

Research on Consumer Behavior Model of Fresh Agricultural Products Under Online to Offline E-commerce Mode

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Abstract: With the continuous development of e-commerce, the e-commerce model of fresh agricultural products gradually integrates from online to offline. O2O (combination of online and offline) is a new e-commerce model that has emerged rapidly in recent years. Consumers can search for nearby businesses by using the smart phone positioning function, place orders on the mobile phone, and make mobile payments, so as to have a consumer experience in the business. This model can greatly shorten consumers' purchase path and decision-making time, and provide consumers with a better shopping experience. Therefore, based on the analysis of the development status of O2O e-commerce model for fresh agricultural products, this paper constructs a relevant theoretical model based on consumer behavior theory and the characteristics of O2O e-commerce model for fresh agricultural products. Through analysis, it is concluded that consumer behavior is affected by their purchase intention, which is also affected by perceived ease of use, perceived usefulness, perceived risk, platform trust. The impact of personal innovation and the accessibility of offline delivery, etc., and based on the data of online and offline questionnaires as the analysis sample, SPSS and AMOS software were used to analyze and verify the proposed assumptions, so as to analyze the key influencing factors of consumer behavior under the O2O e-commerce environment of fresh agricultural products.

Keywords: Fresh Agricultural Products, Online to Offline E-commerce, Consumer Behavior, Model

1. Introduction

In recent years, the online to offline (O2O) e-commerce model has gradually entered the public's field of vision and has developed rapidly. After being widely used in life services such as food delivery, retail, and transportation, various fresh O2O platforms known as the new blue ocean have also appear [1-3]. Meanwhile, it integrates online and offline, realizes the complementarity of advantages and disadvantages, and provides customers with more choices; at the same time, in recent years, the academic and practical circles have been diligently exploring, compared with the traditional shopping mode, in this Under this new

consumption model, will consumer behavior be changed? What are the factors that influence consumer behavior? In addition, with the continuous development and upgrading of the consumption concept in the field of fresh agricultural products, the opportunities and challenges of O2O e-commerce in the field of fresh agricultural products are also constantly developing [4-6]. It can not only organically connect the Internet with consumers, but also connect consumers Linking with offline experience allows customers to better understand fresh agricultural products, thereby enhancing consumers' trust in the safety of fresh agricultural

products, thereby enhancing the market competitiveness of fresh agricultural products under the O2O e-commerce model. In view of this, it is particularly important to study the influencing factors of consumer behavior of fresh agricultural products under the O2O e-commerce model. Therefore, based on the analysis of the development status of the O2O e-commerce model of consumers' fresh agricultural products, this paper will build a relevant theoretical model to analyze the impact of consumer behavior [7-9]. Therefore, based on the analysis samples, the key influencing factors of consumer behavior will be analyzed [10].

2. Analysis of the Influencing Factors of Consumer Behavior Under the O2O E-commerce Mode

2.1. Construction of Research Model and Formation of Scale

Combining the development of fresh agricultural products market and the current situation of consumer behavior in my

country, this paper draws on the Technology Acceptance Model (TAM) proposed by American scholar Davis and Davis & Venkatesh to improve the TAM model. On the basis of integrating and expanding existing research models On the basis of six factors, such as perceived usefulness, perceived ease of use, perceived risk, personal innovation, trust in the platform, and accessibility of offline delivery to study the consumer behavior of fresh agricultural products under the O2O e-commerce model Impact. The data in this paper comes from questionnaires filled in by consumers, including 8 variables and 36 items, using Likert 5-point scale, based on the existing mature scale, combined with the specific practice of the O2O e-commerce model of fresh agricultural products, and finally Determine the dimensions of the measurement [11-13]. In terms of control variables, consumer purchase intention and consumer behavior and their influencing factors under the O2O e-commerce model of fresh agricultural products will be affected by demographic characteristics such as consumers' gender, age, education level, and income level [14, 15]. Therefore, the model framework shown in Figure 1 below is established:

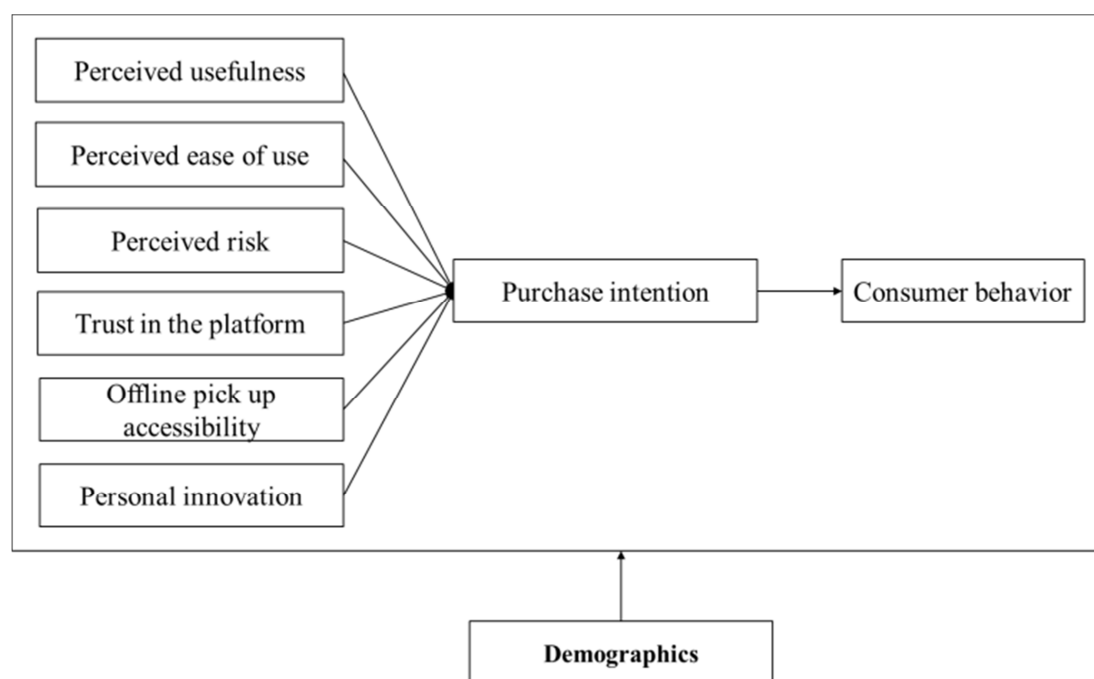


Figure 1. Research framework of the influencing factors of consumer behavior under the O2O e-commerce model of fresh agricultural products.

According to the analysis of the pre-investigation data, 2 items with low reliability were eliminated, and the final formal scale was formed. The measurement items of each variable are shown in Table 1.

Table 1. Demographic characteristics of formal samples (N=363).

Variable	Numbering	Item
Perceived usefulness	q1	O2O e-commerce platform has a complete range of fresh agricultural products
	q2	O2O e-commerce platform can save time when purchasing fresh agricultural products
	q3	O2O e-commerce platform can improve my work and life efficiency by purchasing fresh agricultural products
	q4	The O2O platform is convenient to purchase fresh agricultural products
Perceived ease of use	q5	It is very easy to obtain products and services on the O2O platform
	q6	The payment method of O2O platform is easy to use
	q7	In general, it is easy for me to buy fresh agricultural products on the O2O platform

Variable	Numbering	Item
Perceived risk	q8	I'm worried that I can't get fresh agricultural products in time after online payment
	q9	I'm worried that I will receive the wrong fresh agricultural products when I buy fresh agricultural products on the O2O platform
	q10	I'm worried that the quality of fresh agricultural products cannot be guaranteed
	q11	I'm worried that the after-sales service is not guaranteed
	q12	I'm worried that it will cost more to buy fresh agricultural products on the O2O platform
	q13	I'm worried that it will take more time to buy fresh agricultural products on the O2O platform
	q14	When purchasing fresh agricultural products on O2O platform, I am worried about personal information security
	q15	When purchasing fresh agricultural products on O2O platform, I am worried about personal property safety
Trust in the platform	q16	I believe that O2O platform merchants of fresh agricultural products are trustworthy
	q17	I believe that O2O platform merchants will consider the interests of consumers
	q18	I believe that O2O platform merchants will abide by the commitments of transactions and services
	q19	I believe that O2O platform merchants will not infringe on personal privacy
	q20	I believe that O2O platform merchants can meet my needs
	q21	I believe that the commitment of O2O platform merchants is trustworthy
	q22	In a word, I trust merchants who use O2O platform mode
	q23	There are many self-promotion points offline
Offline pickup accessibility	q24	It is convenient for me to pick up goods online and offline
	q25	Timely distribution of offline fresh agricultural products
	q26	The offline distribution of fresh agricultural products is arranged reasonably
Personal innovation	q28	Among the people around me, I tend to try new technologies first
	q29	I won't hesitate to try a new product
	q30	I like to experience new information technology
	q31	If I have the opportunity to contact the O2O platform, I will use the platform to buy fresh agricultural products
Purchase intention	q32	I plan to use O2O platform to buy fresh agricultural products in the near future
	q33	I will give priority to the O2O e-commerce model as the preferred way to purchase fresh agricultural products
	q34	I often use O2O platform to buy fresh agricultural products
Consumer behavior	q35	I will recommend others to buy fresh agricultural products in this way
	q36	I will continue to use O2O platform to buy fresh agricultural products in the future

2.2. Sample Collection and Data Statistics

After the formal questionnaire is formed, start the formal survey. The objects of the formal survey are the same as those of the pre survey, that is, consumers who have used the O2O e-commerce platform to purchase fresh agricultural products. The survey method is mainly through on-site distribution and online survey. The on-site distribution is

mainly one-to-one survey at the O2O pick-up counter set point and O2O platform experience store. The questionnaire is mainly distributed through WeChat, QQ, email and questionnaire stars. A total of 392 formal questionnaires were issued, 385 were returned, and 363 were valid, with an effective rate of 92.60%.

The demographic characteristics of the formal sample are as follows (Table 2):

Table 2. Demographic characteristics of formal samples (N=363).

Demographic characteristics	classification	frequency	proportion
Gender	Male	148	40.77%
	Female	215	59.23%
Age	Under 25 years old	35	9.64%
	26-35 years old	226	62.26%
	36-45 years old	77	21.21%
	46-55years old	23	6.34%
	Over 55 years old	2	0.55%
	Junior high school and below	2	0.55%
	High school/technical secondary school/vocational high school	19	5.23%
Education	Undergraduate/junior college	315	86.78%
	Postgraduate or above	27	7.44%
	Government agencies/institutions	48	13.22%
	Enterprise	237	65.29%
Occupation	Scientific researchers/teachers	34	9.36%
	Student	16	4.41%
	Self-employed person	16	4.41%
	Retired personnel	1	0.28%
	Housewife	3	0.83%
	Professional	8	2.2%
	Others	0	0%

Demographic characteristics	classification	frequency	proportion
Family income	<10 ten thousand	42	11.57%
	10-20 ten thousand	219	60.33%
	20-50 ten thousand	97	26.72%
	More than 50 ten thousand	5	1.38%
Method of purchasing fresh agricultural products (multiple choices)	supermarket	342	94.21%
	market	255	70.25%
	online shopping	300	82.64%
	other	8	2.2%
Online channels for purchasing fresh agricultural products (multiple choices)	Alibaba, JD, Amazon, Suning, No. 1 Store and other integrated e-commerce platforms	317	87.33%
	Vertical e-commerce platforms such as COFCO Womai, Feiniu.com, China Resources	223	61.43%
	Wanjia, Tiantian Orchard, Original Life, Shunfeng Optimality	84	23.14%
	WeChat, microblog and other social platforms	67	18.46%
Times of purchasing fresh agricultural products online every month	Mobile App	11	3.03%
	0	171	47.11%
	1-2	145	39.94%
	3-5	36	9.92%
Types of fresh agricultural products purchased online (multiple choices)	>5	297	81.82%
	Fruits and vegetables	250	68.87%
	Eggs and milk	216	59.5%
	Meat and aquatic products	59	16.25%
	Flowers and plants	231	63.64%
	Grains	107	29.48%
	Fast food products and others		

2.3. Sample Collection and Data Statistics

The research model structural equation model is divided into: measurement model and structural model.

(1) Measurement model: relationship between indicators and latent variables

$$x = \lambda x \zeta + \delta$$

$$y = \lambda y \eta + \varepsilon$$

X and y are exogenous and endogenous indicators; δ , ε is the error in X and Y measurement; λx is the index of x and ξ . The relationship between latent variables; λy is the index y and η The relationship between latent variables;

(2) Structural model: relationship between latent variables

$$\eta = B\eta + T\xi + \zeta$$

Among η it is an endogenous (dependent) latent variable; ξ It is an exogenous (autogenous) latent variable;

B is the relationship between endogenous latent variables; R is the influence of exogenous variables on endogenous variables; ζ , it is the part that cannot be explained in the mode;

This paper first uses the statistical software SPSS26.0 to analyze the reliability and validity of the sample data, and then uses AMOS 17.0 to test the structural equation model established to identify the influencing factors of consumer behavior of fresh agricultural products under the O2O e-commerce model. The results are shown in Table 3 below. The reliability coefficients of the eight potential

variables of consumer purchase intention, consumer behavior, perceived usefulness, perceived ease of use, perceived risk, personal innovation, trust in the platform and accessibility of offline picking under the O2O e-commerce model for fresh agricultural products are all higher than 0.70, indicating that the design of this questionnaire is reasonable and reliable, and the questionnaire has good internal consistency (Table 3).

Table 3. Reliability Test Criteria.

	≥ 0.7	[0.35, 0.7)	< 0.35
Reliability level	High	Credible	Low

From Table 4, it can be seen that the KMO and Bartlett spherical test values of the questionnaire population and each variable are in line with the standard. The KMO value of the questionnaire population is 0.945, reaching a very suitable level. The scale is suitable for factor analysis, while the significance level of Bartley spherical statistics is less than $0.000 < 0.01$, reaching a significant level, indicating that there are common factors among the scales. Therefore, the questionnaire is suitable for factor analysis.

Table 4. KMO measure and Bartlett sphericity test results of the whole questionnaire.

Kaiser Meyer Olkin measurement of sampling adequacy		0.945
Bartlett's Sphericity Test	Chi square test value	6048.365
	Degree of freedom df	595
	Significance level Sig	0.000

Table 5. Interpreted population variance.

Composition	Initial characteristic value			Extract Square Sum Load			Rotation sum of squares loading		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	7.509	21.454	21.454	7.509	21.454	21.454	4.926	14.075	14.075
2	4.155	11.871	33.325	4.155	11.871	33.325	4.836	13.819	27.894
3	3.482	9.949	43.274	3.482	9.949	43.274	3.661	10.460	38.354
4	2.780	7.943	51.218	2.780	7.943	51.218	3.179	9.084	47.438
5	2.338	6.680	57.897	2.338	6.680	57.897	2.539	7.255	54.693
6	2.221	6.345	64.243	2.221	6.345	64.243	2.431	6.945	61.638
7	1.600	4.570	68.813	1.600	4.570	68.813	2.038	5.822	67.460
8	1.284	3.669	72.482	1.284	3.669	72.482	1.758	5.022	72.482

Extraction method: principal component analysis.

Table 6. Factor matrix after the rotation of the influencing factors scale of consumer behavior under O2O e-commerce model.

	Composition							
	1	2	3	4	5	6	7	8
q1	0.151	-0.123	0.143	-0.049	0.103	0.798	-0.013	-0.033
q2	0.116	0.021	-0.130	0.015	0.033	0.823	0.086	0.000
q3	0.057	0.027	-0.078	-0.119	-0.024	0.854	-0.009	-0.005
q4	0.023	0.140	0.858	0.042	-0.033	0.080	-0.013	0.051
q5	0.079	-0.049	0.951	0.066	0.017	-0.023	0.019	0.037
q6	-0.003	-0.079	0.925	-0.046	0.027	-0.075	0.004	0.023
q7	0.149	-0.048	0.921	0.064	0.061	-0.074	-0.059	-0.019
q8	0.803	-0.091	0.155	-0.104	-0.004	-0.003	-0.027	0.114
q9	0.870	0.020	0.014	-0.187	0.027	0.163	0.159	0.110
q10	0.556	0.146	0.255	-0.052	-0.218	0.209	-0.218	-0.292
q11	0.693	0.003	0.121	-0.213	-0.086	-0.098	-0.096	-0.065
q12	0.706	-0.295	-0.085	-0.187	-0.072	0.117	-0.116	0.001
q13	0.669	-0.148	0.039	-0.205	0.092	0.172	-0.011	0.048
q14	0.805	-0.226	-0.063	0.069	0.009	0.055	0.000	-0.187
q15	0.873	-0.143	0.014	0.080	-0.004	0.029	-0.004	-0.001
q16	-0.169	0.773	-0.017	-0.023	0.004	-0.036	-0.164	0.110
q17	-0.106	0.704	-0.002	0.297	0.215	-0.170	-0.048	0.138
q18	0.019	0.818	0.005	0.096	-0.068	0.091	-0.034	0.084
q19	-0.150	0.543	-0.180	0.242	0.230	-0.024	-0.193	0.203
q20	-0.091	0.837	0.121	0.168	0.014	-0.082	0.215	-0.091
q21	-0.079	0.795	0.073	-0.008	-0.054	0.059	-0.096	0.054
q22	-0.231	0.763	-0.167	0.120	0.078	-0.021	-0.088	0.162
q23	-0.101	0.117	0.035	0.858	-0.181	-0.109	0.010	0.082
q24	-0.234	0.142	0.014	0.824	0.166	0.084	0.095	0.056
q25	-0.050	0.177	0.121	0.795	-0.181	-0.175	0.006	0.067
q26	-0.227	0.141	-0.027	0.806	0.241	0.014	0.031	0.067
q28	-0.056	-0.040	0.034	0.016	0.855	-0.012	0.027	0.070
q29	-0.047	0.186	-0.094	0.000	0.811	-0.032	-0.233	-0.122
q30	0.042	0.036	0.124	-0.009	0.846	0.162	-0.137	-0.062
q31	-0.080	0.023	-0.095	-0.012	-0.057	0.172	0.844	-0.060
q32	-0.059	-0.035	0.115	0.091	-0.155	0.011	0.708	0.151
q33	0.009	-0.313	-0.084	0.027	-0.081	-0.129	0.695	-0.020
q34	-0.141	0.435	0.000	0.226	0.145	-0.238	-0.016	0.549
q35	-0.110	0.431	0.027	0.049	-0.164	0.115	-0.075	0.688
q36	0.118	0.088	0.077	0.099	-0.046	-0.015	0.117	0.799

Extraction method: main component. Rotation method: orthogonal rotation method with Kaiser standardization.

Through factor rotation analysis by maximum variance method, 8 factors were obtained, which can explain 72.482% of the total variance variance cumulatively, as shown in Table 6. The final result of the factor load coefficient is shown in Table 6. The factor load of each item is greater than 0.5, and the test results all meet the corresponding standards, indicating that the scale has good structural validity and can be used for further empirical analysis and hypothesis testing.

2.4. Goodness of Fit Test of Structural Equation Model

Based on the above questionnaire design and collected data, as well as the above test results on the reliability and validity of the questionnaire, it is proved that it is suitable for the structural equation model test, and then the structural equation model can be tested.

Table 7. Model goodness of fit test results.

Statistical inspection quantity	Fitting evaluation criteria	Inspection results	Fit condition
GFI	>0.9	0.930	good
RMSEA	<0.05 excellent; <0.08 good	0.077	good
CFI	>0.9	0.950	good
NFI	>0.9	0.912	good
TLI	>0.9	0.939	good
ILI	>0.8	0.806	good
CMIN/DF	<3	2.104	good

Use AMOS 17.0 software to test the structural equation conceptual model of the initial design. See Table 7 for the goodness of fit test results of the structural equation model:

It can be seen from Table 7 that all fitting indicators fall within the standard range. The most basic criteria for evaluating a structural equation model are $GFI \geq 0.80$ and $RMSEA \leq 0.08$. In this paper, these two index values are met at the same time. This proves that the theoretical model built

in this paper has a high degree of fitting with the actual data, and further proves that the results of data analysis using the model built in this paper are acceptable.

After the goodness of fit test of the model is passed, we also use Mplus to test the model and hypothesis proposed above, and obtain the standard path coefficient and significance test among variables. The results are shown in Table 8.

Table 8. Structural equation model standard path analysis and inspection results.

Relationship	Path coefficient	Sig.
Purchase intention	Perceived usefulness	0.463
Purchase intention	Perceived ease of use	0.274
Purchase intention	Perceived risk	-0.239
Purchase intention	Trust in the platform	0.050
Purchase intention	Offline pickup accessibility	0.249
Purchase intention	Personal innovation	0.344
Consumer behavior	Purchase intention	0.759

3. Empirical Results Analysis

Based on the integration of classical technology acceptance model, extended technology acceptance model, technology acceptance and adoption model and other related theoretical models, combined with relevant literature and the specific practice of fresh agricultural products, this paper constructs a research paradigm suitable for this paper, collects data through questionnaires, A total of 363 valid questionnaires were recovered, and the reliability and validity of the questionnaires were tested by using the structural equation model. Through the test of the goodness of fit of the model and the path analysis, it was verified that the overall effect of the model in this paper was good. The empirical analysis based on the collected data is as follows:

From the running results of the model, it can be concluded that the coefficient between consumer behavior and consumer purchase intention is the highest, consumer behavior is affected by consumer purchase intention, and consumer purchase intention is further affected by perceived usefulness, perceived ease of use, and perceived ease of use.

Perceived usefulness in the O2O e-commerce model affects consumers' purchase intention, which in turn has an impact on consumer behavior.

In the O2O e-commerce model, perceived ease of use has a very significant impact on consumers' purchase intention, which in turn affects consumer behavior.

Under the O2O e-commerce model, perceived risk has a

very significant impact on consumers' purchase intention, which in turn affects consumer behavior.

Under the O2O e-commerce model, trust in the platform is positively correlated with consumers' purchase intention, but it has not passed the significance test, so consumers' trust in the platform has nothing to do with consumers' purchase intention.

The accessibility of O2O e-commerce offline pickup has a very significant impact on consumers' willingness to purchase, which in turn affects consumer behavior.

Under the O2O e-commerce model, personal innovation has a very significant impact on consumers' purchase intention, which in turn affects consumer behavior.

Different demographic characteristics will affect consumers' purchase intention, consumer behavior and various influencing factors under the O2O e-commerce model.

4. Conclusion

Through the structural equation model, this paper empirically analyzes the influencing mechanism of consumers' behavior of purchasing fresh agricultural products using the O2O e-commerce platform. Perceived usefulness, perceived ease of use, personal innovation, and offline pickup accessibility are positively correlated with consumers' willingness to use, while perceived risk is negatively correlated with consumers' willingness to use, and consumers' purchase willingness is in the perceived usefulness. fully mediate between it and consumer behavior. Age, gender, education level and income level will have a

certain impact on one or several factors of consumers' perceived usefulness, personal innovation, perceived risk, consumers' purchasing intention, and consumer behavior. Future research will focus on behavior modes of more specific consumers under O2O e-commerce.

Author Contributions

The Manuscript was written through contributions of all authors. All authors have given approval to the final version of the manuscript.

Conflicts of Interest

The authors declare that they have no competing interests.

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