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FACTORS OF TRUST IN MACHINERY SHARING ARRANGEMENTS

CZYNNIK ZAUFANIA W UMOWACH UDOSTĘPNIANIA MASZYN

Key words: cooperation, Hungary, Sholtes' model, trust
Słowa kluczowe: współpraca, Węgry, model Sholtesa, zaufanie

Abstract. The paper examines the drivers of trust in the machinery sharing cooperation arrangements of Hungarian fieldcrops farms. Our research has focused on the role of two factors on the basis of the widely referred trust model: faith in loyalty and capability. The empirical results clearly confirm the hypothesis of the theoretical model, namely, which partners will trust each other if their faith is high both in loyalty and in competence. Our research has also pointed out that the level of trust between partners is determined differently by the two examined factors: it is statistically proved that the impact of faith in loyalty is higher.

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 [Larsen 2008] and in the United States [Long, 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 (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 [Larsen 2008, Hansen et al. 2002, Forgács 2006, Bakucs et al. 2008, Dudás 2009, Szabó 2010, Takács, Baranyai 2010]. The aim of this research is to explore those factors that have fundamental role in trust development between fieldcrop farmers.

Theoretical background

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 [McAllister 1995, Wilson 2000, Borgen 2001, Hansen et al. 2002, Szabó 2010, Sholtes 1998]. We used Sholtes's trust model as a basis in our research (based on earlier research experiences [Takács et al. 2006].

Sholtes (1998) placed trust in the matrix of loyalty and capability. We can speak about trust if the faith in loyalty as well as in capability has high values among the partners (Fig. 1). The present study aims to test this theoretical model empirically.

		Capability/*Możliwości* "The value I consider my partner is capable and qualified"/ *Wartość, w którą wierzę, że mój partner ma możliwości i kwalifikacje*	
		Low/*Niska*	**High/*Wysoka***
Loyalty/*Lojalność* "The value I believe my partner likes me and he will support me in future"/ *Wartość, w którą wierzę, że mój partner mnie lubi i będzie mnie wspierać w przyszłości*	**High/*Wysoka***	sympathy/*współczucie*	trust/*zaufanie*
	Low/*Niska*	mistrust/*nieufność*	respect/*szacunek*

Figure 1. Development of trust among partners on the basis of loyalty to each other and the presumed capability level
Rysunek 1. Rozwój zaufania pomiędzy partnerami na podstawie lojalności wobec siebie i domniemanego poziomu możliwości
Source: own study based on Sholtes [1998]
Źródło: opracowanie własne na podstawie Sholtesa [1998]

Hypothesis. We have drafted and examined the following hypotheses in our research:

H_1. Higher level of trust is developed if the faith in loyalty as well as in capability has high values among the partners.

H_2. The faith in the loyalty and capability of partners is equally important regarding the level of trust.

Material and methods

Data. Our examinations are based on primary databases. In order to explore the factors of trust 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 private farmers of three statistical micro regions (NUTS-4 level), 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[1].

Table 1. The questions of the survey
Tabela 1. Pytania do kwestionariusza wywiadu

Trust/*Zaufanie*
Q1. How much do you trust your fellow farmers in general? (TR)/ *Jakie jest Twoje zaufanie do kolegów rolników?*
Loyalty (LOY)/*Lojalność*
Q2. I think my fellow farmers definitely keep their words (loy_1)/ *Uważam, że mój kolega rolnik zawsze dotrzymuje słowa.*
Q3. I think my fellows would never do any harm to me if the conditions of farming changed (loy_2)/ *Uważam, że mój kolega rolnik nigdy nie wyrządzi mi szkody jeśli warunki gospodarowania ulegną zmianie.*
Capability (CAP)/*Możliwości*
Q4. 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 (cap_1)/*Wierzę, że jeśli któryś z moich kolegów rolników będzie świadczył usługi maszynami dla mnie, jakość jego pracy będzie najlepsza w danych warunkach.*
Q5. 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 (cap_2)/*Wierzę, że jeśli któryś z moich kolegów rolników będzie świadczył usługi maszynami dla mnie, czas wykonania tej pracy będzie najodpowiedniejszy w danych warunkach*
Q6. I trust that if I lend a machine or tool to any of my fellow farmers, he will use it with the due precautions (cap_3)/ *Wierzę, że jeśli pożyczę moją maszynę któremuś z moich kolegów rolników, będzie jej używał z ostrożnością.*

Source: own study
Źródło: opracowanie własne

[1] 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.

Measures. We used the trust model of Sholtes in compiling the research questionnaire (see theoretical background). According to this, one question (*Q1*) was put for measuring the general level of trust in farmers. The faith of respondents in the loyalty of fellow farmers was measured by two items (*Q3* and *Q4*), while the opinion about their capability was involved in three items (*Q4*, *Q5* and *Q6*). The respondents could reply to each question in a scale from 1 to 7. The questions in the survey are presented in the Table 1.

On the basis of questions concerning the trust in the loyalty and capability of fellow farmers we have made an aggregated scale (*LOY* and *CAP*) according to the following relations:

$$LOY = \frac{loy\_1 \cdot A_{loy\_1} + loy\_2 \cdot A_{loy\_2}}{A_{loy\_1} + A_{loy\_2}} \tag{1}$$

and

$$CAP = \frac{cap\_1 \cdot A_{cap\_1} + cap\_2 \cdot A_{cap\_2} + cap\_3 \cdot A_{cap\_3}}{A_{cap\_1} + A_{cap\_2} + A_{cap\_3}} \tag{2}$$

where:

LOY and *CAP* – values of aggregated scale in case of given observation units,

loy_x and *cap_x* – values of replies given to questions,

A_{loy} and A_{cap_x} – linear correlation coefficient of items with Principal Components[2].

We have used the following statistical methods in the research: descriptive statistics, t-tests, one-way ANOVA with Post Hoc Tests, hierarchical ANOVA and linear regression.

Results

According to the experiences of empirical research, the level of average trust among the surveyed group of farmers is a bit higher than medium, the average is 3,77 (Tab. 2). As it is well-known, the respondents used a scale from 1 to 7 to evaluate their own level of trust towards fellow farmers. The replies were distributed as follows: 21% in the sample categorically declared, that: „today you cannot trust anybody in the world…!", they indicated the trust level 1. Another 19% chose level 2, thus indicating that they do not really trust their fellows. The weight of those with intermediate trust levels (scale 3-5) was 30%, while the upper end (scale 6 and 7) of trust scale was marked by 17 and 13%.

The questions of trust among partners was examined in relation to faith in loyalty and capability. According to the results, all of the possible replies related to the faith in the qualities of fellow farmers received higher average marks than the items used for measuring the loyalty. Comparing the values of aggregated scales (*LOY* and *CAP*), the higher level of faith in capability can be statistically proven[3]. It is an interesting experience, that there is only a medium-strong interrelation[4] between the two variables, which indicates that the two examined approaches represent different dimensions according to the farmers, too.

In the next phase of research, the testing of Sholtes trust model was carried out. The *LOY* and *CAP* scales were divided into two parts (*High* and *Low*) by using the averages belonging to them. On the basis of this, 4 groups were formed. In what follows the level of general trust (*TR*) was examined in these groups (Tab. 3).

Table 2. Descriptive statistics of the variable set
Tabela 2. Statystyka opisowa zmiannych

Describing/*Opis*		**TR**	**loy_1**	**loy_2**	**LOY**	**cap_1**	**cap_2**	**cap_3**	**CAP**
Mean/*Średnia*		3.77	3.69	3.47	3.59	3.96	4.13	3.95	3.94
CI (95%)	Lower Bound/*Dolny przedział*	3.41	3.35	3.16	3.26	3.68	3.83	3.68	3.72
	Upper Bound/*Górny przedział*	4.14	4.01	3.84	3.92	4.22	4.39	4.23	4.16
St. Dev./*Odchylenie standardowe*		2.13	1.96	2.05	1.92	1.61	1.65	1.60	1.27

Source: own study
Źródło: opracowanie własne

[2] The items were considered with different weights in the drafting of aggregated scales. The weights were formed with Principal Component Analysis (PCA) method, by using the so-called *A* matrix values.

[3] Based on Paired-Samples T-Test (Sig.: 0.009).

[4] Pearson's: 0.61 (sig.: 0.000).

Table 3. Level of trust (TR) in the individual groups
Tabela 3. Poziom zaufania w grupie indywidualnej

		Level of capability/*Poziom możliwości*	
		Low/*Niski*	High/*Wysoki*
Level of loyalty/ *Poziom lojalności*	High/*Wysoki*	Group 1/*Grupa 1* TR-mean: 3.85 CI (95%): [3.30-4.39] n=13 (sympathy/*współczucie*)	Group 2/*Grupa 2* TR-mean: 5.69 CI (95%): [5.37-6.05] n=52 (trust/*zaufanie)*
	Low/*Niski*	Group 3/Grupa 3 TR-mean: 1.77 CI (95%): [1.46-2.07] n=47 (mistrust/*nieufność)*	Group 4/Grupa 4 TR-mean: 3.45 CI (95%): [2.55-4.35] n=20 *(*respect/*szacunek)*

Source: own study
Źródło: opracowanie własne

The results of examinations performed with descriptive statistics were checked by one-way ANOVA and Post Hoc Tests, too. Our results clearly prove that the assumption based on Sholtes trust model is correct, it is statistically proven that the average level of trust in individual groups is significantly different: among others it can be observed that the average level of trust in Group 2 is significantly higher than in the other groups, while in case of Group 3, it is lower than in the others. It is very interesting, that the expected values of Group 1 and Group 4 are not essentially different from each other (Tab. 4). On the basis of the above, our Hypothesis 1 (H1) is confirmed.

On the basis of our hypothesis 2 (H2), we have examined the impact of faith in loyalty and capability on trust (Tab. 5). The analyses made with explanatory models prove that the level of trust is mostly determined by the faith in loyalty, although the impact of faith in capability is also very strong. Although the difference between the impact („strength") of the two variables is differently evaluated by the statistical models (it is smaller according to the ANOVA model, while it is a bit more significant according to the linear regression), the hypothesis 2 (H2) should be rejected.

Table 5. Impact of faith in loyalty (LOY) and capability (CAP) on trust
Tabela 5. Wpływ wiary w lojalność (LOY) i możliwości (CAP) na zaufanie

Factors/ *Czynniki*	**Hierarchical ANOVA model/ *Hierarchiczny model ANOVA***				**Linear regression model/ *Model regresji liniowej***			
	ETA	**BETA**	**Sig.**	**R^2**	**B**	**BETA**	**Sig.**	**R^2**
LOY	0.719	0.512	0.000	0.643	0.734	0.662	0.000	0.717
CAP	0.669	0.411	0.000		0.439	0.263	0.000	

Source: own study
Źródło: opracowanie własne

Conclusions

The paper examines the factors affecting trust in the machine sharing arrangements of Hungarian fieldcrops farms. The trust was analyzed in relation to two factors, the faith in loyalty and capability. Our results clearly confirm the theoretical model, according to which trust is formed if the faith in both the loyalty and the capability is high among the partners. That presumption of the theoretical model, however, is not correct which considers the impact of each factor on the trust the same. Statistical analyses have proved that the loyalty dimension is more important in the development of trust than the faith in professional competence. It is very unfortunate, because – according to the survey – the faith in competence is higher than the faith in loyalty in the Hungarian agriculture. It partly explains the low level of trust.

Our research, of course, has had some limits. The generalization of the received results is difficult due to the low number of sample elements and the regional concentration of sampling.

All these have formed the possibility of extension, which can be projected in two directions: on the one hand, the quantitative extension of research, that is the enlargement of element number and sampling area, on the other hand, the qualitative extension, that is empirical analysis of other trust models.

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Streszczenie

W artykule dokonano analizy zaufania w systemie udostępniania maszyn rolniczych między gospodarstwami prowadzącymi produkcję polową na Węgrzech. Skoncentrowano się na dwóch czynnikach odgrywających kluczową rolę w modelu zaufania: wiara w lojalność oraz możliwości. Wyniki badań wyraźnie potwierdzają hipotezę modelu teoretycznego, iż partnerzy będą mieli do siebie zaufanie, jeśli ich wiara jest duża zarówno w lojalność, jak i kompetencję. Statystycznie udowodniono, iż czynnik wiary w lojalność odgrywa istotniejszą rolę we wzajemnym korzystaniu z maszyn rolniczych.

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