The Choice of Marketing Cooperative in a Transition Agriculture

Lajos Zoltán Bakucs, Imre Fertő and Gábor G. Szabó
ferto@econ.core.hu

Paper prepared for presentation at the I Mediterranean Conference of Agro-Food Social Scientists. 103rd EAAE Seminar '*Adding Value to the Agro-Food Supply Chain in the Future Euromediterranean Space*'. Barcelona, Spain, April 23rd - 25th, 2007

The Choice of Marketing Cooperative in a Transition Agriculture

Lajos Zoltán Bakucs*, Imre Fertő** and Gábor G. Szabó**

*research fellow

**senior research fellow

Institute of Economics, Hungarian Academy of Sciences

The agriculture in transition countries can be described by considerable uncertainties. In these countries public institutions are ineffective in ensuring contract enforcement. The absence of enforceable contract to set up any kind of vertical co-ordination has become difficult. In addition, this creates severe barriers for price discovery involving high transaction costs to co-ordinate market exchanges. Although there is a wealth of literature on marketing cooperative, but research on their role in transition agriculture is scarce. This paper tries to contribute to this gap. In this paper we have analysed the potential benefits and costs of the marketing cooperatives in Hungary employing transaction cost economics framework. The results presented add to a small literature on the marketing cooperatives in transition agriculture. We found that the quantity, the existence of contract, flexibility and trust are the most important factor for farmers to selling their product via cooperative. The cluster analysis provides some additional insights regarding farmers' choices. Namely, direct benefits including price, input finance extension services and speed of payments from cooperative membership have also important role. The most striking result is that the diversification and reputation has positive influences on the share of cooperative. Furthermore, large farmers have less willingness to sell their product to the cooperative. Surprisingly, asset specificity has rather negative effects on the share of cooperative.

The Choice of Marketing Cooperative in a Transition Agriculture

1. Introduction

The agriculture in transition countries can be described by considerable uncertainties. In these countries public institutions are ineffective in ensuring contract enforcement. The absence of enforceable contract to set up any kind of vertical co-ordination has become difficult. In addition, this creates severe barriers for price discovery involving high transaction costs to co-ordinate market exchanges. In those sub-sectors, where any type of production contracts does exist, agricultural producers face the hold-up problems (e.g. delayed payment for delivered products or ex post price reduction by retailers). These phenomena are reinforced by the emergence of modern retailing sector leading to serious problems for subsectors dominated by fragmented and small-scale farms, like the horticultural sector is. Recently there is growing literature focusing on various governance structures of agriculture in transition countries employing different frameworks (e.g. Rudolph, 1999, Gow et al., 2000, Zaharieva et al. 2002, Fertő and Szabó, 2002, Dries and Swinnen, 2004, Gorton et al. 2006). Furthermore other papers concentrate on the role of contract in transition agriculture (Boger 2001; Boger and Beckmann 2004, Bárdos and Fertő 2006, Fertő 2006, Szabó and Bárdos, 2006). Although there is a wealth of literature on marketing cooperative, but research on their role in transition agriculture is scarce (Fertő and Szabó 2004). This paper tries to contribute to this gap. Marketing cooperatives may solve many problems of vertical coordination, however the numbers of cooperatives are still limited in Hungary. In the study, we examine the Mórakert Purchasing and Service Co-operative, in Mórahalom, county Csongrád, which is located in the southern east part of Hungary. It works as a successful co-operative in terms of increasing annual turnover and membership thus being a good example for solving various coordination issues in Hungarian horticultural sector within an evolving supply chain. The aim of the paper

is to identify the cost and benefits of co-operative membership and their explanatory factors using a small-scale survey among co-op members. The remainder of the study is organised as follows. The section 2 describes the survey design and the variables. The results are presented in section 3. The last section summarises and offers some conclusions on the implications for the market mechanisms of Hungary's horticultural sector.

2. Survey design

We also investigate why the members of co-operative sell their products via Mórakert Co-operative. The questionnaire was prepared in consultation with management of Mórakert Co-operative. The total number of observations is 44. Table 1 and Table 2 present descriptive statistics that identify the average cooperative members' profile and the production structure, respectively. In order to facilitate the comparison across the different variables, instead of standard deviation we computed coefficient of variation.

Table 1: Cooperative member profile

Indicators	Mean	Coefficient of variation	Min.	Max.
Total land (ha)	25.10	2.43	0.25	350
Land rented (ha)	27.78	1.71	0.5	150
Full time family labour (person)	2.55	0.50	0	7
Paid labour (person)	6.9	1.37	0	45
Age (years)	48.38	0.17	30	65
Education (1 lowest, 9 highest)	3.79	0.36	1	9

The average cooperative member's farm size is 25 hectares of land, whilst 31% of them rent extra land too. The coefficient of variation (2.43) and the maximum and minimum values corresponding to the total land used emphasise the homogeneity of the producers. The second

line of Table 1 shows that the group of producers using extra land is slightly more homogeneous and they rent bigger plots, (27 hectares on average, with 1.71 coefficient of variation). 88% of members use family labour, whilst 48% employ paid labour (7 people on average) as well. In line with the farm size indicators discussed above, the coefficient of variation of paid labour is also rather high, (larger farms employing more paid labour, maximum 45 people). Turning to the average age, (48 on average, youngest member is 30, oldest 65) the group is more homogeneous with a low coefficient of variation

Table 2: Production structure and the link with the cooperative

Indicators	Mean	Coeff. of variation	Min.	Max.
Vegetable varieties produced	3.24	0.68	1	10
Share of vegetable production sold through Co-op (%)	68.44	0.45	3	100
Fruit varieties produced	1.84	0.72	1	5
Share of fruit production sold through Co-op (%)	70.38	0.45	5	100
Share of potato production sold through Co-op (%)	73.05	0.44	0	100
Co-op Membership (years)	4.17	0.68	1	16

The lower coefficient of variation indicators in Table 2 suggests that the production structure and the importance of cooperative for the members are more homogenous than the average member's profile. 84% of those interviewed produce vegetables (on average 3 varieties), whilst 28% produce fruits (on average 2 varieties). The largest share of production is sold through the cooperative (73% of potatoes, 70% of fruits and 68% of vegetables), with a low variation across members. Finally, the newest cooperative members joined a year ago, whilst

some were present from the beginning. On average, members joined the cooperative 4 years ago.

3. Results

Empirical analysis is conducted in the two stages. First, we focus on the importance of various factors in the choice of co-operative employing multivariate statistical analysis. Second, we investigate the share of co-operative in the selling of various products applying transaction costs economics framework.

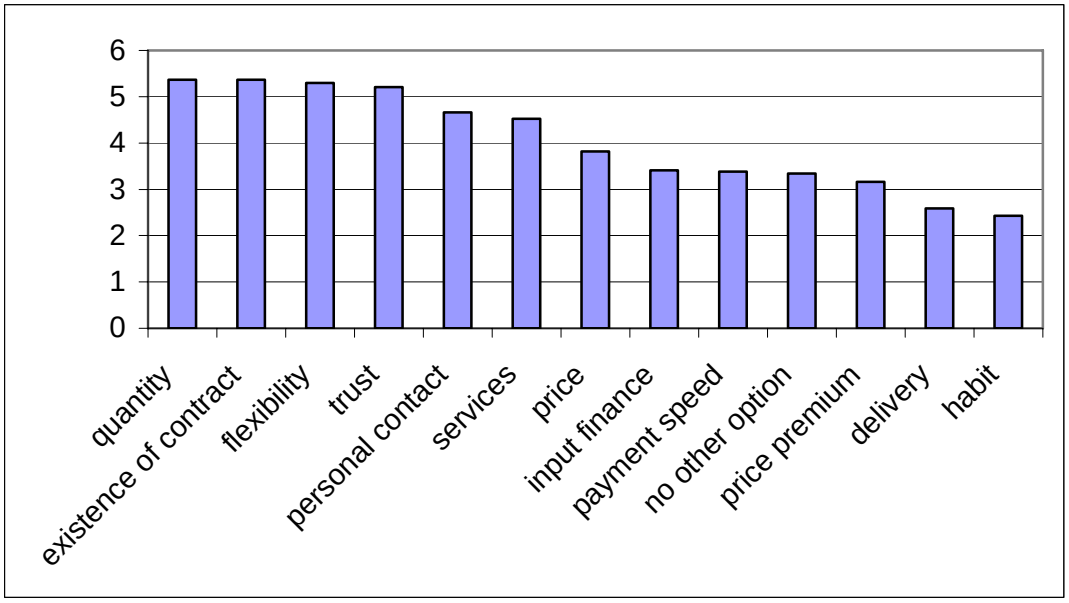
Reasons for choice of co-operative

The respondents sold 59 per cent of vegetables, 21 per cent of fruits and 33 of potatoes via Mórakert co-operative. Thirty four per cent of farmers sold their output to only co-operative, fifty per cent sold to between two and six buyers, remainder sold to more than ten buyers. The majority of respondents are individual farms or family farms (91 per cent), remainders are partnerships and co-operatives. Thirty four per cent of farmers sell only one product and thirty nine per cent sell at least five products. Thirty three per cent of individual and family farms sell only one product.

The theme concerned with potential benefits of co-operative membership employed a 13-item scale that measured the importance of these features in a co-operative choice context (1 = not at all important, 7 = very important). Figure 1 shows the importance in descending orders attached by producers to various marketing factors for sales through the co-operative. The most important factors are for selling via co-operative quantity, existence of contract, flexibility and trust. Interestingly, habit and co-operative deals with delivery price premium

and bargaining power issue are unimportant factors. Furthermore, services (input finance, extensions services) providing by co-operative are also not too important factors for farmers.

Figure 1: Importance of various factors in choice of co-operative (1 no importance; 7 very important)



The factors were further analysed to explore underlying dimension of the producers' perception of benefit from the membership in co-operative. The original variables consisted of 13-item seven-point scale concerned with the importance of factors for the choice of co-operative. However, the communalities for the attributes concerned with "Co-operative deals with delivery" and "Price premium" and "No other option" were judged to be too low (< 0.50) indicating that the set of derived factors explained a low proportion of the variance of those attributes. Consequently the three attributes were excluded from the subsequent analysis. The final solution was derived on the basis of varimax rotation and the extraction criterion was to derive factors with eigenvalues greater than unity which generated a solution in two factors. The Kaiser-Meyer-Olkim measure of sampling adequacy is 0.735, indicating that data matrix has sufficient correlation to justify the application of factor analysis.

Bartlett's test of sphericity accounts for the significance of the correlation matrix. In our case it is large and statistically significant at the one per cent level, so that hypothesis that analysed matrix is the identity matrix can be rejected. Consequently, the factor analysis is meaningful.

The two-factor solution explains 81.8 per cent of the total variance in the data set, which is satisfactory. The cut-off for interpretation purposes is factor loadings greater or equal to 0.5 on at least one factor. The first factor is most strongly correlated with the variables "trust", "quantity", "payment speed", "price", "existence of contract" and "flexibility" (Table 3). The second factor is associated with „"habit", "input finance", "services" and "personal contact".

Table 3: Rotated factor matrix solution: reasons for selling via co-operative

	factor1	factor2	communality
Habit	-0.021	**0.663**	0.540
Trust	**0.751**	0.204	0.605
Quantity	**0.577**	0.170	0.662
Payment speed	**0.670**	-0.080	0.555
Price	**0.775**	0.018	0.600
Input finance	0.171	**0.706**	0.527
Services	0.208	**0.718**	0.559
Personal contact	0.473	**0.531**	0.709
Existence of contract	**0.595**	0.493	0.596
Flexibility	**0.583**	0.376	0.681
Variance (per cent)	0.466	0.353	
Cummulative variance (per cent)	0.466	0.818	
Eigenvalue	4.082	1.450	

Cluster analysis was applied as a two-stage process. In the first stage, a hierarchical analysis was employed to provide an indication of the appropriate number of clusters. Hair et al. (1998, p. 479) suggests a procedure based upon inspection of the distance information from

the agglomeration schedule. Following this procedure the appropriate number of clusters is suggested at the stage where there is a ”large”’ increase in the distance measure, indicating that a further merger would result in decrease in homogeneity. However Hair et al. point out that ”the selection of the final cluster solution requires substantial researcher judgement and is considered by many to be too subjective”’. This procedure suggested either a five-cluster solution or a three-cluster solution. Consideration of relative cluster size and the desire for parsimony led to the choice of a three-cluster solution. Subsequently, in the second stage, the K-Means optimisation method was employed to derive a solution with the specified number of clusters. Consequently the producers respondents are grouped into three clusters, respectively comprising approximately 36 per cent (cluster 1) 34 per cent (cluster 2) and 30 per cent (cluster 3) of the producers sample.

Table 4: Cluster analysis: reasons for selling via co-operative

	Cluster 1	Cluster 2	Cluster 3	mean
Habit	3.44	1.60	2.15	2.43
Trust	5.56	4.87	5.15	5.20
Quantity	5.13	4.93	6.15	5.36
Payment speed	3.81	2.47	3.92	3.39
Price	4.25	3.47	3.69	3.82
Input finance	4.69	2.60	2.77	3.41
Services	5.06	3.67	4.85	4.52
Personal contact	5.38	3.93	4.62	4.66
Existence of contract	6.00	4.67	5.38	5.36
Flexibility	5.81	4.60	5.46	5.30
N	16	15	13	

The main characteristics of three clusters can be identified as follows (table 4). Cluster 1 place more importance on trust, personal contact, the existence of contract, and the direct benefits

from co-operative membership including price, input finance and extension services. On the other hand, cluster 2 places less emphasis on direct or indirect benefits from the co-operative, group means are below average for all reason of selling through co-operative. Cluster 3 places more importance on quantity selling via co-operative and speed of payments. Otherwise cluster 1 and 3 place above average emphasis on services, the contract and flexibility.

Table 5: Classifications of farms by clusters and the share of coop in the selling of products

	Cluster 1	Cluster 2	Cluster 3	Total
vegetable	75.0	57.9	40.8	59,0
fruit	16.9	24.0	21.5	20,7
potato	28.1	39.0	32.3	33,1

Cluster 1 incorporate farms that sell 75 per cent of their vegetable and below average share of fruit and potato through the co-operative (table 5). Cluster 2 consists of producers that sell their fruit and potato above average level. Cluster 3 encompasses farms that sell their fruit and potato at the average level.

Table 6: Classifications of farms by clusters and characteristics of farms

	C luster1	Cluster 2	Cluster 3	Total
hired labour	2.0	6.0	1.7	3.2
area	28.3	9.2	40.9	25.5
membership	3.2	4.1	4.6	3.9
age	47.3	46.8	46.8	47
partners	4.3	10.7	2.1	5.8

Cluster 1 comprises farms that employ 2 hired labour and use 28 hectare with 3 years co-operative membership and sell their product 4 partners in average (table 6). Cluster 2 contains farms with above average hired labour, but below average area and more than 10 buying

partners. Cluster 3 encompasses farms that have less hired labour but use more than 40 hectare land and sell product to only two partners.

The share of co-operative

In this section we test the propositions of transaction cost economics in relating to the share of co-operative in selling of members' product. Transaction costs economics (TCE) claims that firm's vertical boundaries decisions are determined by characteristics associated with efficiency of the chosen form of organisation. It is assumed that efficiency is inversely related to the extent of the costs of organising the exchange. These include the costs of negotiating and written contracts and the costs of monitoring and enforcing contractual performance (Williamson, 1985). The theory focuses on identifying the characteristics of transactions that are best suited to market and firm organisation. TCE asserts that all contracts are incomplete and subject to renegotiations and the possibility of opportunistic behaviour due to the presence of bounded rationality of agents, the asymmetric information and inability to completely specify behaviour in the existence of multiply contingencies. Thus, the problem of opportunistic behaviour is more severe when an exchange requires one or both parties to make considerable transaction specific investments, since such investments create quasi-rent that may be subject to hold up. The one of main advantage of co-operative is to decrease the transaction costs of farmers searching and establishing partners long run.

In this paper we focus on the following specific hypotheses.

H1: Asset specificity. The share of co-operative in selling product increases with the value of relationship-specific investments.

H2: Complexity. Product complexity and product diversification make searching and establishing new partners lengthy, leaky and expensive. Thus, the share of co-operative will increase with number of partners.

H3: Reputation. We expect that reputation has positive effect on the share of co-operative in selling of product.

H4: Size. The larger farms have more bargaining power, thus the size of firms will be negatively associated with the share of co-operative.

Therefore, the theoretical model we test is:

Prob(Share of co-operative)=f(Asset specificity, Complexity, Reputation, Size).

The expected signs of the variables are as follows:

$f1>0$, $f2>0$, $f3>0$, and $f4<0$.

Dependent variable. The dependent variable in our model is SHARE, ranging between 0 and 100 per cent.

Explanatory variables.

Physical asset specificity. Horticultural production's physical asset specificity is captured by two variables: 1) area of plastic tunnel (PLASTIC); 2) irrigated area (IRRIGATED).

Human asset specificity measure as: 1) age of farmers (AGE), and 2) farmers' final level of education (EDUC).

Complexity and diversification. Production diversity is measured number of products in horticultural production (DIVER).

The size of firm. The size of the operation is measured by two variables: the number of hired labour (LAB) and total area in hectare (AREA).

Reputation. It is difficult to quantify reputation in a postal questionnaire; we used two proxies for measuring reputation. We asked about the reasons for selling product via co-operative. The respondents evaluated the importance of specific factors, including trust (TRUST) and

personal contact (PCONT) on a seven points-scale. We estimate our model for each product groups separately. We report only best results in terms of our a priori expectations and statistical significance.

The estimated coefficients of tobit model for vegetables are presented in Table 7. The estimations indicate that asset specificity variables have unexpected sign, and are significant. The reputation variable (PCONT) is significant with expected signs. It indicates that the growing reputation leads to larger share of co-operative in selling of products. The complexity variable (DIV) has expected signs with significance. This suggests that farmers producing more products sell more via co-operative. Finally, the coefficient of AREA is significant with expected signs implicating that larger farms sell less their product through co-operative.

Table 7: Tobit results for the share of co-operative in the total vegetable sales

	Share of co-operative
PLASTIC	-0.388**
EDUC	-10.671***
DIVER	4.455**
PCONT	9.806***
AREA	-0.836***
constant	66.738**
Pseudo R^2	0.1460
N	42

legend: * p<.1; ** p<.05; *** p<.01

The model of fruit yields less promising results (table 8). The estimations indicate that asset specificity variables have the expected signs, and but human specificity variable is only significant. This means that farmers investing more in physical asset specificity try save their investment with selling through the co-operative. TRUST variable has unexpected sign

without significance. The complexity variable (DIV) is significant with expected sign and AREA is not significant with unexpected sign. This suggest again that farmers with wider product assortments sell more via co-operative.

Table 8: Tobit results for the share of co-operative in the total fruit sales

	Share of co-operative
IRRIG	0.358
EDUC	42.208*
DIVER	36.058**
TRUST	-29.613
AREA	0.494
constant	-260.191*
Pseudo R^2	0.1524
N	42

legend: * p<.1; ** p<.05; *** p<.01

Table 9: Tobit results for the share of co-operative in the total potato sales

	Share of co-operative
PLASTIC	-2.538**
EDUC	-3.947
DIVER	1.380
TRUST	5.854*
LAB	-17.365*
constant	139.687
Pseudo R^2	0.1202
N	42

legend: * p<.1; ** p<.05; *** p<.01

Estimations for potato sales are presented in Table 9. The asset specificity variables have unexpected signs and it is significant for only physical asset specificity. We find that

complexity is positively related to the share of co-operative, but it is not significant. The reputation (TRUST) and size (LAB) variable are significant with expected signs. It indicates that the trust yields a larger share of co-operative in selling of products. Furthermore, largest farms have less incentive to sell their potatoes to the co-operative.

In sum, tobit estimation produces mixed results. The hypothesis on the positive relationship between asset specificity and the share of co-operative is not confirmed. Our results provide more support to the positive link between diversification and the share of co-operative. Similarly, estimations show the positive role of reputation in selling product via co-operative. Finally, the size of farms is negatively related to the share of co-operative.

4. Conclusions

In this paper we have analysed the potential benefits and costs of the marketing cooperatives in Hungary employing transaction cost economics framework. The results presented add to a small literature on the marketing cooperatives in transition agriculture. We found that the quantity, the existence of contract, flexibility and trust are the most important factor for farmers to selling their product via cooperative. The cluster analysis provides some additional insights regarding farmers' choices. Namely, direct benefits including price, input finance extension services and speed of payments from cooperative membership have also important role. The most striking result is that the diversification and reputation has positive influences on the share of cooperative. Furthermore, large farmers have less willingness to sell their product to the cooperative. Surprisingly, asset specificity has rather negative effects on the share of cooperative.

Acknowledgement

The research was partly supported by the Bolyai Janos Scholarship.

References

Bárdos, K., Fertő, I (2006). The Contract Choice of Retailers in Hungarian Beef Sector. in. Friztz, M., Rickert, U., Schiefer, G. (eds.): Trust and Risk in Business Networks, 509-516, Universität Bonn-ILB Press, Bonn

Boger, S. (2001). Quality and contractual choice: a transaction cost approach to the Polish hog market. *European Review of Agricultural Economics* 28, 241-261.

Boger, S., Beckman, V. (2004). Courts and contract enforcement in transition agriculture: theory and evidence from Poland. *Agricultural Economics* 31, 251-263

Dries, L., J.F.M. Swinnen (2004). Foreign direct investment, vertical integration and local suppliers: evidence from the Polish dairy sector, *World Development* **32,** 9, 1525–1544.

Fertő, I (2006). The Contractrual Relationships in Hungarian Horticultural Sector. In. Curtiss, J., Balmann, A., Dautzenberg, K., Happe, K. (eds.): Agriculture in the Face of Changing Markets, Institutions and Policies. Challenges and Strategies. 184-193. Institute für Agrarentwicklung in Mittel- und Osteuropa, Halle,

Fertő, I., Szabó, G.G. (2002). The Choice of Supply Channels in Hungarian Fruit and Vegetable Sector. Selected paper presented to the American Agricultural Economics Association 2002 Annual Meeting, held in Long Beach, California.

Fertő, I., Szabó, G.G. (2004). Transaction Cost Economics and Agricultural Co-operatives: A Hungarian Case Study. In. Bremmers, H.J., Omta, S.W.F., Trienekes, J.H. and Wubben, E.F.M. (eds.): Dynamics in Chain and Networks. 245-251. Wageningen Academic Publishers, Wageningen.

Gorton, M., Dumitrashko, M. White, J. (2006). Overcoming supply chain failure in the agri-food sector: A case study from Moldova. *Food Policy*, 31, 90-103.

Gow, H.R., Swinnen, J.F.M. (1998). Up- and down-stream restructuring, foreign direct investment and hold-ups in agricultural transition. *European Review of Agricultural Economics*, 24, 331-350.

Gow, H.R., Streeter, D. H., Swinnen, J.F.M. (2000). How private contract enforcement mechanisms can succeed where public institutions fail: the case of Juhocukor a.s. *Agricultural Economics* 23, 253-265.

Hair, J.F., Anderson, R.E., Tatham, R.L., and Black, W.C. (1998). Multivariate Data Analysis. Prentice Hall, New Jersey

Rudolph, D.W. (1999). Vertical Organization of Agribusinesses in Transition Economies: Hungarian Production Systems or Agricultural Franchising? *Agribusiness,* 15, 25-40.

Szabó G. G., Bárdos, K. (2006). Contracts in agribusiness: A survey in the Hungarian dairy sector. In. Bijman, J., Omta, S.W.F., Trinekens, J.H., Wijnands, Wubben, E.F.M. (eds.): International agri-food chains and networks. Management and organization. Wageningen Academic Publishers, Wageningen, the Netherlands, 65-80

Williamson, O.E. (1985): The Economic Institutions of Capitalism. Free Press, New York.

Zaharieva, E., Gorton, M., Lingard, J. (2003). Procurement mechanisms and the emergence of new governance structures in CEECs: evidence from the Bulgarian wine industry. *Journal of Purchasing & Supply Management*, 9, 235-245.