A Study of Consumer Health Food Purchase Intentions Based on fsQCA Methodology in TPB Framework

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Abstract. In order to reveal the correlation path of consumer health food purchase intentions and to guide the benign development of healthy diet concepts, 310 samples were selected and research was carried out on consumer health food purchase with TPB theory as the core framework. The article replaces behavioral attitude (traditional variable in the TPB model) with perceived value, introduces a new variable: food information, and conducts a configuration analysis on four variables. The study found that: (1) Subjective norm constitutes a necessary condition for health food purchase intentions. (2) When subjective norm is high, other three antecedent conditions: perceived value, food information, and perceived behavioral control have a relationship of mutual substitution, i.e., they are equivalent in terms of results on health food purchase intentions. (3) There are three sufficient configurations that can stimulate the emergence of health food purchasing behavior, including autonomous perceived type, externally restricted type, and information-influenced type. This program not only improves and enriches the variables in the Theory of Planned Behavior (TPB), but also makes up the fact that health food purchase intention is the result of the joint influence of many factors——which is neglected by traditional quantitative method. Since the subjects tested are concentrated in first-tier cities, further support from other research samples is needed for the generalizability of the above conclusions.

Keywords: health food; green food; purchase intention; TPB theory; fsQCA.

1. Introduction

According to the report [1], the prevalence of hypertension among Chinese residents aged 18 years or older is 27.5%, diabetes mellitus is 11.9%, and hypercholesterolemia is 8.2%. Unhealthy lifestyles are still prevalent among residents. This alarming figure is closely related to the modern fast-paced life and irregular diet. Rational diet has been incorporated into the Healthy China initiative [2]. In this social context, it is particularly important to build a way to guide consumers to make healthy purchases. This project aims to study the factors and associated paths that influence consumers' health food purchase.

2. Literature Review and Modeling

2.1. Definition of concepts

2.1.1 Green Food

According to Article 2 of the Green Food Labeling Management Measures issued by the Ministry of Agriculture of China in 2012, green food refers to safe, high-quality edible agricultural products and related products that are produced in an excellent ecological environment in accordance with the green food standards, and have obtained the right to use the green food labeling, and quality control is implemented during whole process [3]. Requirements for quality of Pollution-free food, green food, organic food increase in order [4].

2.1.2 Health food

According to the literature review, the definition of health food is vague. Health food is often accompanied by terms such as "green", "organic" and "safe". In some articles, the actual meaning of

health food is functional food, while in some articles, the meaning of health food intersects with "green food" and "organic food". In fact, there is a difference between "controversial health food" and "non-controversial health food", which depends on whether it is recognized by all consumers [5].

In order to avoid ambiguity, this paper defines health food as natural food, including organic food and green food, which are accepted by all consumers, but not including genetically modified food and functional food, which may be controversial. Therefore, "green food" mentioned in the literature is included in the discussion of "health food" in this paper.

2.2. Health food Consumption Behavior and Consumption Intention

Most of the articles on green food consumption behavior centered on empirical research on the influential factors. (1) In terms of research content, health food purchasing factors of specific groups of people, as well as the influence of different factors on health food purchasing behavior are explored. For instance, Guo explored the health food consumption behavior of the elderly, pointing out that: healthy lifestyle, environmental support, and perception of healthy consumption directly affect healthy consumption behavior, and concluded that the elderly had a high demand for health food consumption [6]. Song explored the green purchasing behavior of consumers in Dalian region based on the characteristics of green food purchasers and consumers' perception of green labels [7]. (2) In terms of research methods: correlation analysis and regression analysis are used. Zhang conducted logistic regression on the factors affecting the green food purchasing behavior of consumers in Chengdu, and obtained: whether there are children under 6 years old in the consumer's family and the consumer's perception of the safety of green food are the main factors [8]. Fu quantitatively analyzed the influence of each factor on purchasing behavior based on Probit regression, and constructed a purchasing behavior prediction model [9].

Among the influential factors, consumption intention is often concerned as an important factor. Several articles mentioned that: consumption intention and purchase behavior do not present a high degree of consistency. Jin, in studying the influential factors of consumption intention, consumption behavior and their relationship, found the problem of inconsistency between consumption intention and consumption behavior [10]. Qing, in summarizing the general characteristics of urban residents' green vegetable consumption behavior, pointed out that: residents' comparatively general intention to purchase green vegetables has not been transformed into actual purchasing behavior [11]. Under the topic of health food purchase intention during the past two years, studies have dealt with: (1) The relationship between health concerns, public opinion perceptions and health food consumption intention among different populations [12]. (2) The influence of online food nutrition information on consumer purchase intention [13].

In this study, we focus on the influential factors of consumers' health purchase intention, and the interrelated roles.

2.3. Theory of TPB

Theory of Planned Behavior (TPB) [14] was proposed by American psychologist Ajzen in 1992. Perceived behavioral control [15] was added to the predecessor Theory of Reasoned Action (TRA), thus improving the prior study's neglect of individual executive ability, and conditions.

The theory argues that behavioral intention is the most direct factor influencing whether humans perform a certain behavior [16], and that attitude toward the behavior, subjective norm, and perceived behavioral control are three main variables determining behavioral intention. All three variables are positively related to behavioral intention. The TPB model is shown in Figure 1.

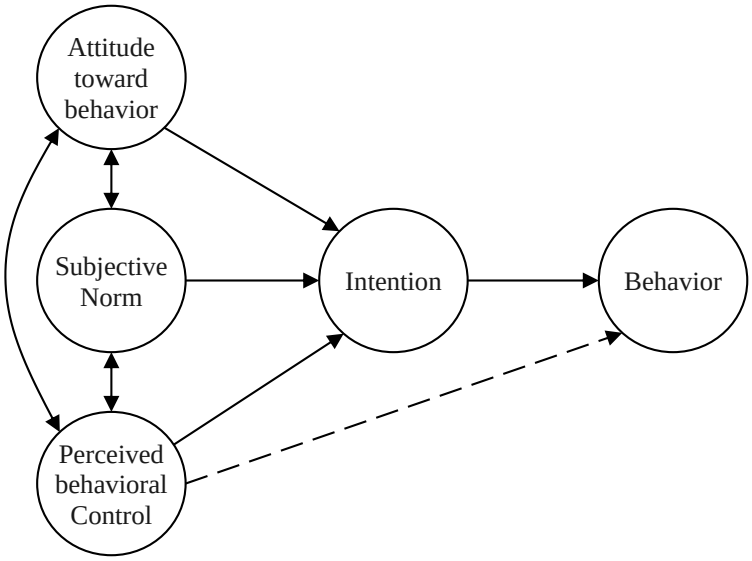

Figure 1. TPB model

Since its inception, TPB theory has been widely used in various fields including communication, psychology, marketing, management, and clinical medicine [15]. More studies have used TPB theory to explain green purchase intention:

Most of them apply the TPB theory under the topic of their own research, validate the TPB model through empirical research, make specific subdivisions of the three main variables, and enrich the relevance of the main variables. (1) Sheng constructed an extended model of the theory of planned behavior and get that: attitude, subjective norm, and perceived behavioral control have a significant positive influence on consumers' green purchase intention. Two important antecedent variables of green purchase intention were found: ecological values and personal perception correlation [17]. (2) On the basis of TPB theory, Lao proposed a theoretical model of the influence mechanism of green consumer behavior. The influence mechanism of green consumption behavior is explored through empirical evidence [18]. (3) Liu decomposed three determinants in the TPB theoretical model. Attitude toward the behavior was decomposed into: personal relative interests, social relative interests, and complexity. Subjective norm was decomposed into: internal norm, external norm. Perceived behavioral control was decomposed into: self-efficacy, and facilitation. Then he proposed an integrated model of green consumption behaviors [19].

Some of them extend the main variables of the TPB model with new latent variables to improve the explanatory power of the model. (1) Hao integrated a part of the variables in the Howard-Sheath buying behavior model into the TPB model to empirically analyze the influence of six antecedent factors on the intention of consumers' green purchasing behavior in Hebei Province [20]. (2) Based on the three main variables of the TPB behavioral theory, Luo added information factors, belief factors, socioeconomic and demographic variables to study the intention to buy safe food [21]. (3) In addition to the three main variables in the TPB model, Zhang proposed that environmental concerns also affect the intention to purchase green products [22]. (4) When studying the purchase decision of green agricultural products, Chen added customer perceived value and intention to pay as new variables based on the traditional TPB theory to explore the effect of their joint efforts on behavioral intention [23].

2.4. Model Construction

This paper argues that TPB theory can explain consumers' health food purchase intention. In addition, this paper attempts to improve the behavioral attitude variable in the TPB theory by directly substituting it with perceived value, thus allowing it to draw on the rich literature on perceived value. On one hand, it has been pointed out in previous articles that attitudes toward buying green food play

a partial mediating role in the process of perceived value influencing behavioral intention [24]. And it has been shown that consumers' green consumption attitudes do not have a significant effect on the intention to consume green [18]. This substitution, on the other hand, has already been used in previous studies: in Huang's study on the health-driven consumption of omnivorous grains, perceived value was substituted for behavioral attitudes in the TPB model [25], and a complete conclusion was obtained.

Hu concluded in her study on the mechanism of perceived value's influence on the intention to consume green food that the emotional, conditional, and ecological values of perceived value played an important role in the process of transforming the level of cognition to the intention to consume, whereas the mediating roles of functional and social values are not significant [26]. And because conditional value and economic factors considered in perceived behavior control are similar, only emotional value and ecological value in perceived value are selected as new variables in this paper.
Combining the research related to the consumption intention of green food and health food based on the TPB model, the meanings of the variables in the model of this paper are shown below:

(1) Perceived Value (PV): In Bai's review of perceived value, perceived value is divided into three categories. In this paper, we adopt the "comprehensive evaluation theory", i.e., perceived value is the consumer's perceived preference and evaluation of the results of the use of a product that certain attributes of the product, the performance of the attributes of the product in a specific situation that helps (or hinders) to achieve its goals and intentions [27].

(2) Subjective Norm (SN): SN refers to the social pressure perceived by an individual in deciding whether to perform a particular behavior or not, which reflects the influence of significant person or groups on an individual's behavioral decisions [15].

(3) Perceived Behavior Control (PBC): PBC refers to the degree to which an individual perceives that it is easy or difficult to perform a particular behavior, and it reflects the individual's perception of the factors that facilitate or impede the performance of the behavior [15].

In addition to this, food nutrition labeling, as an important carrier to convey food nutrition information to consumers, is an effective way for consumers to intuitively understand the nutritional components and characteristics of food, which can well help consumers to accurately recognize food and guide them to rationally choose food [28]. Some scholars have divided food labels to study the differences in the impact of different types of food labels on consumer cognition, emotional preferences, and behavioral responses [29]. There are also scholars who explore the design of nutritional labeling of prepackaged foods in order to achieve the expectation of value guidance to assist consumers in healthy eating [30]. It is evident that food labeling has a significant impact on consumers' health food purchases. Thus, this paper generalizes the nutritional labeling of food as food information, which is included as a new variable in the TPB model.

Prior studies mostly focused on the correlation relationship between the factors affecting consumers' health food purchases, but have neglected the overall effects generated by the combination of factors.

In summary, this paper adds a new variable, Food Information (FI), to the improved TPB model, and focuses on whether (1) perceived value (PV), subjective norm (SN), perceived behavioral control (PBC), and food information (FI) constitute the necessary conditions for consumers to purchase health food; and (2) how the configurations of these factors can increase consumers' intention to purchase health food. The model of consumers' intention to purchase health food is shown in Figure 2.

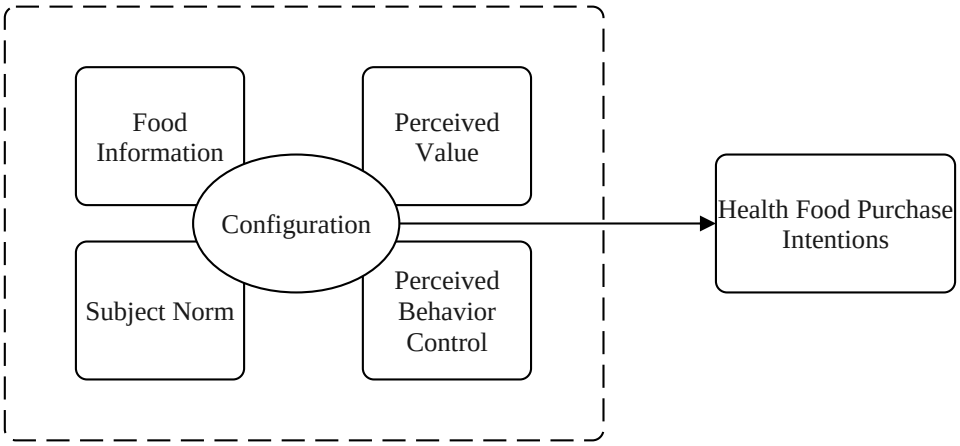

Figure 2. Model of Consumers' Intention to Purchase Health food

3. Research Design

3.1. Research Method

This study adopts Fuzzy-set Qualitative Comparative Analysis (fsQCA), which is a qualitative comparative analysis method to infer causality by looking for affiliation between sets. fsQCA focuses on the combination of factors to find different paths which reach the same result.

For this study, the method can be used to study the causal relationship of health food consumption intention behind the complex phenomenon; it is suitable for multi-case comparative study; and it makes up for the lack of group research under the topic of health food [31].

In this paper, firstly, the collected data are calibrated; secondly, the fsQCA method is applied to test whether individual variables constitute the necessary conditions affecting consumers' intention to purchase health food; then the truth table is constructed to further search for the sufficient configurations; finally, the result table is produced to analyze and summarize the configurations.

3.2. Questionnaire design

The variables of the questionnaire in this study are designed using a five-level Likert scale: completely disagree=1, relatively disagree=2, generally agree=3, relatively agree=4, completely agree=5. After completing the first draft of the questionnaire, a pilot test is conducted. The questionnaire was re-designed to address possible ambiguities and inaccuracies. Final questionnaire is shown in Table 1.

Table 1. Measurement scales

variants	questions	reference sources
Food Information	1 Before buying food, you pay attention to the information on the food label (e.g. energy table, whether it's organic, green, etc.) 2 The information on the food label will determine whether you buy the food or not 3 You will compare the information on food labels of similar products to decide which one to buy	Song[32] (2022)
Perceived value - sentimental value	1 Health food is safer to eat 2 Health food tastes better 3 Health food has more nutritional value	Zhou[33] (2019)
Perceived value - ecological value	1 Buying health food reduces environmental pollution 2 Buying health food helps improve the ecosystem 3 Buying health food is good for social development	Hu[26] (2023)
subjective norm	1 Buy health food fits your diet 2 Buying health food meets family expectations 3 People around you buy health food and you buy it, too 4 Buying health food is in line with social consumption trends 5 Purchasing health food is in line with national industrial policy	Huang[25] (2022)
Perceived behavioral control	1 You are comfortable with the amount of money spent on health food 2 It is easy to buy health food in the market at present 3 You have enough time and energy to buy health food	Fu[34] (2022) He[35] (2015)

4. Calibration of variables

4.1. Data sources

This study used online questionnaires to collect data. The questionnaire was posted on WJX collected from July 6 to July 11, 2023. 319 questionnaires were received totally. Six questionnaires with answer time lower than 30 seconds and three questionnaires higher than 1000 seconds were excluded. 310 valid questionnaires were obtained, with a validity rate of 97%.

4.2. Calibration of variables

In order to meet the requirements of fuzzy sets on data (continuous values between 0 and 1), the variables are calibrated: firstly, the anchor points are given qualitatively, and secondly, the obtained data are transformed into set affiliations. The anchor points (thresholds) set in this paper are: the values of 95%, 50%, and 5% of the array of each variable (e.g., the value of the 95% in the array means: 95% of the values are less than or equal to the result).
The calibration anchor points for each variable are shown in Table 2.

Table 2. Sets, calibration statistics

Research variables	Totally affiliated point	Junction	Totally unaffiliated point
FI	15	12	6
PV	30	24	17
SN	25	20	14
PBC	15	12	7

4.3. Reliability and validity analysis

In this paper, SPSS 25.0 was used to test the reliability and validity of the sample data obtained. Reliability test: the Cronbach's coefficient of the data is 0.928, which is greater than 0.7, which shows a high reliability; Validity test: the KMO value of the data is 0.919, with significance <0.05, thus indicating that the appropriateness and validity of the questionnaire questions are high. The first 10 columns of data are shown in the Table 3.

Table 3. first 10 columns of data

index	2	3	4	5	6	7	8	9	10	11
Total seconds	92	99	87	66	67	62	86	59	64	185
Q1	2	2	2	1	2	2	2	2	2	2
Q2	2	4	4	2	2	3	4	2	3	2
Q3	1	1	1	1	1	1	1	1	1	1
Q4	4	5	5	4	4	5	5	1	3	2
Q5	4	5	5	3	3	5	3	1	3	1
Q6	3	5	5	2	4	5	5	1	3	1
Q7	5	5	5	3	4	5	5	3	5	4
Q8	4	4	4	3	3	3	3	2	3	2
Q9	5	4	5	4	4	5	5	3	3	4
Q10	4	4	4	3	3	5	3	2	5	4
Q11	4	4	4	3	3	5	3	2	5	4
Q12	5	3	4	3	3	5	3	2	5	4
Q13	5	5	5	4	4	5	3	2	5	2
Q14	5	4	4	4	3	5	4	2	5	5
Q15	5	4	4	4	4	5	3	1	5	2
Q16	5	4	5	4	4	5	3	2	5	4
Q17	5	4	4	3	4	5	3	2	5	4
Q18	4	4	4	4	3	5	3	1	5	3
Q19	5	4	4	3	3	5	3	2	5	4
Q20	3	4	4	3	3	4	3	2	3	2
Total value	75	72	75	57	59	82	60	31	73	52

5. Analysis results

5.1. Necessary condition analysis

In this paper, fsQCA method is used to conduct the necessity test, as shown in Table 4: the consistency of subjective norm is high (>0.9), which means it is a necessary condition for consumers' intention to purchase health food, and its coverage is 0.86, indicating that subjective norm, the necessary condition is tangential (relevant) to the result of intention to purchase health food, i.e., it has a strong explanatory power. The consistency of the remaining individual conditions of necessity is generally low (<0.9), i.e., they do not constitute a necessary condition. The results of the necessary condition analysis suggest that the subjective norm is more important than the other variants. In the absence of subjective norm, consumers' intention to make healthy purchases cannot arise. Necessity test of individual conditions of fsQCA method is shown in Table 4.

Table 4. Necessity test of individual conditions of fsQCA method

conditions tested	consistency	coverage
FI	0.86	0.83
FI	0.43	0.47
PV	0.88	0.91
PV	0.44	0.44
SN	0.92	0.86
SN	0.41	0.46
PBC	0.79	0.89
PBC	0.54	0.50

5.2. Configuration analysis

The purpose of the sufficiency analysis is to identify the minimum sufficient conditions for consumers' health food purchases. In this study, the threshold of consistency was set to: 0.8, PRI consistency was set to: 0.7, and the case threshold was set to 1.

The results of the QCA truth analysis in this study are shown in Table 5, which show that there are three configurations of states that realize consumers' high intention to purchase health food. The consistency indexes of the three configurations are 0.91, 0.89, and 0.96, respectively, indicating that these three configurations are sufficient conditions for health food purchase. The overall coverage is 0.99, indicating that the three configurations explain about 99% of the high health food purchase intentions. The overall consistency is 0.84, indicating that these three configurations cover most of the cases are sufficient conditions for health food purchase intentions. Configurations of the health food purchase intention are shown in Table 5.

Table 5. Health food purchase intention configurations

conditions	health food purchase intention		
	M1	M2	M3
FI			n
PV	n		
SN	n	n	n
PBC		n	
consistency	0.91	0.89	0.96
raw coverage	0.88	0.79	0.79
unique coverage	0.06	0.03	0.02
solution coverage		0.99	
solution consistency		0.84	

Note: The relevant symbols appearing in the table are described as follows: n indicates the occurrence of a conditional variable, a large circle indicates a core condition, and a small circle indicates a marginal condition (in this table, only large circles exist).

5.2.1 Autonomous Perceived Type

M1 (Perceived Value & Subjective Norm) suggests that regardless of the level of food information and perceived behavioral control, the result of health food purchasing can be achieved if the perceived value and subjective norm are high. In this study, perceived value (including emotional value and ecological value) means: consumers feel good about one or more properties of the health food, including safety, taste, nutritional value, and environmental friendliness, which in turn creates a preference for the intention to purchase health food.

Emotional value: The reason why consumers buy organic food is that they think it is healthier and safer [36].

Ecological value: environmental awareness has a significant effect on consumers' intention to purchase. Environmental awareness can not only promote intention, but also directly promote green consumption behavior [37].

Under this path: consumers are not influenced by external people or objects, and subjectivity plays a decisive influence on purchase intention.

5.2.2 Externally Restricted Type

M2 (Perceived Behavioral Control & Subjective Norm) indicates that regardless of the level of food information and perceived value, high intention to purchase health food can be achieved when subjective norm and perceived behavioral control are high. In this study, perceived behavioral control is defined as: the degree of difficulty perceived by the consumer in making a health food purchase. The constraints of economic and time factors, all of which constitute an impediment to eventual purchase intentions. Since the price of health food is generally higher than that of general food, economic concerns can affect the final purchase intention, and the price sensitivity factor has an extremely significant impact on the green purchase factor [38].

5.2.3 Information-influenced Type

M3 (Food Information & Subjective Norm) suggests that regardless of the degree of perceived value, perceived behavioral control, if the food information and subjective norm are high, high intention to purchase health food can be achieved. Food information in this study refers to: information on food labels. This means that even if consumers do not establish the perceived value of recognition of health food before purchasing, or have time or financial constraints, food information can sway consumers' final purchase intention if there is a strong subjective norm.

In a previous study, it was found that: green food information has a direct relationship on consumers' purchasing behavior [39], and the green food labeling perception factor has a very significant effect on green purchasing behavior [38]. Further, in this study, it was found that: as the subjects ages, there shows an increment of the attention to food information, which is more able to determine the consumer's decision to purchase.

Considering these three paths together: subjective norm, as a necessary condition, plays a decisive role in the behavior of consumers' health food purchases. And there is a mutual substitution relationship between the remaining three antecedent conditions. According to norm-focused theory, descriptive norm is the influence of the others' behavior (who is important for individual) on individuals [15]. In this study: the act of family members and people around them purchasing health food motivates individuals to learn and imitate, thus creating a convergent purchase intention. In addition, questions in this paper are set in a hierarchical manner, from four aspects: family members, people around, society, and the country. The results show that all four aspects have a positive influence on consumers' health food purchases. Among them: family members have the strongest influence, society and country have the second strongest influence, while people around them have a slightly weaker influence.

5.3. Robust Test

In this paper, we conducted two robust tests on the antecedent configurations of consumers' intention to purchase health food. Each test change only one condition. Firstly, the consistency threshold is adjusted from 0.8 to 0.85, which produces basically consistent configurations; secondly, the case frequency is raised from 1 to 2, which yields basically consistent configurations. Therefore, the findings of this paper are robust.

6. Conclusions and Implications

This project selected 310 samples for investigation and analysis, and used the TPB model as a theoretical framework to draw the following conclusions:

(1) Subjective norm is necessary to stimulate consumers' intention to purchase health food. Configurations composed by perceived value, subjective norm, perceived behavioral control, and food information can significantly drive the formation of purchase intention. They are: 1) autonomous perceived type, 2) externally restricted type, and 3) information-influenced type. The coverage rate of all three configurations reached 79% and above. Among them, the coverage rate of autonomous perception type is as high as 88%, which indicates that most of the subjects generate purchase intention through autonomous perception, i.e., the pathway of autonomous perceived type is more efficient in stimulating the purchase intention of health food. Subjective norm and perceived behavioral control are both generated as core conditions in the pathway, which fully explains the importance of both, i.e., subjective norm and perceived behavioral control together lead to the generation of intention. This is highly consistent with the explanation of how intention is generated in TPB theory.

(2) The cross-sectional comparison of paths M1, M2 and M3 illustrates that under conditions of high subjective norm, food information: perceived value and perceived behavioral control can be substituted for each other, and all of them can lead to the generation of intention to purchase health food. That is, under the premise of high subjective norm, one of the three is sufficient to achieve a high health food purchase intention.

The innovations of this project are mainly focused on the following two aspects:

(1) This project is the supplements of the TPB theory. It improves and enriches the variables in the TPB model: replacing behavioral attitudes with perceived value and introducing a new variable: food information. Both perceived value and food information appear as core conditions in the group results.

(2) This project expands the research on the issue of intention to purchase health food. Using the fsQCA method, this study identifies three ways to stimulate consumers' intention to purchase health food by combining the variables of TPB theory. It is demonstrated that the relationship between the variables and the intention to purchase health food is not a simple linear relationship, but a complex group relationship.

This project has two implications for management:

(1) Subjective norm is the most important factor in promoting consumers' intention to purchase health food. People around them as well as society's policies are more capable of swaying consumers' intention to purchase health food. People are products of their environment. When dealing with a consumer, it is not only the individual himself who is confronted, but also the influence he may have on the behavior of people around him. When the society attaches greater importance to health food, the individuals in it will naturally incline to buy health food. From another point of view, a consumer's intention to purchase health food, or not, is the result of the superimposition of the individual himself and the surrounding environment. Therefore, health food producers should focus on the quality of their products and their own reputation.

(2) Under the condition of subjective norm: perceived value, perceived behavioral control, and food information play alternative roles to each other. For manufacturers, they should achieve at least one of the following conditions: high perceived value, high perceived behavior control or high food information. 1) Perceived Value: In this study, it was found that some consumers were skeptical about the environmental significance of health food. It is important to enhance consumers' knowledge of health food by publicizing the role of health food in promoting ecological protection during the production process. 2) Perceived Behavioral Control: In the process of conducting the study, it was found that: about 40% of the subjects held the opinion of general agreement and below that it is convenient to purchase health food in the market. Health food purchasing channels should be broadened so that consumers can buy assured health food conveniently. In addition to this, services such as fresh delivery can be provided to improve consumer satisfaction. Under the premise of quality assurance, technological innovation should be actively carried out, so that health food could be more affordable. 3) Food Information: Manufacturers can consider designing health food logos to attract consumers to buy health food.

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