

Research Report: Factors Affecting Sales of Selected Agricultural Products in Network Marketing

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Abstract

The goal of this research was to investigate factors affecting the purchase of selected agricultural products, including honey, rice, and tea, through network marketing in the city of Mashhad, Iran, in 2020. The results of a multinomial logit model showed that price of the product, product brand recognition, gender, age, and household income had a significant effect on the probability of buying selected agricultural products through network marketing. We conclude that offering lower prices, offering products with brand recognition and consumer loyalty, and distribution of products in network marketing with a focus on economic and demographic characteristics of customers incentivize buying from network marketing.

Keywords: network marketing, sales, marketing margins, multinomial Logit, selected agricultural products

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Introduction

Network marketing is a direct person-to-person selling method in which sellers work independently to promote products and services, with customers playing the role of intermediaries. With the rapid growth of the internet, more consumers choose to shop online (Rai, 2021). Agricultural product e-commerce has resulted in more consumers relying on e-commerce platforms to buy agricultural products (Tzeng et al., 2021). The rapid growth of e-commerce and the development of online shopping has had a great impact on traditional business activities (Xiang, 2019) and has changed consumers' lifestyles (Guo et al., 2022). Progress in science and technology has also changed human food consumption habits (Saghaian and Mohammadi, 2018). In the era of the internet and e-commerce, it is beneficial for enterprises and farmers to construct agricultural product network marketing systems to enjoy the benefits of using agricultural product e-commerce. They must identify its influencing factors and create an application system with the support of policy makers to promote agricultural products e-commerce marketing (Chao, 2022).

Nielsen and Montemari (2012) investigated the role of employees in the success of network marketing and showed how the interpersonal relationships of network colleagues inside and outside the network are effective in creating value added for the company. Nasehifar, Dehdashti Shahrokh, and Moghadam (2015) prioritized the factors affecting the willingness of people to work in network marketing. Their results showed that trust in the company, the company's support (commercial and psychological), and the company's training have a significant effect on the willingness of employees to engage and work; among those, trust in the company had the greatest effect.

A difference between farm gate price and retail price is expected and exists everywhere, but in developed countries, the price difference is mostly related to marketing services, such as packaging, grading, transformation, branding, and other marketing services, while in developing countries, such marketing services with high marketing margins are lacking. One of the ways to reduce the marketing margin and create more income for the producer and less cost for the consumer is to use network marketing. The primary purpose of this study is to investigate factors affecting consumers' willingness to buy selected agricultural products through network marketing.

Methodology

To achieve the primary goal of this research, a multinomial logit model was used. Multinomial logit is a linked set of binary logit models that can efficiently use data and create logical relationships between parameters (Long and Freese, 2001).

Formally, the multinomial logit model can be written as:

$$\ln \Omega_{m|b}(x_i) = \frac{\Pr(y_i = m | x_i)}{\Pr(y_i = b | x_i)} = x_i \beta_{m|b} \quad \text{for } m = 1 \text{ to } 4 \quad (1)$$

where b is considered as the base or comparison group for (i) buying from wholesale or retail, (ii) buying directly from the producer, (iii) buying from online store, and (iv) buying from network marketing.

An important assumption that must be tested in the multinomial logit model is the independence of irrelevant alternatives (IIA). This assumption means that adding or deleting an outcome does not affect the odds ratio of the remaining outcomes. To consider the effect of explanatory variables on the purchasing method of consumers, the multinomial logit model was applied, and STATA 15 software was used to estimate the models. The research model was:

$$\begin{aligned} \ln \Omega_{4|1}(x_i) &= \ln \frac{\Pr(y_i = 4 \mid x_i)}{\Pr(y_i = 1 \mid x_i)} = \\ &= \beta_{0,4|1} + \beta_{1,4|1} \textit{gender} + \beta_{2,4|1} \textit{edu} + \beta_{3,4|1} \textit{price} \\ &+ \beta_{4,4|1} \textit{brand} + \beta_{5,4|1} \textit{adv} + \beta_{6,4|1} \textit{job} + \beta_{7,4|1} \textit{age} + u_i \end{aligned} \quad (2)$$

Equation (2) indicates the odds ratio of outcome 4 versus outcome 1 ($Y_i = 1$ is the base group and $Y_i = 4$ is the network marketing group). The independent variables included were age, gender, education of the head of the household, household income, job of the head of the household, having a product with a reputable brand, and the existence of ads for the product (see Table 2). u_i in equation (2) is the error term that has a logistic distribution.

Data Description

Data required for this research were obtained from the households of Mashhad city, Iran, in 2020. Mashhad is the capital city of Khorasan Razavi province in Iran with about 914,146 households in 2015, from which a sample of 280 households were selected by a simple random method, and the heads of those households were questioned about the methods of purchasing selected agricultural products. Buying methods included buying from wholesalers and retailers, buying from producers, buying from online stores, and buying from network marketing, and a description is shown in Table 1. The selected agricultural products in this study included honey, rice, and tea, commonly used in different countries through online stores and network marketing. These products, offered through different sales channels including network marketing, are bought by most families and usually have characteristics like high shelf-life, ability to be stored, and different prices and weights.

Results

The information related to the research variables are shown in Tables 1 and 2. In Table 1, the dependent variable or purchasing method of households is divided into four categories.

Table 1: Frequency of Consumer Purchasing Methods (N = 280)

Purchasing Method	Frequency (%)	Cumulative Frequency
Buying from wholesale or retail	40	40
Buying directly from the producer	20	60
Buying from online stores	12	72
Buying from network marketing	28	100

The independent variables selected that may affect the dependent variable, that is, the buying method of agricultural products in network marketing are listed in Table 2.

Table 2: Description of Study Variables

Variable	Type	Description
Purchasing method	Dependent	4 Category
Price of the product	Independent	Continuous
Income	Independent	Continuous
Advertising	Independent	1 if ad influences purchasing method and 0 otherwise
Brand	Independent	1 if brand influences purchasing method and 0 otherwise
Education	Independent	Continuous
Gender	Independent	Gender of respondents: 1 for men, 0 for women
Type of job	Independent	Freelance job =0 and government job=1
Age	Independent	Continuous

The results of estimating the multinomial logit model using STATA 15 software are presented in Table 3. In the multinomial logit model, the group of the dependent variable that has the highest frequency is considered the base group, and other categories are compared with that. In this study, the first category, buying from wholesalers and retailers, has the highest frequency, considered as the base group, and other dependent variables are compared with that base category.

Table 3. The Results of the Multinomial Logit Model

Variable	Dep. Variable Categories	Coefficient	Standard Deviation	Z stat.	Prob.
Price	Y = 2	0.47**	0.22	2.14	0.03
	Y = 3	-0.61**	0.27	-2.25	0.02
	Y = 4	-0.78*	0.27	-2.89	0.00
Income	Y = 2	0.13	0.20	0.66	0.51
	Y = 3	-0.59**	0.29	-2.04	0.04
	Y = 4	0.81*	0.28	2.86	0.00
Advertising	Y = 2	0.18	0.17	1.03	0.30
	Y = 3	0.38	0.28	1.38	0.16
	Y = 4	0.05	0.30	0.20	0.84

Table 3. (cont)

Variable	Dep. Variable Categories	Coefficient	Standard Deviation	Z stat.	Prob.
Brand	Y = 2	0.84*	0.21	4	0.00
	Y = 3	-0.12	0.27	-0.45	0.65
	Y = 4	0.64*	0.27	2.38	0.1
Education	Y = 2	1.14*	0.28	4	0.00
	Y = 3	0.15	0.40	0.38	0.70
	Y = 4	0.28	0.27	1.03	0.44
Type of job	Y = 2	0.13	0.20	0.63	0.52
	Y = 3	0.49*	0.30	1.63	10.0
	Y = 4	0.61	0.78	0.78	0.45
Gender	Y = 2	0.01	0.23	0.04	0.95
	Y = 3	-0.12	0.39	-0.31	0.74
	Y = 4	0.48**	0.18	2.6	0.02
Age	Y = 2	0.2	0.23	0.87	0.55
	Y = 3	-0.69	0.42	-1.62	0.11
	Y = 4	-0.49**	0.25	-1.96	0.05
Goodness of fit measures	LR		71.31		
	LR (<i>p</i> -value)		0.00		
	R2 McFadden's		0.28		
	R2 ML (Cox-Snell)		0.40		
	Deviance		189.6		

Note: Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels.

The results of Table 3 show that with an increase in the price, the probability of buying directly from the producer (group Y = 2) increases, and the probability of buying from online stores or network marketing (groups 3 and 4) decreases relative to the base group. Therefore, reducing the price in network marketing can have a positive effect on increasing sales. Examining the income variable shows that with the increase in household income, the probability of buying from online stores decreases compared to buying from retailers and wholesalers, and the probability of buying from network marketing increases. Also, advertising has had an insignificant effect on the probability of buying from different sales methods.

Having a reputable brand increases the probability of buying from the producer compared to buying from retailers and wholesalers and increases the probability of buying from network marketing. Education has an insignificant effect on the probability of buying from network marketing, while it increases the probability of buying from the producer compared to the base category (i.e., buying from retailers and wholesalers). The gender variable indicates that men are more likely to buy from network marketing than women, compared to buying from retailers and wholesalers. Finally, as the buyer's age increases, the probability of buying from network marketing decreases, and buying from wholesale and retail methods of sales increases. These results show most young people are willing to buy from the network marketing method.

Since the equations estimated in the multinomial logit regression model are nonlinear, the values of the coefficients cannot be directly interpreted, and only the sign of variables can be interpreted. For the numerical interpretation of the variables, the marginal effects of the variables must be obtained. In summary, the estimation results of Table 3 show that the variables affecting consumers' willingness to buy selected farmers' products through network marketing include the product price, consumer income, product brand, and buyer's gender and age. Therefore, these items should be considered when targeting consumers and market segmentation.

Discussions and Suggestions

The main purpose of the current research was to investigate the factors influencing the willingness of people to buy selected agricultural products in four ways, including buying from retail and wholesale, buying from the producer, buying from online stores, and buying through network marketing. To achieve this goal, a sample of buyers of selected agricultural products, including honey, rice, and tea from city of Mashhad, Iran, was selected by a simple random method. The effect of variables such as buyer's gender, age, education, product brand, product advertisement, product price, and household income was investigated by a multinomial logit regression method. The results showed that factors such as product price, product brand, household income, gender of the product buyer, and the age of the buyer had significant effects on the probability of buying selected agricultural products through network marketing.

Considering the negative and significant effects of price on the possibility of buying from network marketing, we suggest that the products that are sold in the network should be offered at a suitable price for consumers to create more incentives for buyers, given the reduction of the marketing margins. Considering the positive effect of product brand recognition on the possibility of buying agricultural products through network marketing, we suggest that appropriate product branding efforts should be conducted for agricultural products that are offered in this network. Finally, considering the effect of the buyer's gender, age, and income on the probability of sales in network marketing, we recommend that the distribution of products in this method should be done in a targeted manner, considering the demographic and economic characteristics of each region.

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