value can achieve common benefits between enterprises and consumers and achieve a win-win business philosophy [4]. Based on this, a new research point has been thrown out: can integrated marketing communication behavior produce consumer perceived value, and does integrated marketing communication behavior play a positive role in consumer perceived value? How to optimize the integrated marketing communication strategy for the purpose of consumer perceived value?

To sum up, based on the theory of integrated marketing communication, this paper takes the green marketing of dairy products and household building materials as the research object, analyzes the impact of consumers' product knowledge and environmental awareness on consumers' perceived value, constructs a theoretical model from green marketing to consumer perceived value, and make recommendations to promote green development process, revitalize enterprises and increase sales.

1.2 Theoretical basis and literature review

The field of marketing research pays more attention to consumer perceived value, which will be combed in this paper first. The representative definitions of consumer perceived value theory by scholars at home and abroad are shown in Table 1 below.

Based on the above combing, we can find that scholars at home and abroad use "trade-off view" to define consumer perceived value. Based on the theme of this paper, this paper defines consumer perceived pricing value as the subjective value perception of product attributes, functions and services, which is closely related to product functions, personal emotions, product values, price perception, social values and other factors. By measuring the above factors, we can quantify the impact of green integrated marketing communication behavior on consumer perceived value.

Many scholars believe that it is too narrow to measure consumer perceived value only through value structure, and it is too simple to consider quantity from price and

quality, and many scholars try to measure consumer perceived value from other perspectives. Table 2 shows the mainstream methods of measuring consumer perceived value.

Table 1 Definition of consumer perceived value

time	scholar	definition
1996	Zaithaml	Consumer evaluates purchasing behavior after weighing the cost of purchasing a product against the fact of obtaining a product [5].
1999	Dong Dahai	The trade-off between the total cost of consumer shopping products and the total utility of products and related services [6].
2001	Yao	The ratio of what consumers are willing to pay for a product or service to what they actually pay, which is the perceived value of consumers [7].
2002	Wu & Bai	Consumers with characteristic consumer demand and intention, in the products provided by consumer enterprises, perceive various benefits that can be generated or will be generated by purchasing the products, as well as the expenditure that will be generated or will be generated in order to obtain these benefits, and the specific evaluation formed after the comparison of income and expenditure [8].

Table 2 Mainstream consumer perceived value measurement methods

Year	Scholar	Measurement
1991	Sheth, Newman & gross	Function: product parameters and performance. Emotion: the pleasure of consumption. Scenario: the value of a product that can be obtained under certain conditions. Society: the utility of connecting with society when buying a product. Cognition: whether the satisfaction of desire produces perceived value when purchasing products [9].
1997	Ruyter De, Mattson Lemink, & Wetzels	Function: the actual use value of the product. Emotion: the consumer experience. Logic: the logic of rational judgment at the time of purchase. Stage satisfaction: perception of previous consumption behavior [10].
2001	Sweeney & sutar	Function: performance characteristics of the product, such as value and quality.

		Society: the emotional experience of consumption. Emotion: the degree to which self-evaluation is improved during consumption [11].
2007	Moliner, Rodri guez &Callaeri sa,	Function: consumer evaluation of products. Society: the emotional experience of consumption. Emotion: all consumer behavior has social value [12].

Among the measures of consumer perceived value listed in Table 2, Sheth Newman gross's consumer value model is recognized by many scholars and used to study consumer decision-making. Based on perceived value, Sheth Newman gross consumption value model describes the consumption mode of consumers guided by consumption value. The consumption value model proposes to measure consumers' perceived value through five perceived values of function, emotion, context, society and cognition, and to explain the different results of consumers when they face a certain product choice through the five values consumers obtain in consumption.

At first, scholars based on Zeithaml's consumer perceived value model believed that relying on high-quality products and reasonable pricing could enhance consumer perceived value. However, with the deepening of research, more and more scholars realize that it is extremely inaccurate to rely only on products and pricing to reflect consumer gains and obtain perceived value. Zeithaml (1996) proposed that in addition to products and pricing, there must be products and services that competitors are difficult to replicate and surpass [5]. Piercy found that products, prices and services are the main drivers of consumer perceived value [13]. With the development of economy, under the test of market competition, although the quality and pricing of products and services can indeed greatly affect consumers' perceived value, with the homogenization of competition, these three elements alone can not form a competitive advantage, and more driving factors need to be found. Kolter proposed that personnel value and image value can enhance consumers' sense of consumption acquisition, and consumers' sensitive cost payment is not only monetary value, but also non monetary value including time, energy and psychology [14]. Holbrook found that marketing means can also affect consumer perceived value on the basis of products, value and services [15]. Ulaga & Chacour (2001) decomposes products, services and marketing means into 16 consumer perceived value drivers by studying the German food manufacturing industry [16].

In China, Zheng divided the three perceived value elements of product, price and brand image into 22 drivers, and then integrated them into 8 drivers [17]. Shi (2006) went further in Kolter's research, based on the consumer excess value model established by Kolter, taking IKEA as the research object to analyze the improvement of consumer perceived value [18]. Its research found that product types and aesthetics can affect product value, service ability affects service value, brand image affects image value and so on. Other factors such as Su Yu [19], Yan Haoren, Jia Shenghua [20] and Bai Lin [21] found that the relevant attributes of products, product brands, corporate images, public relations, service capabilities and consumer satisfaction all have an impact on consumer



perceived value. However, there are few studies on the impact of marketing behavior on consumer perceived value.

2. Research methodology and Theoretical model

2.1 Research methodology and hypothesis

The original data are obtained by means of questionnaire survey, which provides data support for the theoretical research of this paper and increases the persuasiveness of the theoretical research. The reliability and validity of the original data obtained by the questionnaire are tested to ensure the effectiveness of the data, and then the factor correlation test is carried out on the data. Finally, the influencing factors of consumer perceived value are analyzed quantitatively to provide support for the conclusion of this paper. Through reliability test and validity test, this paper analyzes the effectiveness of the questionnaire and key indicators to ensure the scientificity of the research. The positive effect of green integrated marketing communication behavior on consumer perceived value is analyzed by paired sample t test.

We focus on the impact of green integrated marketing communication behavior on consumers' perceived value, to explore whether green marketing can effectively enhance consumers' perceived value, and whether integrated marketing communication can enhance the role of green marketing behavior on consumers' perceived value. Based on this, three hypotheses are put forward in this paper, as shown in Table 3.

Table 3 Summary of research hypotheses

Serial number	hypothesis
H1	Enterprise green marketing behavior has a positive impact on consumer perceived value.
H2	Consumer environmental awareness plays a positive regulatory role in the impact of green integrated marketing communication behavior on consumer perceived value.
H3	Consumer product knowledge plays a positive regulatory role in the impact of green integrated marketing communication behavior on consumer perceived value.

2.2 Research model

How enterprises affect consumers' perceived value through green integrated marketing communication behavior has attracted the attention of some scholars. In this paper, marketing communication behavior is divided into green marketing communication behavior and green integrated marketing communication behavior, and the promotion mechanism and impact differences of two different marketing behaviors on consumer perceived value are discussed. On this basis, the intermediary mechanism and adjustment mechanism of product knowledge, environmental knowledge and consumption intervention in the promotion mechanism and impact differences are discussed. In order to better explain the impact mechanism of green integrated marketing communication behavior on consumer perceived value and provide a theoretical basis for

enterprises to effectively carry out green marketing behavior, the theoretical framework of this paper is shown in Figure 1.

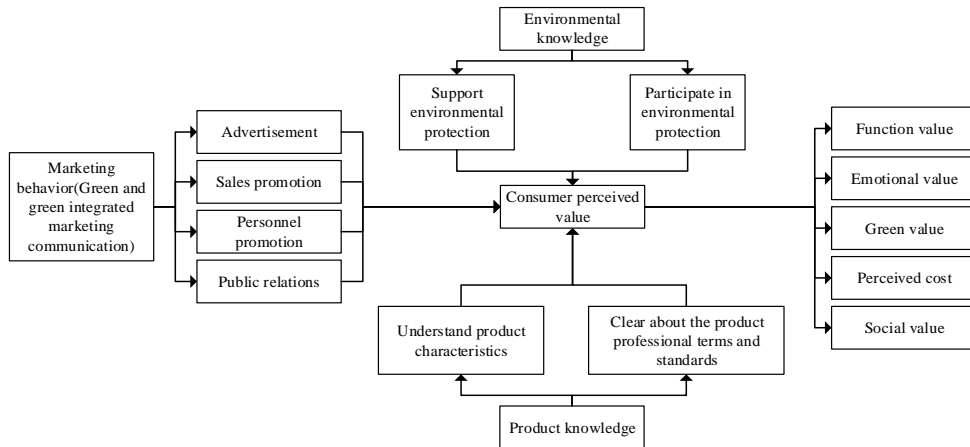


Figure 1 Theoretical model

3. Data analysis and discussion

3.1 Sample size calculation and analysis

In this paper, Shaoguan central city and Guangzhou, Guangdong Province, with higher consumption level, were selected for questionnaire survey. A total of 444 valid questionnaires were collected, of which 220 Guangzhou questionnaires were collected online and 224 Shaoguan questionnaires were collected offline. The questionnaire was divided into 220 milk products and 224 furniture products. Among them, offline questionnaires are mainly in the form of interviews, with investigators acting as marketers, simulating marketing behavior as much as possible, asking questions, and a total of 220 valid questionnaires are recovered.

The basic background information includes gender, age, education level and income, and the descriptive statistical analysis is shown in Table 4.

Table 4 Sample descriptive statistical analysis

Demographic characteristics	Option	Group A (milk)		Group B (furniture)	
		Number of people	percentage	Number of people	percentage
Gender	male	130	59%	96	43%
	female	90	41%	128	57%
Age	Under 18	10	5%	0	0%
	18-25	80	36%	16	7%
	26-35	30	14%	72	32%
	36-45	60	27%	128	57%
	46-55	30	14%	8	4%
	55 and above	10	5%	0	0%

Education	Under high school	30	14%	8	4%
	High school or technical secondary school	10	5%	48	21%
	Diploma or undergraduate	130	59%	152	68%
	Master's degree or above	50	23%	16	7%
Income level	Under 1000	60	27%	8	4%
	1000-3000 yuan	20	9%	0	0%
	3000-5000 yuan	20	9%	56	25%
	5000 yuan and above	120	55%	160	71%

3.2 Sample size calculation and analysis

Reliability is the proportion of true analysis variation of latent variables in the total variance variation. Reliability analysis is generally used by academia to analyze the reliability and stability of variable tables. Before empirical analysis, we must prove that the reliability of the variable table meets the standard requirements through reliability analysis in order to ensure the value of the statistical results of the questionnaire, so further analysis of the questionnaire is meaningful. Scholars unanimously agree that the reliability of the questionnaire is tested by the coefficient Cronbach's α , which represents the credibility of the questionnaire. The higher the coefficient α , the higher the credibility of the questionnaire. In practical application, the coefficient value α is greater than 0.9, indicating that the credibility of the questionnaire is very high; The coefficient value α is between 0.8-0.9, indicating that the reliability of the questionnaire is acceptable; The coefficient value α is between 0.7-0.8, indicating that the questionnaire has certain value, but it still needs to be corrected; If α below 0.7, the questionnaire has no value and should be abandoned. The formula of Cronbach's α is following:

$$\alpha = \frac{n}{n-1} \left[1 - \frac{\sum s_i^2}{s_x^2} \right] \quad (1)$$

where α represents the reliability, n is the number of items, s_i^2 represents the variation value of each item score, and s_x^2 represents the variation value of the total measurement score. From the reliability test table, we can see three analysis contents, namely, CITC (revised items and total correlation coefficient), IFA (reliability coefficient after the item is deleted) and Cronbach's α . According to the CITC to further screen the measurement items, if the CITC value of a measurement item is less than 0.5, unless there are special reasons, the academic community generally believes that the measurement item needs to be deleted to improve the Cronbach's α of the whole measurement group.

Table 5 Reliability analysis of product knowledge

Group	Number	CITC	IFA	Cronbach's α
Group A (milk)	AQ18	0.586	-	0.734
	AQ19	0.586	-	
Group B (furniture)	BQ18	0.722	-	0.805
	BQ19	0.722	-	

From Table 5, we found that Cronbach's α of the three measurement indicators representing product knowledge is greater than 0.7, and the CITC value was greater than 0.5, and Cronbach's α could not be improved by deleting any indicator. It proves that this measure is reliable.

Table 6 Reliability analysis of environmental awareness

Group	Number	CITC	IFA	Cronbach's α
Group A (milk)	AQ21	0.699	-	0.823
	AQ22	0.699	-	
Group B (furniture)	BQ21	0.614	-	0.760
	BQ22	0.614	-	

In this paper, a total of three measurement indicators to measure environmental awareness, Q27, Q28 and Q29, were divided into A and B groups. After the actual reliability test, Cronbach's α is less than 0.7. Then, it needed to be adjusted. After deleting the Q22 project, Cronbach's α is greater than 0.7, the CITC value is greater than 0.5, and the composition of the revised measurement indicators is relatively more reasonable.

Validity is the degree to which a measure can actually measure a concept. Validity is mainly divided into content validity, criterion validity and construction validity. In validity analysis, content validity and construct validity are widely used to measure measurement items and items composed of various factors, among which construct validity is based on convergent validity and differential validity. Convergence validity is to test the correlation between different measurement items of the same variable, and most studies use confirmatory factor analysis (CFA) to test convergence validity. In practice, exploratory factor analysis (EFA) for a single latent variable is often used by

SPS. When EFA analysis is carried out, KMO (Kaiser Meyer Olkin) is used to verify whether the data is suitable for EFA analysis. The value range of K is 0-1, of which 0.9-1 means very good, 0.8-0.9 means good, 0.7-0.8 means good, 0.6-0.7 means medium, and below 0.5 is basically not suitable.

Table 7 KMO and Bartlett tests

Group		A	B
KMO measurement sampling appropriateness		0.664	0.594
Bartlett's sphere test	Approximately chi square	3355.224	4025.108
	D.F	105	105
	Significance	0.000	0.000

From Table 7, 15 indicators of 4 dimensions are tested to analyze whether they are suitable for factor analysis. KMO of Group A and B are 0.664 and 0.594, barely passing the KMO test, and the significance p value of Bartlett test is less than 0.01, indicating that the dimensions of each item are suitable for factor analysis.

3.3 Empirical test of hypothesis

Firstly, the consumer perceived value of group A and group B before and after receiving green marketing information is tested by mean t test, and the results are shown in Table 8. From the results, only one question in group a failed the significance test, and three questions in group B failed the significance test, assuming that H1 is basically valid. However, from the results, although green marketing has marketing effect on consumer perceived value, it has different impact on different products, such as milk in this paper, but it has less impact on furniture. This may be due to the different attributes of the two products. As a product of daily frequent consumption, milk has a higher consumption frequency and a stronger increase in consumer perceived value, while furniture may only be replaced once in the relocation of new houses or the decoration of old houses, with few consumption times and weak consumer perception. In addition, we should also consider the effectiveness and scientificity of green marketing behavior itself.

Table 8 Mean t test of green marketing on consumer perceived value

	milk	furniture
Q1 and Q8	0.007**	0.207
Q2 and Q9	0.007**	0.004**
Q3 and Q10	0**	0.103
Q4 and Q11	0**	0.028*
Q5 and Q12	0.233	0.045*
Q6 and q13	0**	0.395

Table 9 Mean t test of the regulatory effect of 4-12 product knowledge and environmental awareness on consumer perceived value

Group	Regulatory effect	Level	Q1&Q8	Q2&Q9	Q3&Q10	Q4&Q11	Q5&Q12	Q6&Q13
		high	0**	0**	0.355	0**	0**	0**

A	Product knowledge	low	0.002**	0.471	0.045*	0**	0.158	0**
	Environmental consciousness	high	0.004**	0.004**	0**	0**	0.158	0**
	Product knowledge	low	1	1	0.002	0.001**	1	0**
B	Product knowledge	high	0.004**	0**	0.004**	0**	0.02*	0**
	Environmental consciousness	high	0.018*	0**	0.103	1	0.02*	0.004**
	Environmental consciousness	low	0.287	0.01**	0.348	0.018*	1	0.287

They were also divided into group A and group B, and those above the mean indicated high product knowledge and more environmental awareness, while those below the mean indicated low product knowledge and less environmental awareness.

In the mean t test of group a products, it can be found that consumers with high product knowledge can obtain stronger consumer perceived value through green integrated marketing. Among them, 5 questions of high product knowledge passed the significance test, 4 of low product knowledge, and in Q2 and Q9, Q6 and Q13, high product knowledge significantly improved the significance. In environmental awareness, a total of five questions of high environmental awareness passed, including Q1 and Q8, Q2 and Q9, Q3 and Q10, Q5 and Q12. More environmental awareness has significantly improved the significance.

In the mean t test of group B products, it was also found that 6 questions in high product knowledge passed the significance test and 3 questions in low product knowledge passed the significance test. And Q2 and Q9, Q4 and Q11, Q5 and Q12 increased significantly. In environmental awareness, four problems in high environmental awareness passed the significance test, and two problems in low environmental awareness passed the significance test, among which Q1 and Q8, Q3 and Q10, Q5 and Q12, Q6 and q13 were significantly improved.

The combined H2 and H3 hypotheses hold. Environmental awareness can strengthen consumers' understanding and acceptance of green marketing, and consumers are more likely to shape green consumption habits. Compared with consumers with low or no environmental awareness, consumers with strong environmental awareness have greater and stronger consumer perceived value through green marketing behavior, because their ideas subtly recognize this behavior. At the same time, product knowledge can make consumers better understand the brand, packaging, price and function of green products, make it easier to understand the consumer utility that green products can bring to themselves, and further shape the green consumption attitude through consumers' understanding of product knowledge, which can further enhance consumers' perceived value.

4. Conclusions and Recommendations

In order to study the impact of consumers' product knowledge and environmental awareness on consumer perceived value, we summarize the previous studies on green marketing and consumer perceived value. Then, we propose three hypotheses and a theoretical model. We adopted two obvious green attributes, milk and furniture, as



research subjects. A total of 444 valid questionnaires were collected, including 220 for milk products and 224 for furniture products. Quantitative method was employed to analyze the reliability and validity of the data obtained from the questionnaire. The validity and reliability tests of the above variables were used by SPSS to prove that the selection of the above variables was effective. Subsequently, through the empirical analysis of the data of group A and group B through the mean t test, some valuable studies are obtained, which are summarized as follows: First, compared with furniture, green marketing behavior has a more obvious increase in the perceived value of consumers who buy milk, and although green marketing behavior has an increase in the perceived value of furniture consumption, it is not large. Secondly, for consumers who know more about product knowledge, the consumer perceived value that consumers can obtain through green marketing behavior is stronger, because such consumers know what kind of products they need and what kind of green products can meet their own green consumption needs. Thirdly, for consumers with stronger environmental awareness, the consumer perceived value that consumers can obtain through green marketing behavior is stronger, because consumers prefer and prefer to consume green products to meet their own consumption utility and maximize their own consumption utility.

Whether the enterprise's green integrated marketing communication behavior can succeed or not, consumers are the direct influencers. This paper shows that in the interaction between individual consumers and green marketing, consumers have more product knowledge. If consumers have a more comprehensive understanding of the green information of products, they can more easily understand the resources and energy that green products can save compared with other ordinary products. Green product knowledge can help consumers make correct decisions. Therefore, consumers should improve their product knowledge through multi-channel self-learning. Secondly, people with stronger environmental awareness pay more attention to environmental protection and are more willing to protect the environment through green consumption, and their sense of green consumption will also be stronger. Consumers should actively learn green environmental protection knowledge, establish green consumption thinking, and more actively consume green products. They should promote the healthy development of enterprises by consuming green products, consolidate their market position, and promote the enthusiasm of enterprises in green production. For enterprises that are not green and maliciously destroy the natural ecology, consumers should consciously resist their products to influence their production and management concepts, change their marketing and sales methods, and force them to change their business concepts, actively participate in green environmental protection and protect the environment



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