Influencing Factors Analysis on E-business Sales Model Adoption by Vegetable Farmers of China under Different Sales Environment

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Abstract

Based on the data collected from the questionnaire, this paper analyzes the influencing factors of the adoption of e-business sales model under different sales environment to the farmers. Through data analysis, we find that E-business price recognition, annual income, sales difficulty status, Information access level, market distance, government support policy, and sales channel level were the key factors of impacting the adoption of e-business sales model to the vegetable farmers in Beijing metropolitan area, China.)

Keywords

E-Business, Agricultural, Sale Model.

1. Introduction

In China, the e-business sale model is a new distribution way for the vegetable farmer. Few farmers had the experience of selling vegetable on websites, though the consumers in the cities have accept the life style of buying vegetable from the e-business websites because it is a much convenient shopping way. With the development of mobile Internet, the e-business developed fast in modern society [1], more and more vegetable farmers know the e-business and want to explore a new way to sell more vegetable and earn more money, but there are many factors to impede the farmers to sell vegetable on e-business websites, such as the skill of e-business, the knowledge of marketing strategy, the difficult of e-business logistics arrangement, and other reasons. As people's understanding of e-business is different, the adoption of e-business will not be the same [2]. What are the factors influence the e-business sale model adoption to the vegetable farmers? And how the factors affect them? We will try to give our finds and explain it.

The traditional vegetable distribution channels for the farmers in China are always concentrated in famers' market, super market, sales middleman, farmer co-operative, vegetable merchant, and food-processing plant. It is a new popular way of selling vegetable on e-business websites for the famers because it is easier and faster for the farmers to find the buyers and complete the transaction efficient. The price of the same vegetable in different distribution channels is not always the same, as to the vegetable farmers, the more distribution channels they have, the more market information they will know and the information can help them to achieve a satisfying price in transaction.

However, each kind of sales channels corresponding to the transaction costs are different, which led to farmers in the choice of sale channels, it is necessary to consider the vegetable price but also consider the transaction costs in different distribution environment. The famers in different distribution environment need to compare revenue and cost of distribution ways, and select the optimal distribution way.

2. Model and hypotheses

Formula (1) is the calculation formula of farmers' household sales income. Ii is the income of the i-th farmer selling vegetables, x_{ij} said the farmer i uses the j-type vegetable sales way, η_j said the probability of choosing the j-type sales way, p_{ij} said the vegetables sales price of j-type sales way, λ_j indicating the ratio of the transaction cost of one vegetable unit in the case of the j-th sales method to the vegetable production cost Cb.

$$I_i = \sum_{j=1}^{m} x_{ij} \cdot \left[\eta_j \cdot (p_{ij} - C_b \cdot \lambda_j) - C_b \right] \quad i = 1, 2, \cdots, n; \; j = 1, 2, \cdots, m \tag{1}$$

From the formula(1), we can know that increasing the unit price of vegetables, reducing the cost of planting vegetables per unit C_b or reduce the transaction costs of unit vegetables can improve the sales income of farmers Ii.

As this article focuses on the study of the intrinsic link between e-business sales model adoption and the sales environment, we assume the unit of vegetable cultivation costs C_b is a fixed value, and he transaction costs vary according to the sales way.

The process of selecting the sales way is the process of maximizing the sales revenue. Therefore, the farmer's sales way selection model is below:

$$I_i = \max \sum_{j=1}^{m} x_{ij} \cdot \left[\eta_j \cdot (p_{ij} - C_b \cdot \lambda_j) - C_b \right] i = 1, 2, \cdots, n; \; j = 1, 2, \cdots, m \tag{2}$$

Based on the model above, we suppose e-business sales model can help farmers understand the market demand and price information better, and have a positive role in promoting the sale of agricultural products, improve farmer income, solve sales difficulties. In the case of external conditions appropriate, farmers will use e-commerce model to sell vegetables.

3. Research Method

3.1 Data

In 2015, we collected data from production and operation survey of vegetable farmers in Beijing metropolitan area, China. More than 400 questionnaires are collected by investigators from China Agricultural University and Beijing Bureau of Agriculture. After checking, there are 396 questionnaires to meet the requirements of research. In the questionnaire, some of the content of the survey investigates the e-business sales model awareness and application of the farmers.

3.2 Method

There are two state of e-business sales model adoption for the farmers, which is adoption and non-adoption. Due to the discrete characteristics of the variable values, we chose select the binary selection Logit model as the main data processing method. Formula (3) describe the principles of data processing.

$$P_i = F(\alpha + \sum_{j=1}^{m} C_i x_{ij}) = 1 / \left\{ 1 + \exp\left[-(\alpha + \sum_{j=1}^{m} C_i x_{ij}) \right] \right\}, i = 1, 2, \ldots, n \tag{3}$$

Pi is the probability of selecting the e-business sales model for the farmer, m is the number of the independent variables, x_{ij} represents the jth factor (explanatory variable) that affects the farmer's e-business sales model, C0 is the constant, C_j (j = 1, 2 , ..., m) is the regression coefficient of the independent variable, obtained by the maximum likelihood estimation method.

3.3 Variable description

Set eb as the dependent variable, if the farmer has e-business sales experience, eb=1, otherwise, eb = 0.

Explanatory variables in the model include: plant experience (N), education level (E), market distance (D), E - business price awareness (Y), government Support Police (F), income (I), join cooperatives (J), the sales channel level (W), and sales difficulties status (Z). The description of variables is in table 1 below.

Table 1. Variable Description

Variables	Variable Description
plant experience (N)	The number of years for farmers to plant vegetables.
educational level (E)	The education level is divided into six levels, 1: "not gone to school", 2: "primary", 3: "junior high school", 4: "high school ", 5: "college", 6: "undergraduate and above".
market distance (D)	Farmer to the nearest market distance, in kilometers as a unit
e-business price recognition (Y)	If the farmer believe the sale price of vegetable in e-business model is higher than or equal to which in traditional sale model, then y=1, otherwise y=0
government support policy (F)	If the farmer believe his or her sale activities is supported by government policy, then f=1, otherwise f=0
income (I)	Farmers' annual sales of vegetables
join cooperatives (H)	If the farmer join cooperative, then j=1, otherwise j=0.
information access level (J)	If the farmer a, then j=1, otherwise j=0.
sales channel level (W)	If the farmer's sales channel is greater than 2, then w=1, otherwise w=0.
sales difficulty status (Z)	If the farmer has sale difficulty, then z=1, otherwise z=0.

The grow experience is a variable that reflects the accumulation of professional knowledge of farmers. It is generally believed that the longer the planting time is, the more rich the experience. In this study, we use the farmer's planting time as a variable to reflect the cultivation experience.

The educational level reflects the knowledge accumulation of the farmers. The accumulation of knowledge may affect the judgment and the value of the e-business sales model and whether or not to adopt the e- business sales model.

The distance between the farmer and the nearest farmer's market can reflect the convenience of the traditional face-to-face transaction of the farmer and the cost in the transportation and logistics. It is an important parameter to evaluate the transaction cost of the farmer. We believe that transaction costs may be one of the factors that affect farmers' adoption of different sales models.

E-business price recognition refers to the recognition made by farmers who compare the price of vegetable in e-business websites and the price of the same vegetable in traditional distribution way. If the price of e-business is higher than traditional distribution way, the farmer will intend to adopt the e-business sale model.

Government support policy refers to the government to provide subsidies, tax relief and other policies for farmers who adopt certain sale model. Government support policies can guide farmers to choose a sales model.

Income refers to the annual income of farmers selling vegetables.

Join cooperatives refers to the status of farmer in joining cooperatives. Cooperatives are an important form of agricultural industry in China. Cooperatives numbers are able to get help and support from cooperatives in terms of capital, technology and sales model selection.

Information access level refers to the frequent degree of communication or consultation between farmers and other peers. More opportunities for communication can help farmers to acquire more

information sources and gain more experience and knowledge. It is also possible for farmers to be affected by other farmers, while the adoption of e-business sales model.

Sales channel level refers to the number of channels which farmers have at present. Farmers have more sales channels, the higher the level.

Sales difficulty status refers to the farmers in the sale of vegetables, whether there is sales difficulty. If there is difficulty in sales, the farmer's sales difficulty status is 1, otherwise, 0.

4. Measurement

Table 2 reports the descriptive statistics of the variables mentioned in table 1.

Table 2. Measurement of Variables

Variables	Mean	S.D	Min	Max
e-business status	0.06	.244	0	1
plant experience (N)	13.02	8.392	1	39
educational level (E)	3.14	.601	1	6
market distance (D)	5.67	3.769	0	20
e-business price recognition (Y)	0.25	0.432	0	1
government support policy (F)	0.39	0.489	0	1
income (I)	67843.23	51503.426	5000	500000
join cooperatives (H)	0.55	0.499	0	1
information access level (J)	0.33	0.470	0	1
sales channel level (W)	0.46	0.499	0	1
sales difficulty status (Z)	0.49	0.501	0	1

Table 3. Logisitic regression results

Variables	Coefficient	Prob.
constant C	-7.970989***	0.0000
plant experience (N)	0.001309	0.9660
educational level (E)	0.624684	0.1111
market distance (D)	-0.117678*	0.0992
e-business price recognition (Y)	3.464016***	0.0000
government support policy (F)	-1.074718*	0.0609
income (I)	1.64E-05***	0.0041
join cooperatives (H)	0.005588	0.9933
information access level (J)	1.462549**	0.0228
sales channel level (W)	-0.902284*	0.0982
sales difficulty status (Z)	1.794479***	0.0051
Total OBS	396	
S.E. of regression	0.192797	
LR statistic	78.56414	

*** p≦10%, * *P≦5%, * p≦1%

The data in table3 is the result of regression analysis in binary Logit selection model calculated by SPSS software. "E-business price recognition", "income" and "sales difficulty status" were tested at

1% of the statistical level. “Information access level” was tested at 5% of the statistical level. “Market distance”, “government support policy”, “sales channel level” were tested at 10% of the statistical level. “E-business price recognition”, “income”, “sales difficulty status”, ”information access level” impact the adoption of e-business sales model positively, “market distance” and “government support policy” impact the adoption of e-business sales model negatively.

5. Analysis and Findings

“E-business price recognition” is a significant factor, and for the positive effect. This shows that if farmers through their own practice or experience that through the e-business model of the price of vegetables than the traditional transaction price higher, then the farmers choose the greater the possibility of e-business sales model.

“Income” is a significant factor, and for the negative effect. This shows that the higher the farmer's income, the greater the possibility of adopting the e-business sales model, the reason is that farmers with high income in the resource utilization capacity, management and management ability is strong, dare to try e-business sales model.

“Information access level” is a significant factor, and for the positive effect. It means farmers and peers exchanges more, the more likely it is to adopt e-business sales model.

“Sales difficulty status” is a significant factor, and for the positive effect. In the case of poor sales of vegetables, farmers choose to increase the possibility of e-business sales model, the reasons are mostly due to difficulties in selling vegetables to force farmers to have to adopt e-business sales model to find sales opportunities.

“Market distance” is a significant factor, and for the negative effect. The distance between farmer’s location and the resent market is an important indicator of the cost of transaction. The farther away, the greater the cost of transport, the unit logistics costs higher. Excessive logistics costs will inhibit farmers from adopting e-business sales model.

“Sales channel level” is the last significant factor, and for the negative effect. If farmers have a variety of sales channels, their willingness in adopting e-business sales model will be reduced.

6. Conclusion

Through data analysis, we find that E-business price recognition, annual income, sales difficulty status, Information access level, market distance, government support policy, and sales channel level were the key factors of impacting the adoption of e-business sales model to the vegetable farmers in Beijing metropolitan area, China.

E-business sales model is conducive to reducing market information asymmetry, so that farmers get more market demand information and price information. In reducing the difficulty of sales of agricultural products at the same time, the farmers’ production decision will be more accurate. Because of the difference on the selling habit and the market environment of the farmer, the influencing factors of the adoption of the e-business sales model are different, and the analysis of these influencing factors can provide reference for the government's policy formulation.

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