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The Importance and Role of Trust in Agricultural Co-operation – Some Empirical Experiences from Hungary

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Abstract

This paper examines the relations of trust in agricultural cooperation from two aspects. On the one hand, it gives a short review of relevant literature, with special regard to agri-food economy. On the other hand, it uses the results of empirical survey for the analysis of trust in machinery sharing arrangements of Hungarian agricultural producers. In connection with this, the trust is examined in two dimensions: contractual and competence trust. Our results prove that there is a positive correlation between the level of trust and the farmers' activity in cooperative agreements. It could also be proved that the trust need is very different in the different fields of cooperation. It is a tendency that the contractual trust is more important in more intensive, higher-dependence cooperation activities, while competence trust becomes into the foreground in the more extensive solutions.

1. Introduction: background, motivation and aim

The positive economic impacts of cooperation between farmers in many areas of agricultural production – with special regard to machinery use – have been examined by researchers both in Europe (see e.g. Larsen, 2008) and in the United States (e.g. Long and Kenkel, 2007). The above researchers point out that the partnership of farmers might have a major role in improving the profitability of farms and reducing the costs of production. In this sense, the cooperation of farmers in the agricultural economies of countries with structural and efficiency problems can be especially important in the achievement of goals of sustainable agriculture.

In the 1990s, there were some trials in Hungary (too) to introduce the capital-efficient machine operation arrangements and partnerships (e.g. machinery ring), but these were not as successful as it was hoped by the professionals at that time. The empirical research on the subject points out that the reason for failure is the low cooperation willingness of farmers (Takács et al., 2006; EUROLAN, 2005). The negative experiences have motivated the present research, too.

The cooperation willingness of farmers, as the basic condition of efficient organization and operation of communities based on human cooperation, has already been examined by a lot of researchers. The key role of trust factor has been clearly proved (see Section 2 and 3). The main objective of the present research is to examine the role of trust – in this regard - in machinery sharing arrangements.

The structure of the paper is organised as follows: after introduction, the second section briefly reviews the relevant current literature regarding trust with special emphasis on the agri-food economy. In section three role of trust in Hungarian agricultural co-operation is introduced including the review of some empirical studies. Section four presents model, data and results of an empirical research on machinery-sharing arrangements in Hungary. Finally, we draw conclusions with implications for further research.

2. Different approaches to trust[1] with special emphasis on the agri-food economy

Trust is very important in human relations, thus it is very significant in the cooperation among farmers, too. Questions of trust – as research topic – have become into the focus of interest in many scientific fields during the recent decades.

Trust as a subject of study in (agricultural) economics is a relatively new phenomenon in spite of the fact that it has been used widely in sociology, anthropology and other "soft" disciplines. However, in the last 25 years the number of publications on trust in the economics literature has grown vastly. Some of them contain one or more definitions of trust or some classifications of categories related to the term. Here only some very important references will be made.

To be able to understand the development of trust in co-operatives and possible ways to influence it, different authors (e.g. McAllister, 1995, Wilson, 2000; Borgen, 2001; Hansen et al., 2002; Szabó, 2010 etc.) classify many types of trust (e.g. cognitive and affective types etc.) as well as different levels of trust in co-operative organizations (e.g. between two members, among multiple members in general, as well as between the members and management).

One of the most cited paper is by McAllister (1995). The author identifies two main types of trust: affective and cognitive. The former is more subjective and emotional bonded, while the latter is mainly based on rational calculations and empirical evidence. Hansen et al. (2002) develop these categories further and also use a process based approach. They also distinguish two types of trust: among members and also between members and the management.

Wilson (2000) classifies different trust hierarchies (Wilson, 2000: 5), as well as giving an overview and critique of social capital and trust, including references to agribusiness economics. He also examines the changing types of trust in business relationships (trust mix) over time and states that weak trust can be changed into semi-strong trust or later even into strong trust. He also argues that trust which alters the terms of trade can reduce transaction costs and create additional (time) resource and flexibility for the management.

Based on a large volume of (agricultural economics) literature, Sodano states "…that trust is essential to guarantee the success of cooperative relationship." (Sodano, 2002: 104) Referring to the existing literature, she also emphasizes "…the role of trust in facilitating vertical contractual relationship as well as horizontal coordination in the agricultural sector through grower associations and cooperatives" (Sodano, 2002: 105). In searching for a "workable" definition of trust, Sodano presents two main types of trust:

1. Trust as a form of social organization (impersonal trust), and
2. Trust as an exchange coordinating means or governance structure (interpersonal trust).

Contrary to Williamson (1993), she thinks that the connection between trust and transaction cost economics is more complementary rather than alternative in approaching to organizational problems. She also examines the role of trust and vertical coordination in the food system. By reviewing the literature she states:

"1. Networks, and primarily strategic alliances seem to be the best organizational firm's response to new challenges …
2. Trust is a basic asset required to build stable and effective networks.

[1] Trust can be viewed as part of social capital (Szabó et al., 2005; Tömpe, 2008; Coleman, 1990) etc.) which is even larger context and it can be used for a more complex approach to rural and family enterprise development.

3. The kind of trust with the highest effectiveness ("productivity") in promoting networks is the less rational one ….
4. Supply chain management through inter-organizational network is generally expected to enhance total system efficiency and welfare" (Sodano, 2002: 109).

Bakucs et al. (2008) give a theoretical background of trust in agricultural co-operatives, including references for more detailed reviews. Fairbairn (2008) in searching for the co-operative advantage and questioning whether co-operatives should have social goals as well, apart from economic ones, states: "To realize the importance of trust and social capital to co-operatives – the importance of culture – is to some extent to return to the roots of co-operation (Fairbairn, 2008: 207). Török and Hanf (2009) also argues that "trust plays an important role for farmers to join a marketing cooperative in transition countries" (Török and Hanf, 2009: 1).

3. Role of trust in agricultural co-operation: selected empirical studies from Hungary

Regarding transition economies, theoretically marketing co-operatives may solve many problems of transaction related problems via horizontal and/or vertical coordination. However, the number of co-operatives is still limited in transition countries like Hungary, although "…trust plays an important role for farmers to join a marketing cooperative in a transition country" (Bakucs et al., 2007, 2008). One possible explanation for this phenomenon is the lack of trust and willingness to co-operate among producers, as well as between farmers and their business partners (Bakucs et al., 2008). Analysing the most important causes to join a co-operative, Bakucs et al. find „…that the quantity, the existence of contract, flexibility and trust are the most important factors for farmers to selling their product via cooperative" (Bakucs et al., 2007: 15).

Bakucs et al. (2008) investigated the impacts of trust among the members, as well as between the members and the management in the case of Hungarian Mórakert co-operative. According to the authors' knowledge, this paper was the first to systematically investigate different types of trust among members of a marketing co-operative and between members and management of a co-operative in a transition country. They focused on the effect of trust on co-operative membership performance, satisfaction and their commitment to remain a part (member) of the co-operative according to the hypotheses and findings of Hansen et al. (2002), which analyze the role of trust in cooperative performance.

The results by Bakucs et al. (2008) suggest that trust among co-operative members and trust between member and management have positive effects on group cohesion. They also find, as did Hansen et al. (2002), that affective trust has a greater impact on group cohesion than cognitive trust on both levels. In addition, trust among members has a greater impact on group cohesion and members' satisfaction than trust between members and the management (Bakucs et al., 2007).

Dudás (2009), analyzing the co-operative's role in coordinating fruit and vegetable producers, deals with trust issues as well. His survey was based on a questionnaire used by Bakucs et al. (2007, 2008). Dudás summarizes his empirical results regarding the impact of trust on co-operative members' group cohesion, performance and satisfaction (emphasis in original) as follows: "Producers' low willingness to cooperate is possibly due to lack of trust. In a questionnaire survey I proved that at ZÖLD-TERMÉK

Cooperative trust has a decisive impact in the development of group cohesion. More precisely, affective trust has a greater impact on group cohesion than cognitive trust. I have found that group cohesion has a positive impact on members' performance and satisfaction**.** Furthermore, it is again affective trust that has a greater impact on members' performance and satisfaction, not cognitive trust. The greater effect of affective trust implies that the emotional foundations of an association and cooperation are stronger than tangible economic results. A PO (Producers' Organization, authors) management may improve the cohesion within the cooperative by increasing its own trustworthiness and strengthening personal contacts (both among members and between members and management). This way its members would be satisfied and stay cooperative members" Dudás (2009: 21).

Forgács (2006) examined two Hungarian agricultural co-operatives as case studies based on interviews. "Field work was carried out in a traditional cooperative, BÉKE, and in a newly-established Purchasing and Marketing Cooperative, HAJDÚ GAZDÁK (PMCHG)" (Forgács, 2006: 23). The most important findings of the study regarding trust and opportunism are the following: "Members in both co-ops regarded trust and reciprocity as important elements of social capital. However, their approach to the issue reflects different standpoints. Trust towards formal institutions differed in the two co-ops. Members of PMCHG had low levels of trust in current government officials and EU institutions. In contrast, BÉKE members had more trust in national government and their trust in EU institutions was also above average. However, where trust levels in state institutions were low, to reduce transaction costs people looked for informal institutions to solve their problems" (Forgács, 2006: 32).

It is also very interesting that the study applies a macro-level approach in connection to a micro-level one. It is remarkable how farmers trust in their own organization in order to solve their (marketing) problems (such as lowering transaction costs) instead of relying on governmental and/or EU institutions. Forgács (2006) also states: "In the two cooperatives the role of leadership differed somewhat. In the BÉKE" Co-op, the management's goal was to avoid breaking up the cooperative community, while at PMCHG the key players' central responsibility was to persuade individual farmers to begin and solidify cooperation in order to build up a new cooperative community. In both co-ops the trust placed in management indicated that leadership plays an important role in cooperatives" (Forgács, 2006: 35).

4. Empirical research on machinery-sharing arrangements in Hungary

4.1. Theoretical basis for the empirical model

We used the Sholtes trust model as a basis in our research. Sholtes (1998) placed trust in the matrix of loyalty and capability. If the belief in loyalty as well as in capability is high among the partners, then we can speak about trust (Figure 1).

The basic model was adapted with slight modifications. Out of the several trust-definitions in the special literature we approved the approach of Sako (1992), according to which we can speak about trust when one of the business partners expects the other to act rationally and in a mutually acceptable way. When discussing the types of trust Sako distinguished – among others – the contractual trust and the competence trust. (1) Contractual trust: it is based on the mutually accepted standard of honesty and keeping the promises; when one of the contracting parties presumes that the other party keeps his

words; (2) Competence trust: when the business partner presumes that the other party possesses the necessary technical and management competence to fulfill the committed tasks. These two types of trust were transferred into the Sholtes model.

		Capability *"The value I consider my partner is capable and qualified"*	
		Low	High
Loyalty *"The value I believe my partner likes me and he will support me in future"*	High	SYMPATHY	**TRUST**
	Low	MISTRUST	RESPECT

Source: based on Sholtes (1998)

Figure 1: Level of trust among business partners on the basis of loyalty to each other and the presumed capability level

The selection of the above trust types was made on the basis of experiences of former empirical research projects (Takács et al., 2006).

4.2. Material and methods

Data

Our examinations are based on primary databases. In order to explore the correlations between trust and willingness to cooperate in machinery sharing arrangements we have performed questionnaire survey in the South-Eastern part of Hungary, in the Southern Great Plain region, in Békés county. The research involved the private farmers of three statistical micro regions, namely Orosháza, Békéscsaba and Mezőkovácsháza. The survey was made between November 2008 and October 2009 and reviewed the economic year of 2007-2008. We collected information about 132 private farms (n= 132) during the survey[2].

Definition of areas of machinery sharing arrangements, measurement models

Cooperation, as an expression is a wide concept – even considering machine use – and it can be implemented in a lot of forms. During the research – based on former research experiences – we have examined the farmers' activity in three areas of machinery sharing:

(1) Machinery services based on mutuality (COOP_1): In our approach this solution is the most extensive form of cooperation. In this case the farmer performs work with own machinery for fellow farmers on mutual basis. The respondents quantified the activity in the questionnaire by evaluating each work process on a scale from one to four. Utilizing this information, the following equation was set up to express the value of activity rate:

[2] It is important to note that in statistical terms we do not regard the sample representative either at national or county level, but on the basis of local-level representativeness of the sample we presume that the results collected from the examined region can be generalized because the region is not much different from the key agricultural areas of the country in regards to economy and society.

$$COOP\_1 = \sum_{i=1}^{n} v_i \qquad i = 1, 2, 3 \ldots n \qquad (1.)$$

where: v_i = frequency of cooperation connected with work process No. *i* [range 0-3: 0- never; 1- rarely: 1-2 times a year; 2- medium: 3-4 times a year; 3- frequent: more than 5 times a year]; *n* = number of work processes [pcs].

(2) Mutual exchange of machinery (COOP_2): this solution means a machinery sharing arrangement where the farmer lends his own asset to his fellow farmer. According to the above concept, the activity can be described as follows:

$$COOP\_2 = \sum_{i=1}^{n} v_i \qquad i = 1, 2, 3 \ldots n \qquad (2.)$$

where: v_i = the participation activity of agricultural machinery No. *i* in cooperation [range 0-3: 0- never; 1- rarely: 1-2 times/year; 2- medium: 3-4 times/year; 3- frequent: more than 5 times/year]; *n* = number of machinery [pcs].

(3) Joint ownership and use of machinery (COOP_3): it is the most intensive form of joint machine use, where the farmers carry out a joint investment and share the acquired technical resource. In this case the activity rate was determined as follows:

$$COOP\_3 = \sum_{i=1}^{n} v_i \qquad i = 1, 2, 3 \ldots n \qquad (3.)$$

where: v_i = joint ownership of No. *i* agricultural machinery of the farm [0, 1 dichotomic variables: 0-no, 1-yes]; *n* = number of machinery [pcs].

Considering the three types of cooperation activity in narrow sense we developed an aggregated willingness-to-cooperate rate (WTC-rate) which describes the total cooperation activity of the observation units. We needed objective weights for correct and precise definition of indices. These weights should be rendered to the different areas of cooperation, thus expressing the different intensity of individual cooperation arrangements. The principal component analysis (PCA) helped us in the solution of the problem. We used the principal component weights in the so-called ***A*** matrix made by multivariate statistical method. According to this, the aggregated index was determined as follows:

$$WTC-rate = \frac{COOP\_1 \cdot A_{COOP\_1} + COOP\_2 \cdot A_{COOP\_2} + COOP\_3 \cdot A_{COOP\_3}}{A_{COOP\_1} + A_{COOP\_2} + A_{COOP\_3}} \qquad (4.)$$

where: *WTC-rate* = aggregated index of cooperation activity in case of the given observation unit [-]; *COOP_x* = the value of activity rates that are typical in the individual areas of machinery sharing arrangements [-]; A_{COOP_x} = the linear correlation coefficient of cooperation arrangements with principal component (***A*** matrix of PC-1) [-].

Measuring of trust

In order to examine the farmers' trust we collected information on the basis trust concepts detailed above (see section 4.1). Two questions were used for measuring the level of contractual trust and three questions for competence trust (Questions used for measuring the trust level: (1) *Contractual trust:* I think my fellow farmers definitely keep their words; I think my fellows would never do any harm to me if the conditions of farming

changed. (2) *Competence trust:* I trust that if any of my fellow farmers provides any machine work to me, the quality of his work will be the best possible under the given conditions; I trust that if any of my fellow farmers provides any machine work to me, it will be done at the most appropriate time, under the given conditions; I trust that if I lend a machine or tool to any of my fellow farmers, he will use it with the due precautions). The respondents evaluated the replies on a scale from 1 to 7, where the opinions were expressed according to the following: 1= „I do not agree at all", 7= „I agree maximally". The expression of each level of trust was made with a simple arithmetical calculation of average.
The validity of Sholtes model was tested (see Section 4.1) with ANOVA model and the belonging post-hoc tests (based on Levene-test: Scheffe- and LSD-test). We have also used regression statistical models (linear and binominal logistic regression).

Hypotheses

Considering the theoretical basis we have examined the role of contractual trust and competence trust in joint machinery sharing arrangements. Two hypotheses were drafted in connection with Sholtes model:

Hypothesis 1 (H1): Machinery sharing arrangement will be the most typical in case of high-level contractual and competence trust.

Hypothesis 2 (H2): Considering the examined areas of cooperation, the role of competence trust is determinant in the more extensive forms of cooperation, while contractual trust is required for the more intensive solutions.

4.3. Empirical results

Testing of the Sholtes model

We divided the contractual and competence trust scales into 3 parts each: 1-2 degrees = meant low levels; 3-5 degrees= medium; and 6-7 degrees= meant high levels[3]. Comparing the two dimensions, the average activity rate (WTC-rate) values are summarized in Table 1. The methods of descriptive statistics prove that the presumption based on Sholtes model was correct because low trust levels were paired with lower average activity rates, while the higher levels attracted higher activity rates. As regards the other trust level combinations the values were calculated between the two extreme values.
We have made control examinations for validating the results. One-way ANOVA model complemented with post-hoc tests was used for comparing the cell average. The results proved that there are significant differences between the cooperation activities of groups of perfect distrust (group 1) and unconditional trust (group 8) – using the titles from the original models. It is interesting, however, that the expected value of activity rate in group 3, which represents the respect towards fellow farmers, does not differ significantly from any of the averages of other groups. None of the farmers belong to the category of pure sympathy, no such combination could be identified in the examined sample. The

[3] The determination of categories was preceded by a histogram examination, that proved the reasonability of formed degrees through the „peaks" of frequencies.

experiences collected in the groups of "trust with reservations" that is medium trust level point out that the trust approach based on Sholtes model cannot give perfect and exact explanation for the cooperation activity of farms either. The validation of the model, however, can be considered successful. The final conclusion is that H1 hypothesis could be proved only partly.

Table 1: The average values of cooperation activity rates (WTC-rates) in each dimension of trust

Dimensions of trust		Degree of trust in Capability			
		Low	Medium	High	Total
Degree of trust in Loyalty	Low	0.42 *(s=0.51)* (1)	1.17 *(s=0.90)* (2)	1.32 *(s=1.20)* (3)	0.99 *(s=0.91)*
	Medium	0.33 *(s=0.51)* (4)	1.28 *(s=0.96)* (5)	1.66 *(s=1.41)* (6)	1.24 *(s=1.06)*
	High	- -	1.56 *(s=1.16)* (7)	1.99 *(s=1.33)* (8)	1.71 *(s=1.22)*
	Total	0.39 *(s=0.50)*	1.31 *(s=0.99)*	1.72 *(s=1.31)*	**1.27** ***(s=1.08)***

Source: own calculation

On the basis of the results it can be stated that both the contractual and the competence trust have important roles in machinery sharing arrangements although the model also underlines that the weight and importance of trust types is not equal[4], and this fact motivates further examinations.

Contractual trust versus competence trust

In further parts of our work we used regression models for analysing the role of individual trust types in different cooperation agreements. The main results of our examination are summarized in Table 2.

The aggregated cooperation willingness values (WTC-rate) were significantly determined by both the contractual and competence trust levels in the multivariate linear regression model. As regards the force of explanatory variables, the competence trust has much greater impact than the level of loyalty trust. It has proved our previous statements. The direction of the impact – as it has been expected – is positive. The two explanatory variables together could explain 13.5% of WTC-rate dispersion.

The activity values in machinery services based on mutuality (COOP_1) were determined only by the trust in the competence of the fellow farmer – according to the statistics. The

[4] The aggregated average values of the categories of the two trust dimensions prove that the individual trust types affect the cooperation willingness differently. In case of contractual trust 0.99 belongs to the lowest trust level and 1.71 to the highest one, while in case of competence trust these values are between 0.39 and 1.72. The slope of the average cooperation activity curves is different. (The average slope determined with the simplest estimation procedure – according to $\Delta y/\Delta x$ correlation – is 0.24 in the whole x definition range in case of contractual trust, while it is 0.44 in case of competence trust.)

trust in loyalty shows great independence from this. All these prove that this solution is the "most extensive" form of machine use cooperation, where the most important factor is the belief in the partner's capability to fulfill his undertaken tasks.

Table 2: Effect of contractual (LOY_TR) and competence trust (CAP_TR) on cooperation willingness (summarizing table of results of regression analysis)

Independent variable	Dependent variables							
	WTC-rate		COOP_1		COOP_2		COOP_3	
	R^2= 0.135		*R^2= 0.093*		*R^2= 0.100*		*Nag. R^2= 0.113*	
	B	*Sig.*	*B*	*Sig.*	*B*	*Sig.*	*B*	*Sig.*
LOY_TR [-]	0.170	0.046	0.000	0.997	0.241	0.037	0.168	0.310
CAP_TR [-]	0.304	0.000	0.327	0.000	0.181	0.006	0.456	0.045

Source: own calculation (n= 132)

The multivariate model analyzing the machine lending cooperation (COOP_2) shows interesting results. Both explanatory variables have become significant model elements, although value B indicates that the level of loyalty trust has greater impact and gives better explanation to machine lending activity than competence trust. Although the difference in explanatory force is slight, but confirmed. The two variables together in the model explains only 10% of the heterogeneity of cooperation activity.

The correlations between machinery sharing (COOP_3) and the discussed trust dimensions are examined in the frames of binominal logistics regression[5]. Analyzing the individual impact of variables it is obvious that only the impact of competence trust can be regarded significant before entering the model, the loyalty trust is not significant. It partly contradicts to preliminary expectations, because it was presumed that the role of contractual trust would become determinant at the highest level of cooperation. In total the model – following its construction – is significant and can explain 11.3% of the total dispersion, according to Nagelkerke R^2. Following the involvement of trust variables in the model, the competence trust has kept its significance, so the given variable essentially contributed to the model. On the basis of this we can conclude that the joint machine ownership, as form of cooperation is based mostly on competence trust, although the loyalty trust also has some not negligible – although statistically only partly confirmed – role. Hypothesis 2 could be confirmed only partly due to the above revealed interrelation.

5. Conclusions

The results of – non-representative – empirical research made in agricultural enterprises of Békés county indicate that farmers in the new situation following the social transition gave wrong answers – in the long run - to the occurring problems. It was a general phenomenon that the social ties were broken due to the difficult economic and social conditions and it led to massive distrust. Distrust has also emerged in the relations

[5] There were only 12 farms in the whole sample which used this form of cooperation, and only 2 farms could claim that they have more than one machinery in joint ownership, thus the linear model could not be used for exploring the correlation. COOP_3 variable was transformed into dichotomous variable, value 0 was given to those farms where this form of cooperation was not used and value 1 was given to those where it was used.

between farmers and induced the worst possible replies to the occurring problems. When looking for solutions, the farmers were motivated for independence instead of cooperation and it has made the difficult situation even worse. This phenomenon can be traced even today, the level of trust is still very low. It is a positive sign, however, that a young generation of farmers have emerged – free from the real or presumed injuries of the pre-transitional period - and they have higher trust levels and are more open to cooperation, to the ideas of joining forces and economic advantages.

The above mentioned empirical results cannot be generalized since they are only case studies and all cases have geographical and commodity limitations as well. Thus, further research is needed to clarify the role of trust in the success or failure of agricultural co-operation in Hungary and other transition countries.

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