Study on Influencing Factors of Millet Product Consumption Behavior of Residents in Hebei Province -- Based on the Perspective of Planned Behavior Theory

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Abstract: As a product with both nutritional value and health function, millet products are favored by more and more consumers. Hebei Province is one of the important provinces whose residents produce millets and consume millet products. And it is of great significance for leading the development of local millet industry to study behavior in millet products consumption. Therefore, this study is based on the survey results of 440 residents in Hebei Province. At the same time, under the guidance of planned behavior theory, this paper analyzes the factors affecting the consumption behavior of millet products of residents by the Binary Logistic model. The results show that: urban and rural residents' awareness of millet products' nutritional and health functions, texture, appearance quality, promotion of millet products, product prices, knowledge of millet products, consumers' gender, age and residence, etc., all have a significant impact on residents' millet product consumption behavior. Accordingly, this article proposes countermeasures and suggestions for the high-quality development of the millet industry in Hebei Province from the aspects of increasing the research and development of high-yield and high-quality millet varieties, supporting the development of millet deep processing enterprises, and promoting the development of diversified functional millet products.

1. Introduction
In recent years, with the improvement of residents' living standards and the continuous optimization of dietary structure, the domestic food demand is changing from the quantity to the food nutrition, safety and health function. In this context, miscellaneous grain products which are homology of medicine and food have been favored by more consumers, and promoted development of miscellaneous grain industry at the same time. Millet is one of the most traditional and important grain crops in north China. So all kinds of its processed products, including millet and its processed products, such as millet rice crust, millet small steamed corn-bread, rice vinegar and rice wine, become an important part of urban and rural residents' food consumption\textsuperscript{[3-6]}. However, when examining the millet product market, the problems that cannot be ignored are the single millet products and the low total consumption\textsuperscript{[7-8]}.

Previous researchers have studied the consumption of miscellaneous grain products like millet from different angles. Li Yuqin\textsuperscript{[1-2]} analyzed consumers' millet consumption behavior in Wuhan; Liu Fei and Liu Meng\textsuperscript{[5]} et al. analyzed the consumption intention of urban residents of millet and its influencing factors. At the same time, scholars such as Kang Liyun, Yuan Shuyang, Zhu Ju'jin\textsuperscript{[9-10]} analyzed and discussed consumers' purchase intention or consumption behavior by using the theory of...
planned behavior. As a whole, the in-depth research on the consumption of millet products is relatively lacking based on the perspective of planned behavior theory. Taking Hebei province as an example, this study identifies the influencing factors of consumer behavior of millet products based on the theory of planned behavior, by the method of qualitative and quantitative, in order to provide references fully for tapping the consumer demand and reasonably guiding millet suggestions on product development.

2. Theoretical Assumptions

years, with the improvement of residents' living standards and
The theory of planned behavior is one of the most important theories to study consumer behavior \cite{11}. The theory believes that consumer behavior is jointly affected by consumers' attitudes to the behavior, subjective norms, and perceptual behavior control \cite{12}. Many researchers analyze consumption behaviors of agricultural products by the theory of planned behavior, but demographic characteristic variables will also affect the consumption behavior of residents. Thus, we adds demographic characteristic variables on the basis of the original planned behavior theory model \cite{15}, and explore the influencing factors based on the extended planning behavior theory \cite{14}.

1. Attitude mainly refers to consumers' subjective feelings and emotional cognition of products \cite{12}. This mainly includes health function, nutritional value, green and safe, taste, product type, packaging and appearance quality of millet products.

2. Subjective norms mainly refer to the influence of individuals or groups that have influence on individuals' behavior decisions on whether an individual takes a certain behavior \cite{12}. It mainly includes intergenerational consumption habits, product introduction and the promotion of millet products.

3. Perceptual behavioral control mainly refers to the hindrance of an individual's past experience and expectation. The more resources and opportunities he owns, the more perceptual behavioral control he will have \cite{13}. This paper mainly includes the convenience of buying, price, the preferential activities of the store and the understanding of millet products.

4. Demographic characteristics mainly include age, gender, residence, education level and other factors.
Based on the above analysis, this paper puts forward the following hypothesis:

H1: Attitude factors will have a significant impact on residents' consumption behavior.

H2: Subjective normative factors will have a significant impact on residents' consumption behavior.

H3: Perceived behavioral control factors have a significant impact on residents' consumption behavior.

H4: Demographic characteristics will have a significant impact on residents' consumption behavior.

3. Data Source and Sample Feature Analysis

The objects of this survey are urban and rural residents in Hebei Province. The data and relevant information are mainly from the field interview and questionnaire survey conducted by the team. Research sites involved Baoding, Langfang, Shijiazhuang, and so on. The survey data were collected and analyzed by SPSS.21 software.

The basic characteristics of this survey are as follows: The proportion of males is 35.2% and females is 64.8%. The P value obtained by the chi-square goodness of fit test is 0.000, less than 0.05, indicating that the number of females is significantly more than that of males The respondents covered all age groups, and most are people aged 18-25 and 46-55, accounted for 45.9% and 26.4%. The number of unmarried people was slightly higher than married people. Most of the education level is bachelor's degree or junior college degree, and junior middle school or below. The residences are evenly distributed among cities, towns and rural areas. As the students have no source of income, we don’t take it into account. Apart from the sample of students, the monthly income of the respondents ranges from 2000 yuan to 5999 yuan, with a moderate income level.
4. Empirical Analysis on the Influencing Factors of Millet Product Consumption Behavior

4.1. Model Selection

The question in this study is “whether to consume millet products”, and the dependent variable "whether" is a binary variable, so the binary Logistic regression model is adopted for analysis. We use binary Logistic regression model to understand which factors are affecting consumers’ behavior of millet products.

The specific form of the model is set as follows:

\[ \ln \left( \frac{p}{1-p} \right) = \beta_0 + \beta_1 \times X_1 + \beta_2 \times X_2 + \ldots + \beta_n \times X_n, \]

4.2. Analysis of Model Regression Results

Before Logistic regression, we tested the reliability and validity of the sample data. The analysis results showed that the overall reliability statistic Cronbach's alpha was 0.934, close to 1, indicating that the overall reliability of the sample was good, and the Cronbach's alpha values of all dimensions of the sample were all more than 0.7, so the data consistency within all dimensions of the sample was also good [13]. The KMO value of the sample was 0.918 for the suitability test, and the Sig value of Bartlett's significant level test was 0.000 and less than 0.05, indicating that the sample data had good structural validity [15].

This paper uses SPSS.21 to work Logistic regression and uses backward condition selection method. The model regression results are shown in Table 1.

| Step | Influencing factors               | B   | S.E. | Wals  | df | Sig.  | Exp (B) |
|------|-----------------------------------|-----|------|-------|----|-------|---------|
| Health Function                      | 3.70| .757 | 23.88| 1   | .000 | 4.454  |
| Nutritional Value                    | 5.19| .944 | 30.22| 1   | .000 | .006   |
| Packaging                            | -3.76| 1.393| 7.287| 1   | .007 | .023   |
| Taste                                | -0.756| 1.596| 5.805| 1   | .036 | .469   |
| Appearance Quality                   | 3.662| 1.352| 7.332| 1   | .007 | 3.947  |
| Promotion of Millet Products         | 4.612| 1.987| 5.388| 1   | .020 | 1.651  |
| Price                                | -3.142| 1.895| 2.749| 1   | .097 | .043   |
| The Understanding of Millet Products | 2.5  | 1.598| 2.448| 1   | .188 | 1.186  |
| Gender                               | -1.753| 1.189| 2.173| 1   | .04  | .173   |
| Age                                  | 3.292| .912| 13.025| 1   | .000 | 2.886  |
| Residence                            | -2.125| .841| 6.390| 1   | .011 | .119   |
| B                                     | -3.858| 2.400| 2.584| 1   | .108 | .021   |

Model \( \chi^2 = 147.72, P=0.000, P<0.05 \), indicating that at least one OR value of the variables included in the fitting model has statistical significance, and the Logistic regression model has significance, that is, the model has overall significance.

The results are discussed as follows:

1. Attitude factors: The influence of health function, nutritional value and taste on residents' consumption of millet products is positive. Millet products are rich in nutrition, and are both traditional ration and health food, which conforms to the residents' higher demand for food of good taste, health function and nutritional value. The packaging has a negative impact on the consumer behavior. As the daily food of residents, the requirements for its packaging are not higher than some luxuries. The appearance quality of millet products has a positive impact on residents and it is an important factor. Some of these hypotheses have not been tested. First, green and safe isn't confirmed. Millet is a dryland crop that is easy to manage in the field. Compared with other agricultural products
such as vegetables, residents believe that millet products are relatively green and safe. Second, the product category has not been tested. On the one hand, residents' understanding of millet products only remains in the primary processed millet, and they don’t understanding other deep processed products. On the other hand, affected by consumption habits, residents' consumption of millet products is dominated by millet, and they do not consume much of other processed products.

2. Subjective normative factors: the promotion of grain products has a positive impact on the consumption of residents' millet products. From the perspective of consumer psychology, residents are easily affected by information from the outside world in the process of consumption, so the promotion will deepen residents' goodwill and trust, and generate consumption behavior. Intergenerational consumption habits and product introductions are not proven. Intergenerational consumption habits are more prominent among the elderly in rural areas. However, with the continuous progress and development of the society, the population flow between urban and rural areas increases and most young people leave the countryside, and the intergenerational consumption habits gradually weaken. Residents always purchase millet and have a higher understanding of it, so product introduction has no significant impact on residents' consumption behavior.

3. Perceived behavior control factors: price has a negative impact on residents' consumption behavior of millet products. Under the existing paying ability, residents will choose cheap and high-quality products. So residents will pay more attention to its price, and will judge whether the product is worth money according to its past purchasing experience. Residents' understanding of millet products has a positive impact on their consumption behavior. The preferential activities of the store have not been confirmed, because millet products belong to small products, given priority to the traditional consumer market, and rarely participate in promotional activities.

4. Demographic characteristics: Gender has a negative impact on the consumption behavior. Under the influence of the traditional Chinese family structure of "male mainstays outside, female mainstays inside", women's consumption habits generally determine the consumption pattern of the whole family. Age has a positive impact on residents' millet consumption behavior, which indicates that the older people are more likely to consume millet products. On the one hand, affected by the traditional habits of millet consumption, elder people have a stronger consumption tendency. On the other hand, as the age increases, the body's various functions will slowly decline. People pay more attention to the rationality of dietary structure and diversification. The place of residence has a negative effect on the willingness to consume millet products. Along with the formation of the Chinese urban and rural dual structure, urban and rural resident's consumption level and dietary structure are different. Rural residents tend to consume millet products due to the habits and deep understanding. However, town and city residents lack the knowledge of millet products, so the desire to consume millet products is low[16].

5. Conclusions and Suggestions

5.1. Conclusions

At present, with the development of economy and society and the improvement of residents' living standard, people are in pursuit of healthy and nutritious food. Millet products are favored by consumers because of their high nutritional value and health function. Based on the theory of planned behavior, the analysis of binary Logistic regression model showed that: In terms of attitude, residents' perception of taste, health function, nutritional value and appearance quality have a positive effect on their millet products consumption behavior, while packaging has a negative effect. This indicates that residents pay more attention to the internal quality and function of millet products; In terms of subjective norms, the promotion of the product has a positive impact. In terms of perceived behavior control, price has a negative impact on residents' consumption behavior. Therefore, practical marketing strategies and reasonable price policies should be formulated. The understanding of millet products has a positive impact on their consumption behavior, so we should continuously improve the understanding and recognition degree of residents on millet products. In terms of demographic characteristics, age has a
positive effect on residents' millet consumption behavior, while gender and residence have a negative effect. This indicates that older people prefer millet products with both nutritional value and health care function, and the differences in consumption concepts and dietary structure between urban and rural areas and between genders affect their behaviors.

5.2. Suggestions

5.2.1. Support the Research and Development of High-Quality and High-Yield Millet Varieties to Improve the Nutritional Quality of Millet Products

We will improve the research and development of millet varieties, support and guide technical exchanges and cooperation among enterprises, scientific research units and institutions of higher learning to improve the nutritional quality and market competitiveness of millet products. It is necessary to cultivate new varieties with high nutritional quality and high yield, and open up new industries of functional varieties of millet, such as edible varieties used for processing, special varieties for health care, and staple food varieties, to meet the requirements of different consumer groups for diversified varieties, characteristics and functions of millet products. At the same time, different varieties should be developed according to local conditions in different regions and planted on a large scale to avoid mixed varieties and improve the yield and quality of millet.

5.2.2. Support the Development of Millet Deep Processing Enterprises and Promote the Development of Diversified Millet Products

At present, Hebei residents mainly consume primary processed products. "Millet convenient porridge", "millet beverage", "small rice wine" and other deep-processed products have appeared in the market and are favored by the majority of consumers. Thus, we should vigorously support the development of millet deep processing enterprises and change the development mode of the existing processing enterprises. We should increase the investment in science and technology, cooperate with universities and technical secondary schools and scientific research institutes, promote the development of diversified millet products to meet the long-term needs of urban and rural consumers in the north, and promote the consumption of consumer millet products.

5.2.3. Increase Promotion to Increase Consumer Awareness of Millet Products

Although millet products are favored by more and more consumers due to its nutrition and health care, a considerable number of residents still stay in the cognition of its primary product millet and millet processed products are low visibility and small market share. The key reason lies in the lack of effective means of promotion. We recommend a variety of means to increase the promotion of miscellaneous grain products, such as using the live agricultural support platform, millet product exhibitions, television, and other activities. We also can make use of the cultural connotation and historical background of millet, increase the understanding, trust and goodwill of miscellaneous grain products and promote residents' consumption of millet.

5.2.4. Product Graded Packaging, Flexible Pricing

Economic and social development brings the change of income gap between residents and the demand for millet products between different income groups will also be different. Enterprises should be targeted at customers as a guide and provide different quality grades of millet products for different income consumer groups. High-income people pay more attention to the brand, popularity and exquisite packaging of products, while price is often not the most important factor affecting their consumption. Therefore, high-quality products with high added value should be built for high-income groups. Middle-income earners pay more attention to the quality and nutritional value of a product than to its brand, popularity and exquisite packaging, so it is more important for them to have good quality and low price. One of the most important factors affecting the consumption of low-income people is the price. The product only needs to meet their basic food needs. Therefore, we should provide ordinary millet
products with low price.

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