

Citrus Marketing Channel Strategy and Its Determinants in Mazandaran Province of Iran: An Application of Nested Logit Model

S. M. Mojaverian^{1*}, F. Rasouli¹, and S. A. Hosseini-Yekani¹

ABSTRACT

One of the really important challenges facing agricultural producers is the choice of their product distribution channels. The present study is aimed at investigating the citrus marketing channel strategy and its determinants among citrus orchardists of Mazandaran using a Nested Logit model. Some two hundred and fifty two orchardists from 15 cities of Mazandaran were taken as the study samples. Four distribution channels and three nests were considered in determining the factors influencing the choice of marketing channel. Since the estimated structural parameter did satisfy the condition of lying between 0 and 1, the nested logit model was proved as appropriate for the intended application. The results indicated that the orchard distance from the nearest city, orchardist's experience, sale time, marketing costs, the kind of product and the dominant marketing channel constitute the most important factors of distribution channel selection as regards the citrus producers in Mazandaran. According to the obtained results, by increase in the orchards' distance from the nearest city, the producers' tendency to sell their products through channels of shorter distances from buyers also increases. Also, results revealed that the older the orchardist, the higher his/her degree of risk aversion. An estimation of binomial Logit Model for the second and third nests had consistent results regarding the marketing costs. As the marketing costs increases, the orchardist's tendency to sell his/her products through other channels of a lower marketing cost will increase. Furthermore, results revealed that as the citrus price rises, the producers get further intended to sell their products in the market rather than selecting either the pre-sale method or selling their produce to the local dealers.

Keywords: Citrus, Iran, Marketing channel strategy, Mazandaran, Nested logit model.

INTRODUCTION

Citrus is one of the horticultural products that includes some of the most important tropical as well as subtropical plants. From a botanical point of view, citrus belongs to Rutaceae family and Aurantioideae sub-family. With a transition from traditional to modern agriculture in Iran during the recent decades and the increased share of marketed products as compared with the overall total products, marketing of agricultural products has gained its special importance. Currently,

farmers are dissatisfied with how to supply their products to the market and as well with their scant share of the final gain (Kazemnejad, 2005). According to experts, this is due to the existing inefficiencies in the agricultural market structure. (Rezaeizal, 1995). According to FAO statistics, citrus production across the world with an average annual growth of 3%, has reached from 111 million tons in 2005 to 131 million tons in 2011. Iran, producing 3.38% of the world's citrus is ranked seventh worldwide. Iran's citrus production has been about 4 million tons in 2009 and Mazandaran province,

¹ Department of Agricultural Economics, Sari University of Agricultural Sciences and Natural Resources, Sari, Islamic Republic of Iran.

* Corresponding author; e-mail: mmojaverian@yahoo.com



producing 45.1 % of this total production is ranked as top throughout the country.

Citrus production is of a great significance in Iran, since it benefits from the highest volume of production among the other horticultural products with a share of over 31% (Ardestani, 2010). Therefore, appropriate measures in the marketing of citrus should be taken into account by the experts and producers in order to eliminate the inefficiencies prevalent in the market structure of this valuable product. Some of these inefficiencies are widespread presence of middlemen, small share of producers from the final set price and while a high share of marketing cost (Ardestani, 2010). Channel strategy gets an important position in the marketing process of citrus, because of the increase in the citrus production quantity and the increased distance of producers as well as consumers from the product over time (Rousta, 2004). So an investigation of citrus marketing channel strategy and its determinants can be useful in somehow resolving the existing problems of its marketing.

Mosanejad and Mojaverian (1994) studied citrus marketing system in Babol city of Mazandaran Province, using Logit Model and by investigating 126 orchardists and 7 wholesalers. They found that there existed more than 9 marketing channels of 4 different methods. Based upon the calculated marketing margins of their research, direct sale or selling *via* brokers were superior as over the other methods.

Ardestani *et al.* (2008) calculated marketing margin, market agents' shares, marketing net profit and market inefficiency of orange along with the price indices during 2001-2005 in Iran in order to clarify the domestic market of the product. The results of their study revealed the high share and growth in the wholesale margin, high profit share of wholesalers, high share of marketing costs received from the paid price to the producers and as well the obvious improper role of wholesalers.

Tsourgiannis *et al.* (2008) aimed at identifying the factors affecting the choice

of marketing channel by sheep and goat farmers in the Region of East Macedonia and Thrace (EMTh) in Greece relative to the distribution of their livestock and milk products. Four categories of milk marketing and four categories of livestock marketing channels were identified. Many factors were found to be associated with the selection of milk marketing channel, including milk price, loyalty, speed of payment, degree of isolation, farm area, size of flock, volume of production, farmer's age and debt level. Such factors as livestock price, loyalty, capability of buyer to purchase large sums of livestock/meat, speed of payment, personal relationships, size of flock and number of slaughtered lambs were found as associated with selection of a livestock marketing channel.

Martinez (2004) in a survey of horticultural crop growers in the Almeria Province, Spain, showed their preferences for different marketing channels. The influence of such characteristics as grower age, risk aversion, family size as well as holding size on these preferences was determined using Logit Models. The results suggest that the most important marketing channel as regards horticultural products in this state is an auction system.

Park(2009) studied organic producers by identifying specific farm and demographic factors that enhance earnings, given the choice of marketing outlet. The two significant selectivity coefficients confirm that organic earnings when marketing through a single outlet are biased upward since farmers who are better suited to market through multiple outlets have already moved away from this marketing strategy. An accurate evaluation of the projected earnings from any marketing strategy must account for selectivity effects.

The present study aims at identifying the marketing channel strategies among Mazandaran citrus producers using econometric methods and its also aims at investigating the influencing factors of marketing channel selection.

MATERIALS AND METHODS

Inefficiency of linear models in many socio-economical applications has caused researchers to use choice models of a long history in economics and as well in sociology. Choice models are based on consumer theory and the most important characteristic of these models is their behavioral nature.

Discrete choice models show the relationship between a discrete variable Y , which represents the occurrence of an event or a decision among possible choices, and one or more explanatory variables X . Choice process of marketing channel is one application of these models. Discrete choice models, according to the assumptions applied to them, are known as behavioral models.

Choice models are not estimable by simple regression methods because the dependent variable in these models is a random one and such variables are not observable. One of the common estimation techniques of such models is Maximum Likelihood Method which helps to find the closest probability distribution function.

Choice models, according to the individual's choice set, are divided into discrete vs. continuous choice ones. Discrete

choice models are a group of random utility models which have a long application life in economics, marketing and geographies. Most of the discrete choice models are based on the assumption of utility maximization (Bhat, 2004).

In most cases it is assumed that random utility function of activity i for the individual t is as follows:

$$U_{it} = V_{it} + \varepsilon_{it} \tag{1}$$

Where, U_{it} is random utility of choice i for individual t , V_{it} is the systematic part of utility and ε_{it} the random part of it. Basically three common distributions are considered for the random part. Each one of these three distributions results in three major families of choice models namely: Linear Model, Probit Model as well as Logit Model (Mayer *et al.*, 1977).

Nested Logit models, in fact, are special cases of more general models known as Generalized Extreme Value (GEV) (Meyer, 1977). This group of models possess a hierarchical decision making structure. The most famous of such models, the Nested Logit model has been developed by Ben-Akiva and Lerman(1978).

Nested Logit models can be expressed in the form of the product of some polynomial logit models located in a tree according to Figure 1 (Nasiri, 2005). The tree shown in

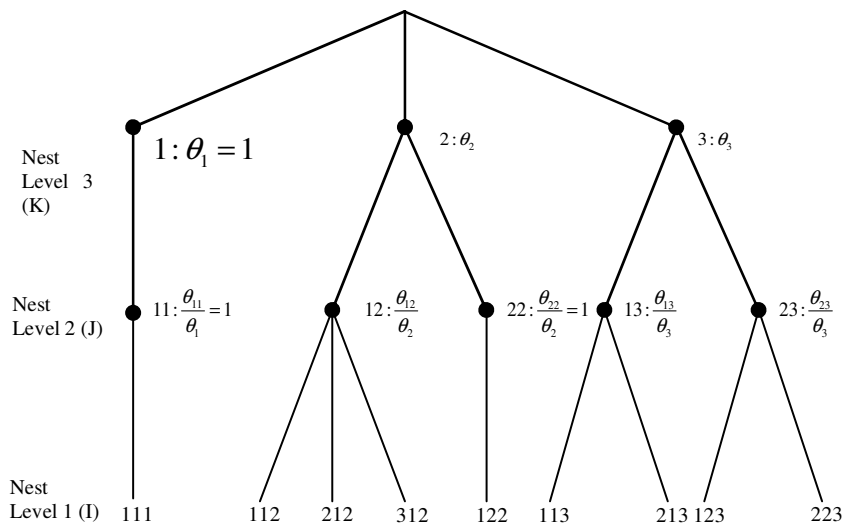


Figure 1. Tree chart of nested logit model.



Figure 1 has three levels of I, J and K and the options are shown at each level. As shown in the Figure, the number of options in every branch and at every level of the branches can be different. But specifically in some branches like 1, 11 and 22 there may be only one member and in this case, structural parameter related to that level of branch and the choosing probability of that option at that level of the branch equals 1.

The values of the structural parameters θ_k and θ_{jk} indicate substitution or relationship between cross elasticity in every branch (Zhang, 2004). The more the number of options, the more nested structures could be proposed. But all the structures may not be correct. This point should be considered in developing the nested logit models along with the introduced conditions of developing multinomial logit model. For example, let's assume that there are three options of a, b and n with a structure similar to that of Figure 2.

In this structure a measure of utility is taken into account for options a and b as like as combination models. Then a measure of combined utility is defined for nest m including the following two options:

$$I_m = \ln \sum_{i=1}^2 e^{V_i} \tag{2}$$

Where, V_i is the total utility of every option inside the nest. Therefore, the total utility of option m is rewritten as:

$$V_m = \theta I_m + \beta X_m \tag{3}$$

Where, X_m is the descriptive variable of

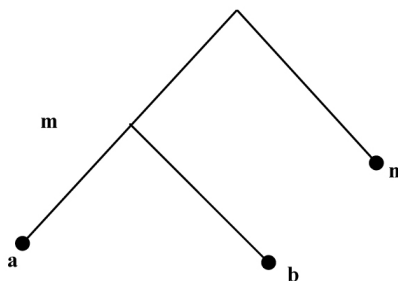


Figure 2. The nested logit pattern for multinomial choice.

option m and while vectors θ and β the model parameters.

The nested model is estimated within two phases. In the first phase, parameters of the options existing in nest m , i.e. a and b , are estimated as like a binomial logit model. Then the value of I_m is calculated and retained for all the components used in estimating the recent model. In the second phase, the model parameters in the top level are estimated like a binomial logit with two options m and n (Asadi, 2003). It is proved that: $0 < \theta \leq 1$

If $\theta < 0$, an increase in the utility of one option of the nest at the second level, will result in decreasing the probability of selecting the options of the nest. Also, if $\theta = 0$, either an increase or a decrease in the utility of one nest's option won't change the probability of choosing the options. Again, if $\theta > 1$, an increase in the utility of one option of the nest (e.g. option b) will increase the probability of selecting b as well as the utility of any other option in the nest. Finally when $\theta = 1$, the results of nested model are algebraically identical to the results of a similar simple multinomial logit model. Following the developing and an estimation of the nested models, every structure which couldn't meet the condition $0 < \theta \leq 1$ will be eliminated. If θ is close to 1, from a mathematical point of view, the nested structure will be close to the multinomial logit structure (Asadi, 2003).

Figure 3 illustrates the nest structure in the present study. According to this figure, the four types of marketing channels include: forwarding (preselling), selling to a local dealer (in the garden), selling through fruit and vegetable market (to wholesaler), and direct sales (at the retail level). Branches from top to bottom indicate a more depth of sale in the market. At the top-level, orchardists have to choose between two options i.e. sell their products prior to fruit ripening (forwarding) or leave it to after ripening. Selection between these two choices is dependent on the farmers' risk aversion coefficient and their financial situation. If orchardists decide to sell their

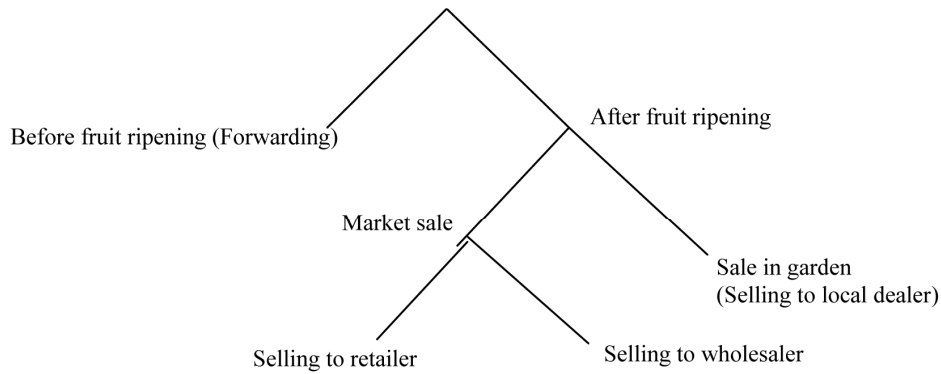


Figure 3. The final model of marketing channels.

fruits after being ripened, then they have to choose between two options: either sale in garden (selling to local dealers) or choose the market sale. Finally, if orchardists decide to sell their products to the market, in the next stage they must choose from between any of the two options i.e. selling to either wholesalers or to retailers.

The data needed for this study have been collected through questionnaires filled by 252 of the 40,938 orchardists sampled in Mazandaran Province.

It should be mentioned that three dummy variables, representing three types of citrus, are considered in this study i.e. orange, mandarin vs. some other types of citrus.

Table 1 introduces the variables and parameters used throughout the rest of the paper.

RESULTS AND DISCUSSION

Whereas the dependent variable in this study, marketing channel strategy, was chosen from among the four commonly used marketing channels, it was not only non-quantitative but also not of two-state. Therefore common methods of regression were not feasible, so the maximum likelihood approach was employed to estimate the model. The econometric package

Table 1. The variables and parameters of the model.

Variable	Variable describing	Unit of measure/quantity	
Dis	Orchard distance	Kilometers	
Expr	Orchardist's experience	Years	
Mrc	Marketing costs	10*Million Rials	
Area	Garden area	Hectare	
Price	Selling price	10* Rials	
Product	Sales quantity	Ton	
I_m	Structural parameter of nest of market sale		
I_r	Structural parameter of nest of market sale-orchard sale		
Dummy	Dummy variable of comparison of sale method of orchardist with the prevalent method of village	Same 1	Different 0
Type 1	Dummy variable of product type (different varieties of oranges)	Orange 1	Other 0
Type 2	Dummy variable of product type (different varieties of Mandarin)	Mandarin 1	Other 0
Type 3	Dummy variable of product type (other citrus fruits than orange and mandarin)	Orange and mandarin 0	Other 1
Time	Dummy variable of time of sale	Autumn 1	Other seasons 0



LIMDEP was applied to estimate the model. The new version of this software which is of the capacity of directly estimating the nested logit models was not available at the time of estimation. So the current model of nested logit was estimated nest to nest. It should be mentioned that modeling starts from the lower nest, e.g. choice between direct sale and selling in fruit and vegetable market, to upper nests.

In order to estimate the binomial logit model of the first nest, choice between two options, i.e. direct sales vs. selling in the fruit and vegetable market, was modeled. To this end, data associated with 114 orchardists who had selected market sale, have been applied in the modeling. In this case, dependent variable was equal to 1 for direct sale choice and 0 for selling in the fruit and vegetable market. Following a determination of dependent vs. independent variables, binomial logit model was evaluated using Maximum Likelihood method. At this stage, either a variable or a set of variables, which according to the research hypotheses influence the dependent variable, have to be included in the model. Then either the acceptance or rejection of the new model is investigated comparing double difference of log-probability of the new vs. basic models, which have chi-square distribution, with critical values of this statistic, as well as evaluating the importance of variables using t-test. Log-Probability value, with the assumption of equal selection probability of each option, is as follows:

$$-L(0) = -\sum_i n_i \ln P_i \quad (4)$$

Where, n_i indicates the number of option i observations and P_i representing the selection probability of option i . In the first step of modeling process, market share and zero models are compared with each other. In market share model, all the coefficients of independent variables, except the model fixed term are equal to 0 and selection probability of each option is exactly equal to the relative frequency of observing that option. According to the obtained results,

the log-probability of market share model was calculated as 77.2552 using LIMDEP. In this step, zero model was served as the basic model since the chi-square statistic value was less than the critical one with a 95% confidence interval and adegree of freedom of 1. Similarly, this procedure was performed for the other variables expected to influence the marketing channel strategy of orchardists. The results related to this procedure are presented in Appendix 1. The final model of the mentioned nest was as follows:

$$U_1 = -0.306Dis - 1.095Expr + 1.332Time + 0.019 price - 3.637Type1 + 4.165Type3$$

$$(0.14)^a (0.38) (1.13) (0.69) (1.47) (1.39)$$

^a The numbers in parentheses show the standard errors.

The results show with an increase in the distance from orchard to the closest city, the producer's tendency to sell his/her products in the fruit and vegetable market increases, while the utility of direct sale being decreased. This is because of the considerable increase in the marketing cost through an increase in the distance, whereas according to questionnaire data, the sale price difference in these two marketing channels is negligible. Also, by increase in the experience of orchardist, the utility of direct sale is decreased and the orchardist tends to sell his/her products in the fruit and vegetable market. Again, results show that producers, whose sales occur in autumn, further tend to directly sell their products. Moreover, an increase in the sale price increases the profitability of direct sale, instead of sale in the fruit and vegetable market. It can be said that the higher sale price encourages the producers to directly sell the product. Furthermore, according to the estimated coefficient of variable *Type 1*, orchardists whose produce is comprised of various types of oranges (Thompson Navel, Siavaraze, Moro) less tend to directly sale their product. Also based on the estimated coefficient of variable *Type 3*, producers who produce different a type of citrus from

orange and mandarin, i.e. lemons, sour oranges and grapefruit, more tend to directly sell the products, rather than sale to wholesalers.

Estimation of the Binomial Logit Model of second nest deals with choice modeling between market sale and sale in place (garden). For this purpose, the statistics data from 189 producers who sell their product in the garden vs. in the market were utilized. In this case, dependent variable is taken 0 for those who sell their product to the local dealers vs. 1 for those who choose market sale (either direct sale or selling to fruit and vegetable market).

The extra step existing in this phase is calculation of bottom nest structural parameter and its entry in the current nest. In order to calculate this parameter, first, using relative utility function obtained in the previous phase, relative utility of direct sale to the selling in fruit and vegetable market, was calculated for all the 189 producers in this phase. According to Equation (2), I_m is calculated as:

$$I_m = \ln(e^{I_m} + 1)$$

Then, this calculated variable was placed into the model of this nest, as for the other variables. It is worth mentioning that, as it was discussed before, if the assumed structure is accurate for the choice, the coefficient of this variable must lie between 0 and 1. The results of estimation of this stage are shown in the Appendix 2. The final model of this nest was as follows:

$$U_2 = 1.605 + 0.208I_m - 0.189Dis + 0.51price - 0.115Mrc - 0.062Expr$$

(0.77) (0.09) (0.33) (0.17) (0.33) (0.22)

According to the attained results, an increase in the distance decreases the profitability of selling in the market. It can be said that suburban orchardists benefit from more update information and therefore incur less marketing costs. On the other hand, the farther orchardists, because of suffering from the more transportation and the other such marketing operations costs as warehousing, have more tendencies to sell their products when still in the garden. Also,

the more experienced orchardists have less tendencies of selling their products in the market. From the level of prices point of view, with an increase in the citrus prices, profitability of selling in the market increases and tendency of producers to sell the products to local dealers decreases. Finally, by an increase in the marketing costs, the profitability of selling the products in the market decreases and the producers have more tendencies garden to sell their products.

The estimation of binomial Logit Model of the third nest was related to the choice of selling the product either before or after fruit ripening. A total sampled data of 252 orchardists were involved to model this nest. Rank 1 is assigned to the orchardists who have sold their fruits after being ripened, and 0 to those who have forwarded their products. In this nest like in the previous ones, using the profitability functions obtained in the previous phase, the structural parameter value was determined for all the producers. Estimated results of the third nest are presented in Appendix 3. The final model for this nest is as follows:

$$U_3 = 6.672 + 0.185I_g - 0.108Dis - 2.866Time - 0.145Mrc - 2.281Dummy - 0.092Expr - 2.676Type2$$

(0.03) (0.72) (0.03) (0.79) (0.97) (0.05) (1.99) (0.07)

The results show that with an increase in the distance from the orchard to the closest city, producers' tendency to pre-sale increases and the profit of selling fruits after being ripened decreases. Also the experienced orchardists benefit from a higher profit of forwarding and therefore, they are less inclined to sell their product after being ripened. The estimated coefficient of variable *Time* shows that orchardists whose sale occurs in the autumn are less inclined to sell their fruits when ripened. These orchardists get a higher benefit from presale. Also, with an increase in the marketing costs, the profitableness in forwarding increases and producers' tendency to sell their fruits after ripening

**Appendix 1.** Binomial Logit Model estimation process of the first nest.

Number of model	Description of Operation	Number of model coefficients	-L(F)	-L(R)	df	-2 [-L(R) +L(F)]	χ^2 n, 95%	Model verification
1	The basic model	1	77.2528	77.2553	1	0.05	3.84	
2	Variable of Area entering the model	1	78.5436	77.2553	1	2.57	3.84	
3	Variable of Dis. entering the model*	1	75.4915	77.2553	1	3.53	3.84	✓
4	Variable of Dummy entering the model	1	75.0955	75.4915	1	0.8	3.84	
5	Variable of Expr. entering the model*	1	62.7064	75.4915	1	25.57	3.84	✓
6	Variable of Mrc. entering the model	2	62.6467	62.7064	2	0.12	5.95	
7	Variable of Price entering the model*	2	32.7878	62.7064	2	59.83	5.95	✓
8	Variable of Product entering the model	2	30.9542	32.7878	3	3.67	7.81	
9	Variable of Time entering the model*	3	30.0529	32.7878	3	5.57	7.81	✓
10	Variable of Type 1 entering the model*	4	19.4978	30.0529	4	21.11	9.48	✓
11	Variable of Type 2 entering the model	5	19.4691	19.4978	5	0.06	11.07	
12	Variable of Type 3 entering the model*	6	12.1252	19.4978	6	14.74	12.59	✓

Source: The results. *These variables are significant at the 95% confidence interval. **These variables are significant at the 90% confidence interval.

Appendix 2. Binomial Logit Model estimation process of the second nest.

Number of model	Description of Operation	Number of model coefficients	-L(F)	-L(R)	df	-2 [-L(R) +L(F)]	χ^2 n, 95%	Model verification
1	The basic model	1	126.952	126.952	1	0.002	3.84	
2	Variable of I_n entering the model*	1	125.030	126.952	1	3.84	3.84	✓
3	Variable of Dis. entering the model*	2	92.6800	125.030	1	64.70	3.84	✓
4	Variable of Mrc. entering the model*	3	85.7682	92.680	2	13.82	5.95	✓
5	Variable of Price entering the model*	4	78.6893	85.768	3	14.16	7.81	✓
6	Variable of Aria entering the model	4	78.6730	78.689	3	0.033	7.81	
7	Variable of Time entering the model	4	78.004	78.689	3	1.38	7.81	
8	Variable of Product entering the model	4	78.6855	78.689	3	0.007	7.81	
9	Variable of Dummy entering the model	4	77.7944	78.689	3	1.79	7.81	
10	Variable of Expr. entering the model*	5	73.8380	78.689	4	70.9	7.81	✓
11	Variable of Type 1 entering the model	5	73.7907	73.838	5	0.095	7.81	
12	Variable of Type 2 entering the model	5	73.7885	73.838	5	0.099	7.81	
13	Variable of Type 3 entering the model	5	73.7848	73.838	6	0.106	7.81	

Source: The results. *These variables are significant at the 95% confidence interval. **These variables are significant at the 90% confidence interval.

Appendix 3. Binomial Logit Model estimation process of the third nest.

Number of model	Description of Operation	Number of model coefficients	-L(F)	-L(R)	df	-2 [-L(R) + L(F)]	X ² n, 95%	Model verification
1	The basic model	1	141.708	141.7085	1	0.00008	3.84	✓
2	Variable of I _g entering the model*	1	91.6714	141.7085	1	100.074	3.84	✓
3	Variable of Dis. entering the model*	2	84.6116	91.6714	1	14.1195	3.84	✓
4	Variable of Area entering the model*	2	84.6093	84.6116	1	0.0045	3.84	✓
5	Variable of Time entering the model*	3	70.7177	84.6116	2	27.78	5.95	✓
6	Variable of Price entering the model	3	69.311	70.7177	2	2.812	5.95	✓
7	Variable of Product entering the model	3	69.2771	70.7177	2	2.88	5.95	✓
8	Variable of Mrc. entering the model	4	58.0913	70.7177	3	25.25	7.81	✓
9	Variable of Dummy entering the model	5	50.0317	58.0913	4	16.12	9.48	✓
10	Variable of Expr. entering the model***	6	45.5623	58.0913	5	8.94	9.48	✓
11	Variable of Type 1 entering the model	6	45.5562	45.5623	6	0.012	11.07	✓
12	Variable of Type 2 entering the model*	7	37.3613	45.5623	6	16.40	12.59	✓
13	Variable of Type 3 entering the model	7	37.2337	37.3613	7	0.25	14.07	✓

Source: The results. *These variables are significant at the 95% confidence interval. **These variables are significant at the 90% confidence interval. ***These variables are significant at the 90% confidence interval.

decreases. A comparison of marketing strategy of orchardists vs. the customary strategy of their village show that orchardists with a prevalent marketing strategy of village are more inclined to forwarding their products. Finally, producers of different varieties of mandarin, i.e. Unshiu or Satsuma, Kinnow as well as Local varieties, are more inclined to pre-sell their fruits.

In order to provide a clearer picture of the results, the Marginal Effects (ME) of each independent variable on dependent variable of the options' selection probability are estimated. Table 2 shows the results of estimating the ME values of each independent variable at each nest. According to this table, citrus type and time of sales exerts the greatest impact on marketing channel selection.

CONCLUSIONS

A comparison of the estimated results of three models regarding the marketing distance indicates, by increase in the orchard's distance from the nearest city, the producers' tendency to sell their products through channels of shorter distances from the buyers also increases. Also, results revealed that the older an orchardist, the higher his/her degree of risk aversion. An estimation of the binomial Logit Model for the second and third nests had consistent results regarding the marketing costs. As the marketing costs go on the increase the orchardist's natural tendency to sell his/her products through channels with a lower marketing cost will increase. Furthermore, results revealed that as the citrus price rises, the producers further intend to sell the products in the market rather than selecting the pre-sale method or sell to local dealers. Also depending upon the type of the fruits, producers' tendencies to choose the marketing strategy differ. For instance, orchardists whose produce consists of either orange or mandarin are more intended to sell their fruits in place (the garden), while,



producers of the other types of citrus (except orange and mandarin), i.e. lemon, sour orange, grapefruits etc. are inclined to sell their products in the market.

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استراتژی کانال بازاریابی مرکبات و عوامل مؤثر بر آن در استان مازندران ایران: کاربردی از مدل لاجیت آشیانه‌ای

س. م. مجاوریان، ف. رسولی، و س. ع. حسینی یکانی

چکیده

یکی از مهم‌ترین چالش‌های پیش روی تولیدکنندگان کشاورزی، انتخاب کانال‌های توزیع محصولاتشان است. هدف از این مطالعه بررسی استراتژی کانال بازاریابی مرکبات و عوامل مؤثر بر آن در بین باغداران مرکبات مازندران با استفاده از مدل لاجیت آشیانه‌ای می‌باشد. در این راستا، ۲۵۲ باغداران از ۱۵ شهرستان استان مازندران نمونه‌گیری شدند. چهار کانال توزیع و سه آشیانه به منظور تعیین عوامل مؤثر بر انتخاب کانال بازاریابی در نظر گرفته شد. از آنجا که پارامتر ساختاری بین صفر و یک قرار گرفته است شرایط لازم برای بکارگیری لاجیت آشیانه‌ای فراهم شده است. نتایج نشان داد که فاصله باغ تا نزدیکترین شهر، تجربه باغدار، زمان فروش، هزینه‌های بازاریابی، نوع محصول و کانال بازاریابی غالب؛ مهمترین عوامل مؤثر بر انتخاب نحوه توزیع در بین تولیدکنندگان مرکبات استان مازندران می‌باشد. بر اساس این نتایج، با افزایش فاصله باغ از نزدیکترین شهر، تمایل تولیدکنندگان برای فروش محصولات خود از طریق کانال‌های کوتاه‌تر نسبت به خریداران نیز افزایش می‌یابد. همچنین، نتایج نشان داد که باغداران قدیمی‌تر، درجه ریسک‌گریزی بیشتری دارند. برآورد مدل لاجیت دوگانه در آشیانه‌های دوم و سوم با هزینه‌های بازاریابی سازگار است. همچنان که هزینه‌های بازاریابی بیشتر می‌شود تمایل باغداران برای فروش محصولاتشان از طریق کانال‌های کم‌هزینه‌تر افزایش می‌یابد. علاوه بر این، نتایج آشکار ساخت با افزایش قیمت مرکبات، تولیدکنندگان تمایل بیشتری به فروش محصولاتشان در بازار نسبت به شیوه‌های پیش‌فروش یا فروش به دلالتان محلی از خود نشان می‌دهند.