Research Article

Consumer Behavior Analysis of Green Food

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Abstract: This study uses empirical research methods, based on detailed analysis of the food transaction big data. It use descriptive statistical method to analyze the current situation of cognitive and behavioral characteristics of the green food and it conducted data mining of factors affecting consumer buying green food. Multiple linear regression analysis have shown that the price factor is an important factor affecting consumer buying green food, next are food quality and health awareness and product awareness is one of the small degree of influence. However, the convenience of purchase has no significant effect on buying green food. At last, this study aiming factors that affect consumer purchasing choice, proposed some suggestions to expand the eco-labeling of food consumption.

Keywords: Consumer behavior, factors, green food, green purchase, property of value

INTRODUCTION

With the continuous improvement of people's living standards, people's food consumption changes the pursuit of quantity to both the quantity and quality. Change the eat concept of full to health and nutrition and food safety issues has been widespread concerned by consumers. Owing to green food have clean, safe, high-quality, high-nutrition and other characteristics, it is increasingly widely favored by consumers, moreover, green food has become a mainstream food consumption patterns of the 21st century.

Green Food means non-polluting, high-quality, nutritious food, as known as Organic Food, Ecologic Food and Nature Food. Chinese government adopted a series of measures to promote the development of green food, but Green Food development scale is still very limited in China. Green Food which get into the market cannot be recognized by most consumers, market share is not high. Most researches think that china consumer are lack of effective demand for green food and they attributed it to consumer's poor awareness of the green food, economic power shortage, qualities are not high, lack of green product information and so on. Further empirical research on food safety market found that consumer's age, income, other individual characteristics and awareness of the relevant food directly affect their buying behavior. But such studies are focused on the harmless or green food, they didn't consider the differences in consumer awareness and consumption between the different categories of products, for example, consumer's concerned about the degree of safety, awareness and purchase consideration for grain, vegetables and meat are different.

Green food's supply and consumer behaviors have become the main contents of sustainable human development and the focus of social attention. As people's awareness of sustainable development of society and people's living standards improve, consumer's green consumption increases. Enterprises can obtain comparative advantage of market competition through green food business. Consumers improve the quality of life through green food consumption; therefore, the green concept has become widely accepted. Currently, the supply of green food and the consumption of green food have serious problem of information asymmetry, consumer's awareness of green product knowledge, enterprise's green knowledge and the spread of green products are major factors affecting the purchase of Green. How mutual relations between these factors and how do they affect the degree of cognitive and purchase of consumers are the core of this study.

This study will use supermarket's transaction data sources for the analysis, investigate the logical relationship between Green information dissemination, Green product attributes and consumer's buying behavior. We investigate the causes of the Green consumer perception of product value attribute from consumer's perspective, as well as Green spread and Green value on the impact of green purchases; provide the basis for enterprises to develop effective Green marketing strategy.

LITERATURE REVIEW

Current research: Research scholars of safe food research from three aspects: consumer awareness of safe food, willingness to pay and buying behavior currently. Scholar studies show that seafood prices and industry attention are the main factor affecting seafood consumer buying behavior (Anderson, 1995). In the food retail sector, green market development is based on two increasingly prominent market tools-third-party certification and private eco-branding. Branding and certification are not identical in their functionality. While eco-branding aims to capture higher market shares through means of product differentiation based on sustainability attributes (Orsato, 2009) certification provides a guarantee of product and process adherence to certain environmental, social and ethical standards at different stages in the value chain (Vorley *et al.*, 2010).

Food users select model: Early model EKB described consumer buying behavior as a procedural process. Later, academia widespread use A-P-I-B (Attitude-Preference-Intentions-Brand purchase) behavior process model to research consumer behavior (Shelby, 2002). The A-P-I-B model explains consumer's willingness to buy, preferences and purchase options only from shallow surface and low-value level. It is useful for short-term forecasts for durable goods, but it doesn't explain what factors can control the attitude of consumers; therefore, multi-attribute factor is introduced into the model. Howard-Sheth (H-S) model uses the product attributes, social attributes and other properties to stimulate consumer attention; it makes consumers perceive preferences and attitudes, formation of purchase intention, thus affecting consumers' buying behavior. H-S model is built on the assumption of a substantial contribution to the expansion of the development chain between multiple factors and buying property, such as through the purchase of willingness to influence the purchase. Later, many scholars have found that H-S model lack convincing support, so they formed the extended chain partly and then did an empirical test. Form of this model has promoted the theoretical analysis and empirical study of consumer buying behavior. According to this theory logic, this study attempts to explore the green multi-attribute how to affects the green purchase behavior.

Buying behavior of food: Buying behavior refers individuals, groups or organizations how to select, purchase, use and disposal of goods, services, innovation and experience to meet their needs and desires. Green food is the production, circulation and consumption of clean, safe, high-quality, nutritious food. Green food purchasing is in the purchase activities of buying consumer goods in consideration of

the characteristics of Green. Early Green purchase behavior is also the environmentally responsible behavior. Our research just put this specific environmental liability to the consumer sector, focused on the environmental impact of consumption. After the 1990s, Green purchasing is not just environmental responsibility, but also the purchase of satisfaction, purchase frequency and purchase recommendation. Domestic and foreign scholars (Zurga and Tavcer, 2013) have conducted a series of studies of the green consumer attitude and behavior. Numerous studies involving Green ideas, Green perception and Green awareness and involves Green knowledge and Green purchasing relationship. The studies for the Green purchasing influence the results, process, frequency and green purchase behavior are still rare.

Green value attributes and cognition: Consumers make purchase decisions based on product attribute or value when they buy products. Product attributes are core values and characteristics of the product. Green food properties refer to food characteristics which are permitted to use green flag morphological, green food product in a particular mode, is a pollution-free, safe, high-quality, nutritious type of food.

There are five categories of product value attribute: functional value (meet products functionality and utility), social Value (use of the product allows consumers and society connections), emotional value (means that the product can trigger emotional tendencies of consumers), curiosity value (use of the product to meet the curiosity) and condition value (refers to the specific conditions of the product provides maximum functionality and social value). Form these values' specific properties for easy empirical. The specific form of the product value attributes (including the effectiveness of internal and external social utility function) affects consumers' buying behavior. This study combine Sheth product value attribute model, build Green value attributes. People's Awareness of green product attributes mainly by public information, stimulate fuzziness and perception of bias, then Howard (Howard, 1989) put the information in the initial factor model as a product purchase, it has a direct impact on people's awareness and attitudes and affecting their buying behavior.

METHODOLOGY

Consumers purchase model: Rational behavior theory model is considered as one of the theoretical model that predicts and explain consumer buying behavior. Rational behavior theory think that behavior's produce mainly depend on people's intention to perform a specific behavior. The stronger the individual's behavioral intention, the greater possibility of enforcement action; otherwise, the weaker the

Table 1: Parameter value

Variable name	Variable symbol	Value range	Value meaning
Gender	G	1, 2	
Age	A	1, 2, 3, 4, 5, 6	1: Age under 20
			2: Age in (20, 30)
			3: Age in (30, 40)
			4: Age in (40, 50)
			5: Age in (50, 60)
			6: Age greater than 60
Income	I	1, 2, 3, 4, 5	1: Month income under 1500
			2: Month income in (1500, 3000)
			3: Month income in (3500, 5000)
			4: Month income in (5000, 7000)
			5: Month income greater than 7000
Education	E	1, 2, 3	1: High school diploma and under this
			2: Bachelor degree
			3: Graduate degree
ChildNum	C	0, 1, 2, 3	Mean the child number and 3 means the number is 3 or more
Risk	R	1, 2, 3, 4	Different level to worry the risk of the food safe. The more max, the more worry
Know	K	1, 2, 3, 4	Different level to know the characteristics and significance about green food. The more max, the more know

individual's behavioral intention, the less possibility of enforcement action. Behavioral intention is the result of three factors working together: individual's behavior and attitude, subjective norms and cognitive control. Behavior attitude is an individual to perform a specific behavior in a given environmental, that is a positive or negative evaluation of the individual to perform certain actions. Subjective norm refers to the belief that individual to perform or not to perform certain acts. Control of cognitive is a factor to promoting or impeding the implementation of an act. When individual behavior has more positive attitude, more intense subjective norms, more control of cognitive beliefs and then individual has stronger behavior intention, therefore the possibility of the implementation of the act is greater.

Analyses of consumer demand in microeconomic all believe that income and price are important factors affecting consumer's choice. In addition, individual characteristics and preferences are also affect consumer choice. This study combine actual purchases of green food, structure factor vector that influence consumers to buy green food:

$$IU = \{G, A, I, E, C, R, K\} \qquad (1)$$

where,
G = Consumers gender
A = Age
I = The monthly income
E = Education
C = The number of children
R = The level of interest in green and healthy food
K = The awareness of green food

In order to facilitate analysis of the data, the value of all parameters are discrete segment and represent each parameter enumeration plastic range, as specifically shown in Table 1.

The consumer choice model for green food:

$$Y_{ij} = F(G_i, A_i, I_i, E_i, C_i, R_i, K_{ij}) + e_i \qquad (2)$$

where,
Y_{ij} : The i-th consumer whether to buy the i-th green food, range for {0, 1}
e : The random error

Due to consumer buying behavior "buy" and "do not buy" is noncontiguous dichotomous dependent variable, purchase behavior relationship with independent variables obey logistic distributional through data analysis. Thus the probability of the i-th consumers choose to purchase green j is:

$$P_i = \frac{1}{1+\exp(-\sum \beta_{ij} X_{ij})} = \frac{\exp(\sum \beta_{ij} X_{ij})}{1+\exp(\sum \beta_{ij} X_{ij})} \qquad (3)$$

where, X_{ij} is the influence variable factors on the i-th consumers choose to purchase green j.

Probability for categorical variables through logic conversion ratio, Eq. (2) can be converted into a linear regression estimation equation:

$$Li = \beta 0 + \sum_{k=1}^{K} \beta_k \bullet A_{ik} + \sum_{m=1}^{M} \beta_m \bullet G_{im}$$
$$+ \sum_{n=1}^{N} \beta_n \bullet I_{in} + \sum_{s=1}^{S} \beta_s \bullet E_{is} +$$
$$\sum_{t=1}^{T} \beta_t \bullet C_{it} + \sum_{q=1}^{Q} \beta_q \bullet R_{iq} \qquad (4)$$

Li represents logarithm in favor of buying green food Odds, as $Li = P_{ij}/(1-P_{ij})$. By the above equation can reveal significant variables affecting the impact and occurrence of events than the degree of influence. Data processing using statistical analysis software to

bivariate regression Logit and using the maximum likelihood method to estimate the parameters of the model.

DATA ANALYSIS

Our research collects consumption records in the fresh produce area of ZhongBai warehouse, as well as the basic information filled in by the members. There are 68934 real-name users with 1093812 items from 349482 purchase records. At first, the purchase procedures of the users are treated as dependent variables, meanwhile the personal features of the consumers, the degree of attentiveness for food safety and how they know the green food are treated as explanatory variables. The regression result of Logistic model is shown as Table 2.

It is observed from the regression results of Logistic model in Table 2 that:

- Two elements including whether there are children under 6 years old in consumer families of missing-inspection and safety perception of green food are significant above level 1%.
- Four elements including the education level, income per month, whether can choose the mark of green food correctly and price evaluation to green food are significant above level 5%.
- Two elements including the gender and the age of consumers are significant above level 10%.
- The other variables are not significant.
- It is observed from Table 2 that the safety perception to green food of the consumers is prominent and positive to their purchasing behaviors. The higher the safety perception to the green food of the consumers is, the more tendentious green food the consumers are. The more the consumers trust the green food, the more propensities for purchasing they have. Furthermore, the Bigger value of Exp (B), i.e., the estimation of safety for green food, means the safety evaluation affects the purchasing of green food in a larger extent. The consumers with lower safety perception of green food tend less to purchase green food.
- Whether there is a child in a consumer family affects significantly, which means the families with children attach more importance to purchase the safe and healthy food. In our investigation, the consumers from the families with children pay high attention to the food safety. They treat the safety and health as the primary factors when they are purchasing.
- The education of consumers has positive effects on the purchasing of green food. Generally, the higher education the consumers have, the more attention they would pay to the health, as well as more concern about the food safety and more tendency

Table 2: The estimation results of binomial logistic regression model for green food purchasing behavior

Arguments	B	S.E.	Wald	Exp (B)
Gender	0.299*	0.561	0.291	1.342
Age	-0.191*	0.282	0.453	0.827
Income	0.009**	0.352	0.002	0.991
Education	0.148**	0.271	0.305	1.157
ChildNum	0.452***	0.611	0.547	1.559
Risk	0.447**	0.514	0.782	1.559
Know	0.021**	0.607	0.021	0.908

S.E.: Standard error; The verification results of the model are: -2LL = 98.348; The chi-square of Cox and Snell = 0.042; The chi-square of Nagelkerke = 0.087; The comprehensive verification results of the model are: The chi-square = 7.041; The degree of freedom = 10; The level of significance = 0.001; ***: Significance above 1% level; **: Significance above 5% level; *: Significance above 10% level

for the green food. In our investigation, the higher-educated consumers know more about the green food. On the contrary, the lower-educated consumers know little about the green food and pay few attention to certification for food safety.

- The average household disposable income per month has significant effects on the purchasing of green food. It means the higher income leads to the more tendencies to the green food. Generally, as the incomes rise, the consumers concern more about their health. So they tend to purchase more safe and healthy food and are willing to pay a certain degree of premium for the safe and healthy food.
- Whether the consumers can correctly choose the mark of green food has positive significant effects on the purchasing of green food. Generally, the consumers who can correctly choose the mark of green food concern more about the green food. They purchase foods primarily based on acquisition of quality and safety certification.
- The effect of price evaluation about green food is on negative direction. The price evaluations of green food are contrary to their purchasing behaviors. If the consumers feel the price of the green food is higher than the value, the purchases would decrease and vice versa.
- It is demonstrated from the results that females tend more to purchase green food. Generally, the females are the primary purchasing powers of food in the families. Furthermore, the females are more concern about the health of the families so they have more tendency of purchasing green food.
- It is demonstrated from the results that the effect of the age is negative. That means the younger consumers tend more for the green food than the elder ones. It is probable because the income level of quinquagenarians above 50 ages among the investigated is quite low. Meanwhile, the education of the young is higher and they have better acceptable ability of information. They can acquire information about food safety via internet, television and newspaper.

CONCLUSION

In this study, we analyzes the trade big data of food, as well as empirically analyzes the influencing factors of purchasing behaviors of green food utilizing analysis and processing tools of mess data. The conclusions are:

- Propagandize the relevant knowledge of green food to promote understanding of the green food. At present the consumers do not well comprehend the relevant knowledge of green food, so the government and enterprises with green food certification should enlarge the propaganda through television, newspaper and internet. Above all, the enterprises should deliver the information via marketing strategy to raise the level of consumers' perception of green food.
- Increase the confidence of the consumers to the green food. The relevant departments of the government should supervise the green food processing enterprises in accordance with strict standards of raw material supply, environment of producing area, manufacturing technique, storage, transportation and sales section. They should intensify the punishment of green food irregularities and improve the safety of green food. The government should publish the information of quality testing timely, objectively and equitably in order to increase the confidence of the consumers to the quality of green food. The enterprises should enhance the quality control and management following the standard of green food in the procedure of production and processing.
- Accelerate the efficient supply of green food. The 72.42% investigated consumers think the price of green food is high or on high side. The government should introduce appropriate incentives and subsidies policy for the green food processing enterprise and peasant households in order to reduce the cost of green food production. It should build green food supermarket or green food special counter so as to decrease the price and enhance the effective demand.

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