

Research on the Consumption Behavior and Influencing Factors of Locally-produced Vegetables in Tianjin

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Abstract: Tianjin residents attach great importance to vegetable consumption, and the vegetable industry is an important support for promoting the transformation of Tianjin's modern urban agriculture. In this study, we reviewed the research results of domestic and foreign scholars on the influencing factors of consumption behavior, combined with field surveys, and used economic theory and empirical analysis methods to analyze in depth the influencing factors of Tianjin residents' consumption behavior of locally-produced vegetables. It was found that factors such as residents' age, understanding of locally-produced vegetables by indigenous people, local product awareness, freshness and taste of locally-produced vegetables, convenience of purchase, and government media propaganda have a significant impact on residents' purchase behavior of locally-produced vegetables. Based on the above research results and the problems found in the survey, corresponding policy suggestions are proposed.

1. Introduction

Vegetables occupy an important position in Chinese agriculture and are an essential component of residents' dietary consumption. Tianjin-produced vegetables are favored by local residents due to their short supply distance, guaranteed freshness, and high local recognition. Supporting the local economy, ensuring fair returns for local farmers, and accelerating environmentally friendly development are also social values reflected in the purchase of locally produced vegetables by Tianjin residents. In recent years, due to fierce competition in the domestic vegetable market and the increasing demand of consumers for healthy nutrition, the diversified consumption demand has put forward new requirements for the development of locally produced vegetables. As consumers' consumption behavior towards vegetables serves as a feedback variable in vegetable circulation, it can effectively guide the development of the vegetable industry and solve deep-seated contradictions and problems in the industry's development. Therefore, under the background of a large market and circulation, studying the consumption status of Tianjin residents for locally produced vegetables and analyzing the influencing factors of their consumption behavior has significant practical significance for promoting the healthy and stable development of the Tianjin vegetable industry.

Research on consumer behavior abroad is relatively early, and it is based on some mature theoretical foundations, combined with interdisciplinary studies of psychology, sociology, economics, and other disciplines, and has been studied in-depth ¹²³. Domestic research mainly focuses on descriptive analysis of product

awareness, purchasing willingness, and consumption behavior status and uses some demographic variables and experience analysis factors as influencing factors for logistic regression ⁴⁵⁶. In terms of analysis methods, both domestic and foreign studies use Logit models, Probit models, structural equation models, and other methods for analysis ⁷⁸⁹. This study focuses on Tianjin-produced vegetables, analyzes the consumption behavior and influencing factors of Tianjin residents towards locally produced vegetables, and proposes corresponding countermeasures and suggestions around improving residents' consumption experience of locally produced vegetables and the supply-side reform of Tianjin's vegetable industry.

2. Theoretical model and research hypothesis

2.1. Theoretical model

This study is based on consumer behavior theory, SOR theory, social cognition theory, and the Howard-Sheth consumer behavior model for analysis. Combined with field research, it is believed that the factors influencing Tianjin residents' consumption behavior of locally produced vegetables include "personal characteristics", "psychological factors", "product factors", and "environmental factors". The specific theoretical model framework is shown in Figure 1¹⁰.

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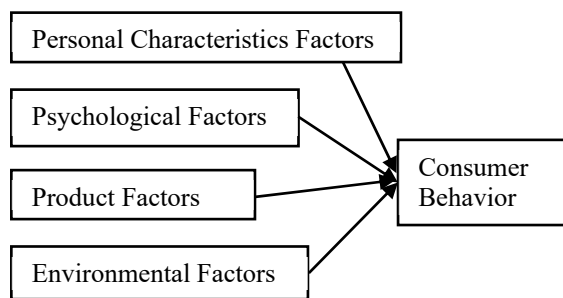


Figure 1. Theoretical model

2.2. Research hypothesis

According to the literature review and statistical analysis of the factors influencing the purchase behavior of locally produced vegetables among Tianjin residents, combined with the theoretical model framework, the following hypotheses are proposed:

(1) Personal characteristic factors and consumer behavior

Hypothesis 1: Age will have a significant positive impact on the purchase of locally produced vegetables among Tianjin residents, i.e., the older the Tianjin residents are, the more they prefer to purchase locally produced vegetables.

Hypothesis 2: Family size will have a significant positive impact on the purchase of locally produced vegetables among Tianjin residents, i.e., the larger the family size of Tianjin residents, the more they prefer to purchase locally produced vegetables.

Hypothesis 3: Annual household income will have a significant positive impact on the purchase of locally produced vegetables among Tianjin residents, i.e., the higher the annual household income of Tianjin residents, the more they prefer to purchase locally produced vegetables.

Hypothesis 4: Indigenous status will have a significant positive impact on the purchase of locally produced vegetables among Tianjin residents, i.e., Tianjin residents who are indigenous people are more likely to prefer to purchase locally produced vegetables.

(2) Psychological factors and consumer behavior

Hypothesis 5: Level of knowledge will have a significant positive impact on the purchase of locally produced vegetables among Tianjin residents, i.e., the more Tianjin residents know about locally produced vegetables, the more they prefer to purchase them.

Hypothesis 6: Local product awareness will have a significant positive impact on the purchase of locally produced vegetables among Tianjin residents, i.e., the stronger the local product awareness of Tianjin residents, the more they prefer to purchase locally produced vegetables.

(3) Product factors and consumer behavior

Hypothesis 7: Price level will have a significant negative impact on the purchase of locally produced vegetables among Tianjin residents, i.e., the higher the price level of locally produced vegetables, the less willing Tianjin residents are to purchase them.

Hypothesis 8: Freshness will have a significant positive impact on the purchase of locally produced

vegetables among Tianjin residents, i.e., the fresher the locally produced vegetables, the more Tianjin residents prefer to purchase them.

Hypothesis 9: Taste and flavor will have a significant positive impact on the purchase of locally produced vegetables among Tianjin residents, i.e., the better the taste and flavor of locally produced vegetables, the more Tianjin residents prefer to purchase them.

Hypothesis 10: Quality and safety will have a significant positive impact on the purchase of locally produced vegetables among Tianjin residents, i.e., the safer the locally produced vegetables, the more Tianjin residents prefer to purchase them.

(4) Environmental factors and consumer behavior

Hypothesis 11: Convenience of purchase will have a significant positive impact on the purchase of locally produced vegetables among Tianjin residents, i.e., the more channels available for purchasing locally produced vegetables and the more convenient the purchasing process, the more Tianjin residents prefer to purchase them.

Hypothesis 12: Government and media promotion will have a significant positive impact on the purchase of locally produced vegetables among Tianjin residents, i.e., the more the government and media promote locally produced vegetables, the more Tianjin residents prefer to purchase them.

3. Research Methods and Data Description

3.1. Research Methods

This study investigates the influence of different factors on the purchase of real estate vegetables in Tianjin. Since the dependent variable, the percentage of real estate vegetables purchased, is an ordered multicategorical variable, and the independent variables are ordered and categorical variables, an ordered logistic model is chosen for the analysis in this study. The dependent variable in this study has three levels, and the corresponding probabilities are π_1 , π_2 and π_3 . In the analysis, it was split into two binary logistic regressions, (1 vs 2+3) and (1+2 vs 3), which are lower level compared with higher level, and the regression models are shown in equations (1) to (2).

$$\text{Logit}(P_{y \leq 1}) = \frac{\ln \pi_1}{1 - \pi_1} = \frac{\ln \pi_1}{\pi_2 + \pi_3} = -\alpha_1 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n \quad (1)$$

$$\text{Logit}(P_{y \leq 2}) = \text{Logit} \frac{\pi_1 + \pi_2}{1 - (\pi_1 + \pi_2)} = \text{Logit} \frac{\pi_1 + \pi_2}{\pi_3} = -\alpha_2 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n \quad (2)$$

where the cumulative Logit (P) is the natural logarithm of the ratio of the probability of the first n ranks ($y \leq n$) the natural logarithm of the ratio of the sum of probabilities (cumulative probability), i.e., the natural logarithm of the ratio of the probability of occurrence of the first few ranks to the last few ranks. β_i is the regression coefficient, indicating the independent variable x_i the change in the natural logarithm of the ratio of the cumulative probabilities of the previous n ranks for each unit change, i.e., the natural logarithm of the independent variable x_i the magnitude of the effect on the first n ranks.

3.2. Questionnaire Design

The survey questionnaire consists of three parts. The first part is a statistical survey of the personal and household basic information of the real estate vegetable purchasers, including indicators such as gender, age, place of residence, education level, occupation, number of permanent family members, whether there are elderly or children living together, and annual household income, with the aim of understanding the basic situation of consumers who purchase Tianjin real estate vegetables. The second part is a survey on the purchase of Tianjin real estate vegetables by consumers, mainly including the ways of obtaining information about real estate vegetables, purchase channels, types of Tianjin real estate vegetables purchased, etc., with the aim of understanding the current basic situation of Tianjin residents' purchase of real estate vegetables. The third part is a survey on the factors affecting Tianjin residents' purchase of real estate vegetables, mainly including consumers' level of understanding of real estate vegetables, local goods awareness, the price level of Tianjin real estate vegetables, freshness, taste and flavor, quality and safety, the convenience of purchasing real estate vegetables, and the government media's promotion efforts, with the aim of exploring the reasons why Tianjin residents prefer to purchase real estate vegetables.

3.3. Data Source

This study mainly adopts an "online + offline" research method. The offline research location is selected as the early market, large market, vegetable distribution base, etc. in Tianjin where real estate vegetables are sold more, and face-to-face, one-on-one interviews are conducted. The online research mainly distributes online questionnaires in various local Tianjin groups. The "online + offline" research collected a total of 233 survey questionnaires, and after screening for completeness and logicity, 214 valid questionnaires were finally retained, with a valid questionnaire rate of 91.84%.

3.4. Variable Assignment

Before entering the questionnaire data into SPSS25.0, each variable needs to be assigned a value. In this study, the dependent variable is the proportion of real estate vegetable purchases, and the independent variables are four latent variables containing 12 observed variables of personal characteristics, psychological factors, product factors, and environmental factors. The specific assignment of each variable is shown in Table 1.

Table 1. Assignment of variables in ordered logistic regression model

latent variable	Observed variables	Variable Definition	Average value	Standard deviation
Explained variables	Y	1=proportion of real estate vegetables purchased is less than 30%, 2=proportion of real estate vegetables purchased is 30%-60%, 3=proportion of real estate vegetables purchased is more than 60%	1.78	0.688
Explanatory variables	X_i			
Personal Characteristics Factors	Age (X_1)	1=18-30 years old, 2=30-40 years old, 3=40-50 years old, 4=50-60 years old, 5=60 years old and above	3.52	1.078
	Number of permanent household members (X_2)	1=1-2 people, 2=3-4 people, 3=5-6 people, 4=more than 6people	3.03	1.045
	Annual household income (X_3)	1=less than ¥ 50,000, 2=¥ 50,000-¥ 100,000, 3=¥ 100,000-¥ 200,000, 4=¥ 200,000-¥ 300,000, 5=more than ¥ 300,000	3.09	1.116
	Whether aboriginal (X_4)	1=yes, 2=no	1.35	0.477
Psychological factors	Degree of understanding (X_5)	1=know little, 2=know some, 3=know more, 4=know very much	2.32	0.759
	Local goods awareness (X_6)	1 = not strong, 2 = not too strong, 3 = average, 4 = relatively strong, 5 = very strong	3.40	0.854
Product Factors	Price level (X_7)	1 = very low price, 2 = relatively low price, 3 = average, 4 = relatively high price, 5 = very high price	3.54	1.028
	Freshness (X_8)	1=very unfresh, 2=less fresh, 3=fair, 4=fresh, 5=very fresh	4.10	0.831
	Flavor and Taste (X_9)	1=bad, 2=not very good, 3=fair, 4=better, 5=very good	4.00	0.719
	Quality and safety (X_{10})	1=Very insecure, 2=Less secure, 3=General, 4=Safer, 5=Very secure	4.06	0.920
Environmental Factors	Convenience of purchase (X_{11})	1=very inconvenient, 2=not very convenient, 3=fair, 4=more convenient, 5=very convenient	3.19	1.082
	Degree of promotion (X_{12})	1=Very little publicity, 2=Less publicity, 3=General, 4=More publicity, 5=Very much publicity	2.81	1.005

4. Model results and analysis

4.1. Model results

The 214 valid sample data were imported into SPSS 25.0 for ordered logistic regression analysis, and the results of logistic regression model analysis of factors influencing the consumption behavior of Tianjin residents' real estate vegetables were obtained. The specific results are shown in Table 2.

Table 2. Regression results of ordered logistic model

		Regression coefficient	Standard Error	Wald Value	OR value	OR interval	p-value
Dependent variable threshold	1	17.195	2.264	57.678			0.000
	2	21.922	2.561	73.269			0.000
Independent variable Characteristics Factors	Age	-0.392	0.1916	4.187	0.676**	0.464-0.984	0.041
	Number of permanent household members	0.314	0.2490	1.592	1.369	0.840-2.231	0.207
	Annual household income	-0.230	0.2045	1.265	0.795	0.532-1.186	0.261
	[whether aboriginal=1]	-0.701	.3820	3.371	0.496*	0.235-1.048	0.066
	[whether aboriginal=2]	0*	.	.	1	.	.
	Level of understanding	1.522	0.2718	31.351	4.582***	2.689-7.806	0.000
	Local goods awareness	0.851	0.2470	11.855	2.341***	1.443-3.799	0.001
	Price Level	-0.172	0.1923	0.796	0.842	0.578-1.228	0.372
	Freshness	2.016	0.3127	41.578	7.509***	4.068-13.858	0.000
	Taste and Flavor	1.161	0.2810	17.078	3.195***	1.842-5.542	0.000
Product Factors	Quality and Safety	0.087	0.2046	0.181	1.091	0.731-1.629	0.671
	Convenience of purchase	0.696	0.1976	12.416	2.006***	1.362-2.955	0.000
	Degree of publicity and promotion	-0.491	0.2139	5.277	0.612**	0.402-0.930	0.022
Environmental Factors							

Note: ***, **, and * represent estimates significant at the 1%, 5%, and 10% statistical levels, respectively

4.2. Analysis of results

Table 2 presents the ordered logistic regression results for the factors influencing the purchase behavior of residential vegetables in Tianjin. The p-value indicates the significance between the dependent variable and independent variables, with a p-value less than 0.05 indicating significance. The odds ratio (OR) is also known as the exponential value of the regression coefficient (exp(B)), representing the extent to which a unit change in the independent variable affects the dependent variable.

(1) Personal characteristic factors. The age factor has a p-value of 0.041<0.05 and an OR value of 0.676, indicating that at a 95% significance level, age is an important influencing factor for Tianjin residents when purchasing residential vegetables. Moreover, as the age of Tianjin residents increases, the proportion of their daily purchase of residential vegetables also increases. The factor of being a native resident has a p-value of 0.066 and an OR value of 0.496, indicating that at a 90% significance level, being a native resident is an important influencing factor for Tianjin residents when purchasing residential vegetables, with native residents purchasing residential vegetables at 0.496 times the rate of non-native residents. Family annual income has little effect on the proportion of Tianjin residents' purchase of residential vegetables. The number of permanent residents in the household has little effect on the purchase of residential vegetables.

(2) Psychological factors. The degree of understanding

factor had a p-value of 0.000<0.01 and an odds ratio (OR) of 4.582, indicating that at a significance level of 99%, the degree of understanding is an important factor influencing the purchase behavior of Tianjin residents towards locally produced vegetables. The local product awareness factor had a p-value of 0.001<0.01 and an OR of 2.341, indicating that at a significance level of 99%, local product awareness is an important factor influencing the purchase behavior of Tianjin residents towards locally produced vegetables.

(3) Product factors. The freshness factor had a p-value of 0.000<0.01 and an OR of 7.509, indicating that at a significance level of 99%, the freshness of locally produced vegetables significantly influences the purchase quantity. The taste and flavor factor had a p-value of 0.001<0.01 and an OR of 3.195, indicating that at a significance level of 99%, the taste and flavor of locally produced vegetables significantly influence the purchase quantity. The price level factor had a p-value of 0.372, and price changes have little effect on the purchase quantity of locally produced vegetables among residents. The quality and safety factor had a p-value of 0.671, and the quality and safety factor has little effect on the purchase quantity of locally produced vegetables among residents.

(4) Environmental factors. The convenience factor of purchase had a p-value of 0.000<0.01 and an OR of 2.006, indicating that at a significance level of 99%, the convenience of purchasing locally produced vegetables has a significant impact on residents' purchase behavior. The promotion and advertising factor had a p-value of

0.022<0.05 and an OR of 0.612, indicating that at a significance level of 95%, government media promotion and advertising of locally produced vegetables have a significant impact on residents' purchase behavior.

5. Conclusion

Tianjin residents attach great importance to vegetable consumption, and the vegetable industry is an important support for promoting the transformation of Tianjin's modern urban agriculture. Based on the theories of consumer behavior, SOR theory, and social perception theory, this study learned from the research results of domestic and foreign scholars on the influencing factors of consumer behavior, combined with on-site investigations, used economic theory and empirical analysis methods to deeply analyze the influencing factors of Tianjin residents' consumption behavior of local vegetables. It was found that residents' age, whether they have children, income level, and education level have a significant impact on their consumption behavior. Therefore, it is necessary to formulate targeted policies and measures to promote the sustainable development of the local vegetable industry in Tianjin.

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