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Economic and social importance of vertical and horizontal forms of agricultural cooperation in Hungary

In the development of a market economy, the ability to cooperate is a major factor determining the competitiveness of economic actors. With complex instruments intended to stimulate cooperation among the actors in farming, the agri-food chain, forestry and rural development, strengthening cooperation is a priority of the Common Agricultural Policy in the current European Union programming period. This paper evaluates the development of different forms of vertical and horizontal cooperation between actors in Hungarian agriculture in the period 2007-2013. Our definition of cooperation is based on a regular market relationship, and our analysis includes not only formal forms of horizontal and vertical cooperation but also the informal networks offering business benefits for producers. The main conclusion is that, owing to the continuing low level of horizontal cooperation in Hungary, high-level vertical integration ensures that producers can achieve a favourable negotiating position, and this in turn reduces the potential for the development of horizontal cooperation. Informal relationships, such as doing favours without charge, are not negligible ways of accessing resources, especially for small farms. A development path for agricultural cooperation in Hungary might be for actors to make collective investments in order to increase value-added and utilise economies of scale, and to organise themselves into alliances, associations, networks and clusters. Beyond the benefits originating from market concentration, these steps could stimulate the dissemination of expertise, improve efficiency and increase innovation capacities.

Keywords: integrators, Producer Groups, Producer Organisations, cooperatives, clusters, machinery rings

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Introduction

In market economies, one of the main success factors of competitiveness is the ability to cooperate (Csizmadia and Grosz, 2012). Strengthening cooperation is a major priority in the European Union's (EU) Common Agricultural Policy (CAP) in the period 2014-2020, so financial support has been extended to all "... cooperation, among different actors in the Union agriculture sector, forestry sector and food chain and other actors that contribute to achieving the objectives and priorities of rural development policy, including producer groups, cooperatives and interbranch organisations" (EC, 2013, p.516).

Essentially, there are two forms of cooperation in agriculture, vertical and horizontal, defined on the basis of the relationships between producers. Integrator companies (organisations registered according to Regulation no. 25/2004 of the Hungarian Ministry of Agriculture and Rural Development) constitute the main type of vertical integration in Hungary. Although they developed into their current form in the late 1960s, large processing companies (such as sugar factories, seed growers and tobacco manufacturers) existed before then, in conjunction with agricultural industrialisation. Through dissemination of modern technologies and organisation of industrial production, they played a significant role in the Hungarian agricultural boom that lasted until the mid-1980s (Enyedi and Reznitzer, 1987). In the past two decades the integrator networks have gone through continuous change. In addition to the other participants, major domestic and international companies (such as Cargill, Glencore and Syngenta) have become market leaders in Hungary. While in the years following political and economic transition – in connection with the incomplete assets of farms – the integrators' main role was mainly input and equipment provision, storage, processing, and commercial and marketing

activities, recently their financing, crediting and innovating functions have become important (Kemény, 2010). The economic importance of agricultural integrators is increased by the provision of inputs and services closely linked to farming processes, and by maintaining direct relationships with the processing and commercial sectors. This hierarchical relationship is based on a contract between the integrator and the producers (Juhász and Mohácsi, 1995).

Many forms of horizontal cooperation (i.e. cooperation between entities of similar size and position) can be found in Hungarian agriculture. The cooperation may be based on marketing and sales collaboration, a common product, or even joint production and storage capacities. The aim is to achieve a common competitive advantage based on economies of scale, or greater purchasing or bargaining power (Sáfrányné Gubik, 2008). Horizontal agricultural cooperation can be either formal or informal. The most common forms of formal horizontal cooperation in Hungary are cooperatives (a traditional form of formal agricultural cooperation registered by the National Tax and Customs Administration of Hungary, NTCA), Producer Groups (PGs), and Fruit and Vegetable (F&V) Producer Organisations (POs), while the informal ones include services provided without charge and machinery cooperatives (Szabó, 2011). In addition, integrator companies and clusters (the spatial concentration of competing enterprises, suppliers and servicing industries of a given fields of activity; Porter, 2000) operate as vertical cooperations covering a considerable part of entire product lines.

Since the 1990s, much research has been carried out in Hungary on the willingness of agricultural producers to cooperate and on the role of the producer organisations. For example, Juhász (1999) studied the F&V sector, Szabó (1999) analysed vertical cooperation and integration in the milk sector, Tóth (2000) looked at the agricultural cooperatives and Dorgai *et al.* (2005) assessed the agro-economic roles of POs and PGs. More recently, Dorgai *et al.* (2010) and Baranyai *et al.* (2013) have shown that, although the

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formal cooperation has increased since the political and economic transition after 1989, the willingness of farmers in Hungary to cooperate, with the exception of some traditionally well-organised sectors (F&V, wine and poultry), is at a low level. Tóthné Heim (2011) found that farmers in the South Transdanubian NUTS 2 region of Hungary have no particular interest in cooperation because of individual interests and high risk aversion. Takács and Baranyai (2010) showed that the willingness to cooperate is lowest among the smallest farms and the highest among medium-sized farms (those with an economic size of 4-8 European Size Units). Dudás and Juhász (2013) pointed out that formal cooperation mainly promotes the interests of the larger producers.

The benefits of cooperation have been widely documented. Wolek and Lopaciuk-Gonczaryk (2006) demonstrated the economic efficiency of informal cooperation. In contrast to the results of Takács and Baranyai (2010), they showed that informal cooperation is the 'capital of the poor', as in Poland it was the strongest among the smallest farms. Through cooperation, farmers could reduce their production costs. This horizontal cooperation is casual; the low incomes prevent the establishment of more developed forms. Horváth (2010) pointed out that among the forms of formal agricultural cooperation the economic role of the F&V POs was increasing. Lanz and Miroudot (2011) showed that besides the F&V POs the role of integrations representing high value-added was also increasing. Szabó (2011) reported that in recent decades a great number of favourable processes started but the horizontal connections of the producer cooperation are still very weak. Seres *et al.* (2011) showed that the development path of POs is not necessarily to involve more members, but rather to increase the sales ratio of the members, the integration of the product chain and the expansion of the PO's services.

This paper examines the development and the relative economic importance of vertical and horizontal cooperation in Hungary in the period 2007-2013. Through comparison of statistical data from different sources, a questionnaire and interviews, we compare the performance of the various cooperation models, identify benefits offered by cooperation over and above those that are already widely known, assess the main constraints to achieving the potential that is possible through cooperation, and evaluate the opportunities and the directions of improvements in cooperation in Hungarian agriculture. Further objectives are to answer the following general questions: what fundamental factors play a role in the development of cooperation, and what are the motivations of the actors and the key success factors and pitfalls? On this basis, the following research questions were formulated: (1) what is the role of the integrator companies in organising the cooperation in connection with the low-level producer relationships; (2) to what extent has the producers' network developed in Hungary since 2007, if at all; and (3) what kinds of developments can be expected in Hungary in the fields of agricultural cooperation.

Methodology

We adopted three approaches in this research. Firstly, official data sets were used to quantify the economic perfor-

mance and the other main characteristics (e.g. the number of organisations and the size of their membership) of the dominant forms of cooperation with formal organisational characteristics in Hungarian agriculture (cooperatives, PGs, F&V POs and integrators) in the period 2007-2013. This was not a simple task as there is no single aggregated statistical database available which is of consolidated structure and upgraded regularly. In the database of the NTCA, only cooperations operating as agricultural cooperatives can be identified clearly; for the other organisational forms it was necessary to identify the formal organisational form on a case-by-case basis according to the organisational registrations. The Ministry of Agriculture maintains records about the PGs and F&V POs, and the County Offices of the Ministry of Agriculture keep records on the organisations registered as integrator companies. Data on clusters which applied for subsidies in the period 2007-2013 were extracted from the support database of the Hungarian National Development Agency.

Secondly, in 2013-2014 two institutes of the Hungarian Academy of Sciences, namely the Institute for Sociology of the Centre for Social Sciences, and the Centre for Economic and Regional Studies, jointly conducted a questionnaire survey of a representative sample of one thousand farmers selected on the basis of farm characteristics (for example, size and sector) and geographical location. The survey covered eight LAU 1 micro-regions of Hungary⁴ and the base population consisted of natural and legal persons who received CAP direct payments in 2012 and farmed more than one hectare of land. From the results of this survey we analysed the willingness of farmers to cooperate, both formally and informally. The questionnaire included questions on in-kind and community use of land and machinery, from the aspect of formal cooperation on purchase of farm inputs, sale and services within the organisation and on the membership of organisations; while the questions on informal cooperation covered the categories of acquisition of information, discussions of problems and general confidence.

We tested for statistically significant correlations in the survey sample between some of the parameters of the farms and the farmers, farmers' attitudes to cooperation and different forms of cooperation. Pearson product-moment correlation was run using IBM® SPSS® Statistics 22 (IBM, Armonk, North Castle NY, USA). In instances where one of the variables (e.g. gender) was measured on a dichotomous scale, a point-biserial correlation was used to measure the strength and direction of the association that exists between the continuous variable and the dichotomous variable.⁵

Thirdly, the potential for the development of agricultural cooperation in Hungary was explored with the help of structured, in-depth, face-to-face interviews conducted in 2014 and 2015 with 19 leaders of agricultural organisations involved in formal cooperation activities. Interviewees were selected to be representative in terms of professional management, membership and the various sectors and organisational forms. We chose three clusters involved in agriculture

⁴ Fehérgyarmati, Hajdúnánási, Marcali, Bóly-Mohácsi, Zalaszentgróti, Budakeszi-Tatabányai, Nagykőrösi and Gyöngyösi.

⁵ See <https://statistics.laerd.com/spss-tutorials/point-biserial-correlation-using-spss-statistics.php>

and visited the representatives of six relevant professional organisations (four of the larger producer councils (F&V, milk, poultry and pig) and two bodies representing farmers' interests with large memberships). Further, on the basis of recommendations from the professional bodies we selected the managers of six successful organisations including PGs and F&V POs and four integrator companies. We asked the interviewees questions on their activities and on the operation of their organisation as well as on any new factors assisting or hampering the cooperation over and above those that are already widely known.

Results

Relative importance of vertical and horizontal agricultural cooperation

There are almost 1500 formal agricultural cooperations in Hungarian agriculture and their economic role is shown by the fact that their combined net revenue (generated mainly from sales of inputs and agricultural machinery, the processing and marketing of agricultural products, and associated services) in 2013 (HUF 2,065 billion) was comparable to the total output (the sales of farm products

and the value of on-farm consumption supplemented with year-end changes of stocks) of Hungarian agriculture (HUF 2,313 billion) (Table 1). Their total assets (HUF 1,431 billion) accounted for nearly one third of the HUF 4,921 billion in total assets of farms engaged in commodity production and, at HUF 50.2 billion, one quarter of their pre-tax profits. Agricultural cooperations made one third of all agricultural investments by value (HUF 90 billion cf. HUF 259 billion) and provided 11.4 per cent of the 314,800 agricultural and food sector jobs. In terms of financial indicators (net revenue, total assets, profit before tax, investment) and the number of employees, the role of integrators among all forms of formal cooperation is outstanding, for example accounting for 80.5 per cent of net revenue.

The great importance of integrators is also demonstrated by the number of integrated farms. Enterprises contracting for production coordinate the production of almost 120 thousand farms (Table 1). By contrast, the agricultural cooperatives include 45 thousand producers, while the F&V POs have 15 thousand and the PGs have 14 thousand members. Machinery rings operating as formal organisations provide the opportunity for 1,300-1,500 farms to utilise their surplus capacity. Hungarian National Development Agency data show that about 40 clusters are engaged in agriculture and include 2,500-3,000 producers in their networks.

Table 1: Financial and other data for formal agricultural cooperations in Hungary by organisational form (2013).

Organisational form	Number of organisations	Net revenue	Total assets	Profit before tax	Investment	Number of employees	Number of members [‡]
		HUF billion				thousand	
Cooperative*	597	118.1	159.7	7.6	13.0	6.3	45
F&V PO**	79	54.7	50.1	0.04	5.6	0.6	15
PG**	201	273.6	68.1	1.0	1.4	1.0	14
Integrator***	615	1662.4	1190.1	43.9	72.7	29.3	120
Total****	1422	2064.9	1431.2	50.2	90.1	36.0	194

Note: * Agricultural cooperation registered by the National Tax and Customs Administration of Hungary (NTCA); ** subsidised organisations; *** organisations registered according to the regulation of the Hungarian Ministry of Agriculture and Rural Development No. 25/2004; **** without overlapping

Data sources: * NTCA; ** Department of Agricultural Markets of the Hungarian Ministry of Agriculture; *** County Offices of the Hungarian Ministry of Agriculture; ‡National Federation of Agricultural Co-operators and Producers Organisations

Table 2: Financial and other data for agricultural cooperations in Hungary by net revenue (2007 and 2013).

Net revenue category HUF billion	Number of organisations	Net revenue	Total assets	Profit before tax	Investment	Number of employees thousand
		HUF billion				
2007						
less than 0.5	1111	137.6	149.5	8.5	9.8	8.6
0.5-1.0	169	120.5	107.1	4.5	7.3	4.7
1.0-5.0	217	432.3	356.3	11.3	20.5	13.7
more than 5.0	64	1153.4	612.0	15.7	23.4	18.3
Total	1561	1843.7	1224.9	40.0	61.0	45.3
2013						
less than 0.5	908	113.7	164.6	6.2	10.4	5.8
0.5-1.0	202	147.3	137.6	5.4	12.7	4.2
1.0-5.0	241	514.2	481.5	20.2	36.9	11.0
more than 5.0	71	1289.7	647.5	18.4	30.1	15.0
Total	1422	2064.9	1431.2	50.2	90.1	36.0
Change: 2007=100%						
less than 0.5	81.7	82.6	110.1	73.4	106.1	67.4
0.5-1.0	119.5	122.2	128.5	120.0	174.0	89.4
1.0-5.0	111.1	118.9	135.1	178.8	180.0	80.3
more than 5.0	110.9	111.8	105.8	117.2	128.6	82.0
Total	91.1	112.0	116.8	125.6	147.7	79.5

Data source: NTCA

Table 3: Patterns of discussion of farm management issues among a sample of 1,000 farmers in Hungary (per cent).

Issue	Family member	Acquaintance	Business partner	Consultant	None of these
Production technology	54.5	22.0	26.9	7.0	22.8
Sale of farm produce	52.6	19.9	30.4	7.9	24.8
Cropping patterns	49.6	15.2	21.6	6.6	32.4
Plant protection measures	46.3	21.2	33.1	8.8	19.3
Agri-environment measures	28.7	11.2	23.3	10.3	42.0
Investment measures	24.7	8.9	18.0	11.2	55.6

Data source: survey conducted by the Institute for Sociology of the Centre for Social Sciences, and the Centre for Economic and Regional Studies, both of the Hungarian Academy of Sciences

By categorising agricultural cooperations according to annual net revenue, trends in concentration during the period 2007–2013 can be illustrated. While the number of organisations with a revenue of less than HUF 0.5 billion decreased by 20 per cent, there was a more than 10 per cent increase in the number of organisations with more than HUF 1 billion revenue (Table 2). In 2013 there were 71 organisations with more than HUF 5 billion annual net revenue and while they represent just 5 per cent of the total number of agricultural cooperations, they are dominating in the sector. They account for two thirds of the revenue of the cooperations (HUF 1,289.7 billion), 45.2 per cent of the total assets, 36.6 per cent of the profits before tax, 33.4 per cent of the investments and 41.7 per cent of the employment. Of these 71 organisations, 55 operate as integrators. They take 82.0 per cent of the net revenue generated in the given revenue category, have 86.2 per cent of the total assets make 86.7 per cent of the investment. Their shares of the profit before tax and employment are 97.3 and 98.0 per cent respectively.

The rate of development is shown by the fact that between 2007 and 2013 the number of these organisations increased by more than 10 per cent, their net revenue by 11.8 per cent, their total assets by 5.8 per cent, their investments by one quarter and their profit before tax by almost 20 per cent.

Cooperation from the farmers' perspective

Formal cooperation

Apart from their obligatory membership of the Hungarian Chamber of Agriculture, of the 1,000 farmers that completed the questionnaire 277 reported that they took part in some kind of formal cooperation. The most common forms of membership were of F&V POs, farmers' circles⁶ and PGs (94, 85 and 60 farmers respectively). By contrast, just eight farmers were members of machinery rings and four of clusters.

The dominant role of the integrator companies in production is clearly illustrated by the fact that more than one third of the surveyed farmers stated that they purchase the inputs they require for plant production (for example seed, fertilisers and plant protection products) through integrator companies. Farmers who use this form of purchasing rely almost totally on the integrator companies and do not use any purchasing channels. As input suppliers provide loans for purchasing inputs, most farmers pay for inputs after harvest with produce or cash. A similar situation can be seen as regards sales of farm produce. Sales through integrator

companies reach almost 100 per cent among the farmers who use this form of cooperation for their sales. Small quantities of grain are not easy to sell to companies dealing with large volumes. Sales through integrator companies are particularly significant among the farms producing grains, oilseeds and fruits and vegetables, but this channel is less significant for the sales of animal products.

Informal cooperation

For the following statements in the questionnaire, which farmers were asked to score on a 1–5 Likert scale (1 = strongly disagree; 5 = strongly agree), the mean results were as follows: "Most people are trustworthy": 3.4; "Most people are honest": 3.5; "People are just as honest as twenty years ago": 2.9; "You never can be too careful": 4.1. For each respondent, an aggregate value of the first three scores was used as a 'confidence index' in the following subsection of this paper.

Farmers were asked with whom they discuss farm-related matters. Around half of those completing the questionnaire discuss day-to-day farm management issues (production technology, sale of farm produce, cropping patterns and plant protection measures) with other family members (Table 3), while around one quarter discuss topics such as agri-environment and investment measures within the family. The share of farmers that discuss farm management issues with business partners is lower, ranging from 33.1 per cent for plant protection to 18.0 per cent for investment measures. The incidence of discussing issues with acquaintances is lower still, being in the region of 20 per cent for day-to-day issues and 10 per cent for agri-environment and investment measures. Fewer than 10 per cent of farmers discuss day-to-day issues with consultants but, by contrast, the opinions of consultants are slightly more frequently sought on the topics of agri-environment and investment measures. At least one in five farmers in the sample does not discuss a particular farm management issue with any of these groups of contacts. This figure exceeds two in five regarding agri-environment measures, and one in two for investment measures.

Correlations between cooperation factors

The parameters of the farms and the farmers used in this analysis were: size of agricultural area on the farm (ha), number of employees, age and gender of the farm manager, and the total number of Annual Work Units (AWU) spent on the farm. Attitudes to cooperation were measured by the use of services (for payment or in-kind; yes/no), confidence index (1–5 scale, derived as described above) and applica-

⁶ Organisations supplying information and advocacy functions, operating as associations.

Table 4: Relationships between the parameters of the farms and the farmers in a sample of 1,000 questionnaire respondents in Hungary, farmers' attitudes to cooperation and different forms of cooperation.

Parameters and attitudes	Form of cooperation					Tender participation	Confidence index
	Membership	Discussion	Seed purchase	Service supply	Input purchase		
Agricultural area	0.125**	-0.108**	-0.010	-0.010	-0.004	0.063	-0.018
Number of employees	0.287**	0.115**	-0.031	0.002	-0.022	0.111**	-0.037
Age of farm manager	0.038	0.103**	0.002	0.027	0.071*	0.081*	0.048
Gender of farm manager	-0.080*	-0.140	-0.121**	-0.110**	0.143**	-0.031	0.005
AWU on the farm	0.169**	0.183**	0.209**	0.129**	0.143**	0.278**	0.031
Use of services	-0.027	-0.002	0.005	0.264**	-0.063*	-0.027	0.105**
Confidence index	0.027	0.035	0.116**	0.169**	0.084**	0.002	-
Tender participation	0.097**	0.183**	0.158**	0.114**	0.160**	-	0.002

Note: **/*: statistically significant, respectively at the 1% and 5% levels (2-tailed); for abbreviations see text

Data source: as Table 3

tion for investment funding from Pillar 2 of the CAP (yes/no). The forms of cooperation tested (yes/no) were whether the farmer is a member of any organisation (*Membership*), discussion of problems with others (*Discussion*), cooperation when purchasing grain seed (*Seed purchase*), supplier of services⁷ (*Service supply*; for payment or in-kind) and cooperation when purchasing inputs (*Input purchase*). Zero values were included in the analysis.

Farmers with more agricultural land, more employees and/or whose farm employed more AWU were more likely to be a member of an organisation and more willing to discuss farm management issues with others (Table 4). Older farmers were also more willing to discuss issues. Relatively strong positive correlations were recorded between gender of the farm manager and the number of AWU spent on the farm and confidence index on the one hand, and cooperation in the purchase of inputs and grain seeds, and through the supply of services on the other. In other words, male farmers, those managing farms with a greater labour demand and those more inclined to judge others as being trustworthy and honest used these forms of cooperation more. Use of services by a farmer was correlated only with his/her supply of services (to other farms) whereas those farms that applied for investment funding from Pillar 2 of the CAP were more strongly involved in all forms of cooperation.

Managers of farms with more employees and those whose farms employed more AWU were more involved in applying for investment funding from Pillar 2 of the CAP, while those that used services recorded a higher confidence index. No significant correlations were recorded between the parameters of the farms and the farmers, and farmers' confidence index.

Potential for development of agricultural cooperation

The face-to face interviews covered the advantages and disadvantages of cooperation, the pitfalls and problems involved, and success factors.

Advantages and disadvantages of cooperation

The most frequently mentioned advantage of cooperation was economic benefits in the form of sales guarantees, higher selling prices for produce, cheaper inputs, lower

transaction costs and greater access to credit. Regular exchange of information also appears as a benefit for members of cooperations. The interviewees highlighted that it is mainly the financially strong producers' organisations and integrator companies ensuring vertical cooperation that are able to provide these benefits. In addition, the interviewees mentioned the professional assistance benefits arising from cooperation. In particular, the producers' organisations and integrator companies of vertical integration provide extension as well as tax and legal advice. They also organise training for their members and provide beneficial services such as free water and soil quality tests, discounted rental of machinery and equipment, technology guidance, quality assurance, organising study tours and forums, writing applications, lending and pre-financing agricultural inputs. Integrator companies provide – in addition to their commercial activities – technology, consulting and financial engineering instruments, organise professional forums, highly customised specific training, presentations and events, distribute publications and provide machine parts supply and service. In the fields of social engagement, it is again clearly evident that the large and financially strong vertical integrators play an important role. Social benefits provided for the members include discounted meals, summer camps for children and the kindergartens. By contrast, most activities of the organisations of horizontal cooperation are only related to input sales and product purchasing.

The financially strong integrator companies operating as vertical cooperation adjust their lending strategies to their clients. In order to reduce risks and transaction costs, these large companies are often not in direct contractual relationships with the producers but rather with the locally operating 'intermediate integrators' which have the necessary local knowledge. Our interview results clearly showed the importance of this special operational form, which is characteristic for the Hungarian integrators. The 'intermediate integrators' are farms with large areas of land and assets, which integrate through contractual machinery services and by making available their storage and drying capacities to local producers that lack these assets. In general, this kind of cooperation covering a wide range of services is not casual but rather a long-term servicing relationship. In Hungary this kind of integration evolved in a self-organised manner at the end of the 1990s, generated by the need to gain access to machinery and assets. Via the integration based on the involvement of the intermediators, the integrator company can cut costs and

⁷ For example plant protection, crop harvest, advisory services, returning nutrients to the soil.

risks arising from the unreliability of the clients. It is often the case in seed production that the intermediate integrators networking the small producers also benefit directly through the benefits obtained from volume purchases and in addition they sell their excess capacities (machinery, storage etc.) to the members of the network.

The interviewees reported that many producers consider that the compliance obligations and transparency are obstacles, despite the fact that these are the basis for cooperation. The disadvantage of cooperation could be that individual interests are subordinate to the community interests. Conflicts can arise because the cooperating actors are rivals as well.

Pitfalls and problems of cooperation

According to the interviewees, the main factor hindering cooperation is the 'black' economy and the 'black' market. The origin of the problem is the lack of resources, which tempts enterprises to put their own interests before the common interests. Therefore, in the hope of achieving higher revenue, they sell their products and services through the black market, and thereby they break their cooperation obligations. These companies are not interested in doing business in a transparent, traceable way.

As for the integrator companies, the survey results highlighted the inherent risk that the producers are not committed to one partner but rather associate with several integrators at the same time. The integrator companies for contract growing mitigate the inherent risks of the agreements by concluding contracts that include the possibility of holding the producers liable. The interviews with the managers of the producer organisations and integrator companies revealed that Hungarian farmers try to avoid long-term contractual relationships, mainly for reasons of risk aversion, low confidence and the sector's involvement in the black economy.

One of the problems mentioned by several interviewees is the effective dissemination of information. Above a certain number of members, close and intense contact with the members becomes difficult. A further pitfall of cooperation is that farmers are not motivated enough to train themselves and learn new professional skills and knowledge. The opinion of the interviewees is that the establishment of cooperation and its reliable operation are greatly complicated by the intricate and ever-changing regulatory environment in Hungary.

Success factors

The interviewees stated that it is important to enhance the interest of the members. Successful cooperators provide a wide range of high-quality services and personal client-centric contact with their partners. They typically operate in vertical form, covering the whole value chain and, in addition to the construction of distribution channels, their research and development activities and the dissemination of technological innovation are important features. The essential factor of the success minimises the risks. The interviewees mentioned good management primarily among success factors.

In the course of the interviews, in connection with the development of the producer organisations and integrator

companies it became clear that the managers are interested in increasing the membership of the organisations as well as in improving the quality of the services provided. The survey showed that the producers' organisations can develop by improving the value-added of their products. The most important element of this is vertical integration along one commodity, which is the most efficient and provides most advantages and the establishment of secondary organisations and federations. Vertical cooperation will become even more concentrated, resulting in larger clusters and networks.

Discussion

In Hungary many forms of cooperation can be identified in the agricultural economy: by legal form, by the composition of the membership, by size, by the bargaining power and by the structures of activities. There are also signs of concentration in Hungary (as in other countries) in terms of trends related to cooperation. The economic importance of the nearly 1,500 domestic agro-cooperations is shown by the fact that their net sales almost equal the total annual output of agriculture (Table 1). Among the forms of formalised vertical cooperation, organisations coordinated by the integrator networks which offer business benefits, including security of purchases of inputs and sales of produce, are the most popular among farmers. The large integrator companies with more than HUF 5 billion in revenue play a very major role in the organisation of agricultural cooperation in Hungary. These large integrator companies prefer to cooperate with smaller 'intermediate integrators' which have local knowledge and direct links with farmers. In terms of financial indicators and employment the position of integrators is outstanding. Sales through integrator companies are particularly significant among the farms producing grains, oilseeds and fruits and vegetables, but less so for animal products.

By contrast, the level of formal horizontal cooperation between farmers in Hungary continues to be low, despite demonstrable advantages of horizontal cooperation (e.g. greater awareness, success is securing funding via tenders etc.). While the number of organisations involved in agricultural cooperation declined between 2007 and 2013, concentration of the organisations in terms of the economic weight and membership is observable (Table 1). While the low level of formal horizontal cooperation activity is no doubt partly due to the widely-reported problems of the risk avoiding behaviour of farmers and the low level of trust with potential partners and institutions, our interview results suggest that the role of the not tested non-cooperative, black market engagement with the enabling business and economic environment in hindering the emergence of formal relationships is also considerable. Therefore, our results add to the findings of earlier research on why the relationships between producers and horizontal integration in the last decade have in many respects remained essentially unchanged.

We provide quantitative data on the nature and extent of informal, horizontal cooperation among farmers in Hungary. Family members are dominant in discussing farm management issues (Table 3). The fact that many farmers do not consult anyone regarding agri-environmental or investment

measures is a concern. Generally, consultation is provided by the integrators as an additional service for their business partners and the role of consultants remains weak. This can indicate both lack of confidence or inefficiency in knowledge transfer, and represents a bottleneck in the development of cooperation in Hungary. The further development of an independent advisory system and consequent closer links between farmers and advisors based on trust will help to extend cooperation activity.

The analysis of the questionnaire data shows that the parameters of the farm do not influence the confidence index of the farm manager, but those with larger farms tend to participate more in membership organisations and in discussions with others. Several factors, including the gender of the farm manager, the number of AWU spent on the farm and the confidence index, are positively correlated with several forms of cooperation, including the purchase of inputs and grain seeds, and through supplying services to other farmers.

As regards future trends in agricultural cooperation in Hungary, the results of the interviews of leaders of professional organisations suggest that vertical integration will further concentrate and develop in the direction of building and shaping clusters and networks. Clusters and networks not only reduce transaction costs and stimulate the spread of new processes and technologies but also have a major role in organising new cooperative relationships. Our econometric analysis has shown that cooperation enhances the rate of success in tendering for funding and keeps partners better informed. Cooperating producers appeared to be more capable of economic development.

The main conclusion from our research is that the efficiency of agricultural economic cooperation is determined by both economic and social factors. The market players prefer verifiable cooperation based on confidence and which, in addition to reducing risk, allows them to increase their market share too. Therefore, in terms of market access the organised, concentrated vertical relationships are dominant in Hungary because in these organisations the accessible procurement advantages, tailored quality services and attainable innovations enhance the willingness of the producers to participate. The cooperations of high level vertical integration help producers to achieve a favourable negotiating position, and this narrows the development potential of horizontal cooperation in Hungary. However, the role of horizontal cooperation is significant in stabilising market relationships, reducing transaction costs, improving production standards and disseminating new technologies. Other widespread forms of cooperation are the mainly informal relationships providing assistance in accessing the basic agricultural services and utilising unused capacities; these are independent of the commodity and size and are characteristic for the Hungarian farms.

The Hungarian Rural Development Programme 2014-2020 provides a policy environment and integrated tools for stimulating cooperation. A development path for agricultural cooperation in Hungary could be for actors to formalise their existing informal relationships by organising themselves into alliances, associations and networks. This would allow farmers to increase value-added and utilise economies of scale, and give them a stronger bargaining position against

integrators in vertical cooperation relationships. Beyond the benefits originating from market concentration, such formalisation could stimulate the sharing of expertise, improve the efficiency of advisory services and increase the innovation capacities of cooperation.

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