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DEMONSTRATION FARMS FOR TRANSFER OF KNOWLEDGE – CASE STUDY FROM POLAND[1]

GOSPODARSTWA DEMONSTRACYJNE W TRANSFERZE WIEDZY – STUDIUM PRZYPADKU Z POLSKI

Key words: agricultural extension, advisory services, demonstration farms, transfer of knowledge, knowledge networks

Słowa kluczowe: doradztwo rolnicze, usługi doradcze, gospodarstwa demonstracyjne, transfer wiedzy, sieci wiedzy

Abstract. The purpose of the study was to present the advisory opportunities in the process of linking research and the needs of farmers, with regard to innovative knowledge. In this process the advisory role was shown through the transfer of knowledge involving environmentally friendly practices from research and experiments conducted on demonstration farms. The research material were raw and existing data, gathered through appropriate questionnaires using the method of in-depth interviews and survey method. The descriptive case presents an example of good practice in agricultural extension and advisory services, operating within a created network of cooperation. The network approach is characterised by various formal and informal connections between network participants and the interactions among them. The linkages and interactions between the network participants concern conducting research, designing and implementing solutions and tools, providing advice, and the dissemination of knowledge and innovation. Demonstration farms represent the highest level of agricultural production and are the place of performance of seminars, lectures, demonstrations and shows in order to facilitate the transfer of knowledge from science to practice.

Introduction

As a political mid-term goal for the 10-year period from 2010 to 2020, the declared "Strategy 2020" prioritizes economic growth based on knowledge and innovation, resource efficiency and social and territorial cohesion in all EU member states [*2020 final: Communication…* 2010]. In this context, the Common Agricultural Policy (CAP) plays a crucial role, especially through rural development policies [Knierim et al. 2015]. Here, several instruments aim to enhance the process of knowledge exchange, information dissemination and innovation creation, namely knowledge transfer and information actions (Art. 14), advisory services (Art. 15) and cooperation in networks (Art. 35) [EU 2013].

There is a wide consensus among scholars and policy makers that knowledge is a key resource to support European agriculture in meeting new challenges such as e.g. international competition, food safety, health or environmental issues.

Organizations delivering farm advice are targeted by different EU policies, such as the "Farm Advisory System" (FAS) or the "European Innovation Partnership" (EIP) regulations. But precise and up-to-date knowledge on these services were missing current transformations of their funding, organization, advisory methods, performance for different groups of farmers and rural populations [Kania et al. 2014, Prager et al. 2015].

Purpose, methodology and research questions

The purpose of the study was to present the advisory opportunities in the process of linking education and the needs of farmers, with regard to innovative knowledge. In this process the

[1] Article prepared under 7FP titled Agricultural Knowledge and Innovation Systems for an Inclusive Europe (PRO AKIS).

advisory role was shown through the transfer of knowledge involving environmentally friendly practices from research and experiments conducted on demonstration farms[2].

The case study selection originated from an attempt to show good advisory practices with regard to the transfer of applied research results to agricultural practice and their implementation. The analysis consists demonstration farms as an innovative example of cooperation between science, agricultural advisory services and farmers.

The case study method enables the accurate analysis of phenomena, it allows comparisons to be made and differences identified, building relations and links which lead to better understanding. The case study may thus better describe and explain phenomena than extensive statistical survey. This method can be either an analysis of one or in conjunction with other various cases, where data for analysis can be obtained, in particular, by observation, interview and document analysis [Czakon 2011].

In order to collect data a method of secondary data analysis was used along with primary data. In order to collect primary data in-depth individual interviews were undertaken and a survey method was used. In order to achieve the research objective the following tools were used: survey questionnaire and in-depth interview questionnaires.

The study involved the research institute (1 professor representing Institute of Technology and Life Sciences in Falenty – author of innovative method of balancing the fertilizer components), 5 agricultural field advisors from the Provincial Agricultural Advisory Centers (ODRs – subordinate to Provincial Self-Governments), 1 specialist from the Agricultural Advisory Centre in Brwinów, division in Radom (CDR – subordinate to Ministry of Agriculture and Rural development), farmers (5 owners of demonstration farms located in 5 provinces in Poland) and other farmers (7 potential recipients of innovations farms, the same provinces).

The paper seeks to answer the following research questions[3]:

– Do the agricultural advisory services still play an important role in the transfer of research results into agricultural practice?
– What are the knowledge and information sources used by researchers, agricultural advisors and farmers?
– What is the role of knowledge and information exchange between farmers, research institutes and agricultural advisors (on the example of the cooperation network)?
– Is the cooperation between farmers, agricultural advisors and researchers permanent?
– Who supports farmers´ decision-making process concerning pro-environmental behaviours?
– What is the impact on the effectiveness and competitiveness of agricultural farms exerted by the implementation of good practices and operationalization of knowledge?

Findings and discussion

Actors and sources of knowledge: where does the knowledge comes from?

The knowledge comes from various sources. The type of knowledge which is needed on farm is mostly determined by the production line, farmer experience in management (the smaller their experience, the more often various sources of information are sought,) and financial capabilities. On the basis of the interviews conducted, various sources of knowledge and information were identified. They are specified below, including the hierarchy of importance (prioritization):

– the internet (email, agricultural portals, agricultural advisory websites, rural networks, etc.);
– agricultural training courses, e-learning and blended-learning courses;

[2] These demonstration farms have been established as a result of the implementation of The Baltic Deal international project 2010-2013. A total of 117 demonstration farms have been established in the countries of the region of the Baltic Sea, including 47 in Poland. The project was financed from the Baltic Sea Region Programme 2007-2013 and NEFCO/NIB, Baltic Sea Action Plan. The main goal of the project was the protection of water by the minimizing of fertilizers losses from agricultural farms without any harm to the productivity and competitiveness of these farms.

[3] The same research question were examined in case studies in Bulgaria, France and Germany [Madureira, et al. 2015].

- literature: agricultural journals (e.g. Top Agrar, journals issued periodically by CDR or by ODRs), training materials and instruction materials, leaflets, brochures or agricultural manuals;
- the research projects conducted in Poland and abroad, working in international teams, joining initiatives;
- domestic and international conferences and seminars;
- study trips in Poland and abroad (e.g. to other demonstration or educational farms);
- experiments conducted on farms by companies supplying production means (e.g. creation of experimental plots, field tests);
- workshops, shows, fairs, agricultural exhibitions or festivals.

Agricultural advising directly cooperates, above all, with research institutes, the so-called National Research Institutes (NRI). These are, amongst others: the Institute of Technology and Life Sciences in Falenty, the Institute of Soil Science and Plant Cultivation in Puławy, National Research Institute of Animal Production in Balice, Institute of Rural and Agricultural Development, Institute of Agricultural and Food Economics. All interviewed advisors highlighted the crucial role of the research institutes with regard to previous research and experiments. By working together in research projects, experiments and the dissemination of innovations, it is possible to transfer research results and fulfil the farmers' knowledge needs. Essential links in this process are agricultural advisors who cooperate with research institutes and the researchers employed there. Agricultural advising is therefore a kind of platform between science and agricultural practice. Cooperation between advisors and research institutes has a significant influence on the level and the scope of advisory services provided.

However, agricultural advisors and farmers pointed out that the cooperation with agricultural universities is not sufficient. The reason is, to a large extent, the lack of benefits for the cooperation with practice, i.e. in this case for the cooperation with agricultural advisory and farmers. The respondents pointed to only a few (or zero) contacts with agricultural universities, a lack of research coordination with farmer's needs, and weak research transfer into agricultural practice. Respondents assumed that for the close collaboration between science and agricultural practice, it is necessary for advisory institutions to become a "broker" between the science and a practice. They have direct contact and close relations with farmers, mainly with those who are leaders in rural communities and those who most rapidly acquire innovations. Farmers also highlighted the lack of access to technological knowledge from e.g. specialized agricultural advisors from the Provincial Advisory Centres as well as from research institutes (in the form of, for example, instructional booklets prepared by researchers, described in the advisors opinion as: "published in the past and very useful").

Demonstration farm owners are knowledge creators and co-founders within knowledge network. On demonstration farms, the exchange of experiences occurs (e.g. during training, discussion meetings and seminars), and new knowledge is created (for instance, as a result of research implementation and the conducting of experiments).

Taking into account other farmers, e.g. those who participated in training organized on demonstration farms, it should be stated that they use free public advisory services most often and willingly participate in training organized by advisory centres. With regard to advisory needs all farmers indicated technological knowledge and information about the Common Agricultural Policy (CAP). Moreover, the training sessions that they attended were assessed as interesting, eventful and encouraging good environmental practices. They underlined the innovation of knowledge applied on demonstration farms but, at the same time, they indicated that not all solutions and tools can be applied on their farms. The reasons for this are, for example: the lack of proper financial means, fear of changes or the lack of support (financial, advisory) in the process of the implementation of new solutions.

Processes and methods to exchange knowledge

The process of knowledge exchange is complex and multidimensional. Knowledge is created, generated, supplemented and processed on many levels. Several methods of knowledge exchange can be specified on the basis of:

- the implementation of common research by Agricultural Advisory Centre (CDR) and research institutes (subject-matter specialist);
- the organization of training sessions for farmers and country inhabitants by the Provincial Advisory Centres ODRs (advisor-farmer), including the demonstration farms (farmer-farmer);
- the implementation of the field tests and experiments by researchers from research institutes and universities on demonstration farms (sampling of water and soil, experimental fields, etc.) (researcher-farmer);
- training and experiments carried out by the companies supplying the means of production (seller-farmer).

In the opinion of the respondents the role of research in agriculture should be essential, but it is insufficient. There is a barrier in the transfer of knowledge directly to the farmer. Research institutes and agricultural universities should equip the CDR with knowledge and information which would be transferred to the local advisors who, in turn, could pass this knowledge to the farmers. The general evaluation by the farmers indicates the lack of measurable effects and the low usability of research in agriculture. Most often it results from the application of the technology transfer model instead of the social interaction or problem solving model. The two latter approaches focus on the close cooperation with farmers and the search for solutions to problems that they face every day [Kania 2007]. Advisors underlined the significance of the research in growing competitiveness and innovation of Polish agriculture. In their opinion there is no consistent system of knowledge and information exchange between science and practice. This system would be based on a close and regular cooperation of science and advisory services, e.g. in the form of a permanent cooperation calendar (meetings, seminars at the research institutes or universities). As a result of a such cooperation, it would be possible for the researchers to become familiar with the problems reported by farmers, and familiarize advisors with scientific issues.

The knowledge content addressed by demonstration farms

Demonstration farms were established in order to achieve specific goals and conduct scientific research. Their functioning is permanent and it does not refer solely to the research implementation period. Demonstration farms serve as a research-training base which serves both researchers and agricultural advisors as well as other farmers. Since these are different farms, i.e. of different sizes, different types of production, located in different parts of Poland, and they meet different needs. Taking the obtained results into account, many types of knowledge developed on demonstration farms can be identified. They are, amongst others knowledge: of the plant production technology (initially concerning proper fertilizing and the protection against pests), concerning the animal production technology (mainly the nutrition of livestock), about agricultural technology, of the environmental protection and ecology, of agro-environmental programs, of economics and farm management.

The issues raised in the cooperation network and the problems dealt with on demonstration farms have a close connection with public goods. The rationale for actions undertaken is to raise awareness of these problems and make the methods for solving them commonly available. Public goods are those that serve common needs and are used by the whole society, e.g. national defence, administration, education (as the goods delivered to the society by the state) [Maciejczak 2009, Fijoł 2011]. Agriculture and rural areas also deliver many public goods, such as: food safety, landscape, multifunctionality in agriculture, organic production, regional products, agritourism, biodiversity, natural environment, innovations in agriculture, etc. The type of knowledge and its content that are processed and developed in the discussed network strictly relate to the problems concerning public goods delivered by agriculture.

The target population for the activities provided on demonstration farms are all farmers in Poland. Due to a big diversity in demonstration farms, they have different problems and implement different ways to solve these problems. These actions correspond to the needs of farmers with regard to the methods and tools to limit fertilizing losses on agricultural farms [Pietrzak 2013]. They are used for the protection of the natural environment, especially water protection. Farmers use this knowledge commonly because they are all obliged to meet the requirements of cross-compliance principles (from 2013), and they have been required to apply the principle of integrated plant protection from the year 2015 [Kiełbasa 2014].

The role of advisory services

The purpose of agricultural advisory is to help other farmers solve their problems. However, the broader perspective of agricultural advisory also states that it is to [Wiatrak 2006, Kujawiński 2009]: define scientific research areas in agriculture, create new agricultural knowledge, help test and adapt new knowledge into practice, implement and disseminate the agricultural knowledge, help and encourage farmers to use new knowledge.

Considering the case analysed, it should be assumed that agricultural advising and its services perform the following functions: advisory function (advice and consultations), educational (training sessions, courses, seminars, lectures, study trips), dissemination (shows, demonstrations, field tests and experiments), information (collecting, processing and popularizing the information among farmers), and income (implemented in the form of individual advisory services on a farm).

This means that demonstration farms perform a very important role. They are a base for field experiments and tests carried out by researchers and private companies. As a result, the owners of these farms become leaders in their regions, with regard to the implementation of new technology.

The knowledge flows

On the basis of research and analyses the following kinds of knowledge were defined as essential for the case study: about limiting fertilizing losses in agricultural production, concerning agro-environmental good practices, concerning modern animal production technologies.

The flow of knowledge concerning limiting fertilizing losses, agro-environmental practices and animal production technology from the perspective of surveyed farmers has been presented on Figure 1. It shows the knowledge is created mainly by research institutes and agricultural universities, the Agricultural Advisory Centre and Provincial Agricultural Advisory Centers. Demonstration farms (run by early adopters) are becoming the source of knowledge for other farmers.

Demonstration farms are very important in the process of co-operating this knowledge because they are places where the knowledge is gathered and the creation of practical solutions take place. Then it is passed further, i.e. to other farmers or rural inhabitants and local authorities interested in it.

In the respondents' opinion, the flow of knowledge takes place in many directions - often at the same time. The knowledge is created on many stages; it is generated and developed on every level. It is of a dynamic character and it often evolves, depending on the needs of its recipient and promoter. On the basis of the obtained information, it can be stated that the strongest links in this process are formed by: 1) subject matter specialists and agricultural field advisors; 2) subject matter specialists and researchers; 3) ODRs field advisors and farmers; 4) farmers and the companies supplying industrial means for agricultural production.

Considering the analysed system of the flow of knowledge we can distinguish its basic processes as follows:

– creating knowledge: new knowledge is created on demonstration farms with the cooperation of these farms owners, specialists from the CDR and researchers;
– processing knowledge: the knowledge is processed (modified, tested, improved) on demonstration farms with the participation of farmers, field advisors, and (to a lesser extent) researchers;

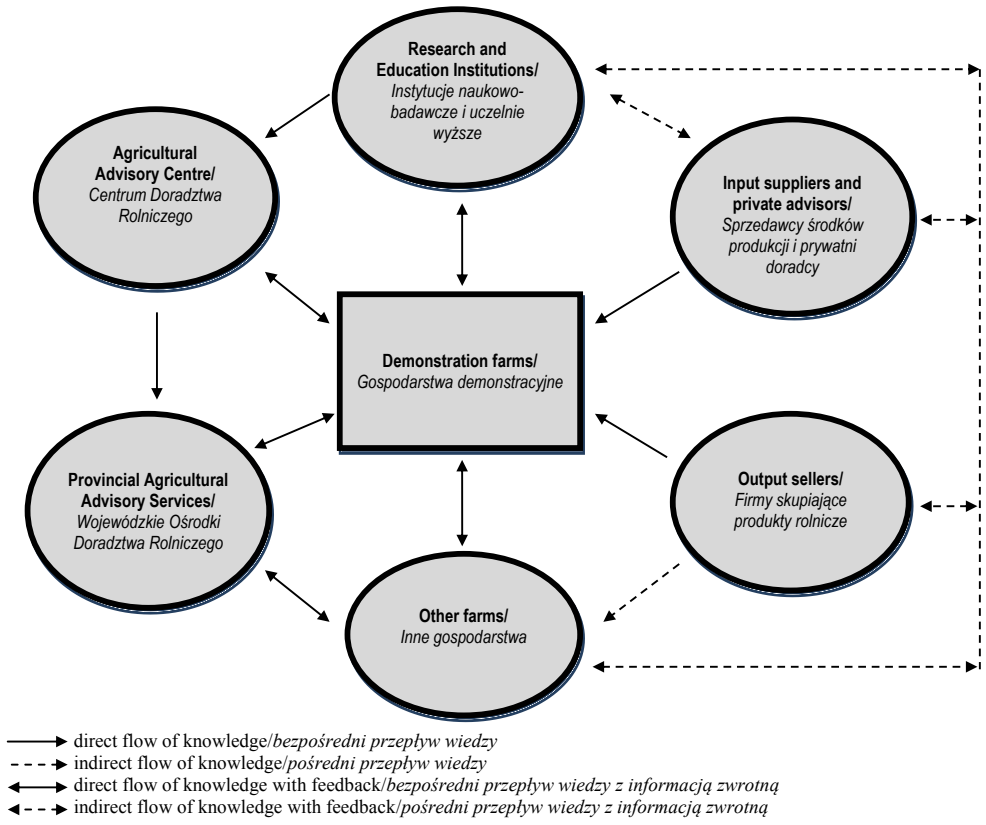

Figure 1. The flow of knowledge from the perspective of surveyed farmers.
Rysunek 1. Przepływ wiedzy dotyczący ograniczenia strat nawozowych, praktyk rolnośrodowiskowych i technologii w produkcji zwierzęcej z perspektywy badanych rolników
Source: own study
Źródło: opracowanie własne

– transferring knowledge: demonstration farms pass the generated knowledge to other farmers and countryside inhabitants through different channels of knowledge and information; to a broader extent, knowledge is popularized by researchers and specialists from the CDR, most often in the form of the publication of scientific papers;
– using knowledge: new knowledge is used by other farmers and rural residents to, amongst other practices, optimize fertilization and restrict fertilizing losses; by researchers to develop further directions of scientific research in agriculture; and by specialists from the CDR to prepare educational and training programs for provincial agricultural advisors.

Conclusions

On the base of the case study results we investigated that demonstration farms represents the highest level of agricultural production and are the place of performance of seminars, lectures, demonstrations and shows, in order to facilitate the transfer of knowledge from science to practice. The research questions can be shortly answered as follows:

1. Agricultural advisory services in Poland play very important role in the system of knowledge and information. They enable the transfer of knowledge into agricultural practice and provide constant access to advisory services for farmers.

2. The respondents pointed to many sources from which they derive knowledge and obtain important information. The most common were: internet, training courses, individual discussions with field advisors, popular and scientific journals, and scientific publications.
3. The field advisors and the subject matter specialists are the main "connector" of the scientific sphere (national research institutes, universities) and agricultural practice (farmers). Field advisors transfer current information to farmers, indicate what sources can be used, where to seek important information, where to obtain knowledge, and how to use it. Agricultural field advisors also constitute a valuable source of feedback for the specialists and researchers, initially with regard to sociological and economic knowledge of a given region, of the rural environment, social groups and farms.
4. The cooperation of farmers with field advisors is of a permanent nature, as opposed to the cooperation with researchers (which is sporadic).
5. The ecological and pro-environmental actions undertaken by farmers are usually initiated by field advisors, cooperating permanently with farmers. Farmers have many of their own ideas and inspirations, but even so they often count on the opinions and support of field advisors before they implement these ideas.
6. In the respondents' opinion scientific research in agriculture, the creation of new knowledge and its operationalization, result in increasing innovation. Modern technological solutions have a significant impact on economic values. It improves farm competitiveness, because it refers to innovation and science. In the case described, social needs and the protection of public goods are also important. The application of new knowledge has a positive impact on the natural environment, and especially on water, in this case.

The respondents have underlined the significance of cooperation in implementing innovation in agricultural practice. The network approach integrates the participants and contributes to the consolidation of the cooperation between them. Despite many positive features this cooperation also has some weaknesses. The main problem is poor feedback from advising to science. Because agricultural advising has an important role in connecting practice and science, it should not only be limited to providing knowledge and information to farmers, but it should also transfer feedback to science. Such information enables the improvement of conducted research and makes it possible to focus on the needs of farmers.

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Streszczenie

Celem pracy było przedstawienie potencjału i możliwości doradztwa w procesie łączenia nauki i potrzeb rolników w zakresie innowacyjnej wiedzy. Rolę doradztwa w tym procesie ukazano na przykładzie transferu wiedzy w zakresie proekologicznych praktyk, powstałych dzięki badaniom i eksperymentom prowadzonym w gospodarstwach demonstracyjnych. Materiałem badawczym były dane pierwotne i zastane zebrane za pomocą odpowiednich kwestionariuszy przy wykorzystaniu metody indywidualnych wywiadów pogłębionych oraz metody ankiety. Stwierdzono, że doradztwo rolnicze w Polsce odgrywa bardzo istotną rolę w systemie wiedzy i informacji rolniczej. Umożliwia transfer wiedzy do praktyki rolniczej oraz zapewnia rolnikom stały dostęp do usług doradczych (bezpłatnych i płatnych). Współpraca rolników z doradcami ma charakter trwały, w przeciwieństwie do współpracy z naukowcami, która ma charakter sporadyczny. Respondenci wskazali na wiele źródeł, z których czerpią wiedzę i pozyskują ważne informacje. Najczęściej były to: internet, szkolenia, kursy, indywidualne dyskusje, porady oraz czasopisma popularne i naukowe. Jak wynika badań, to właśnie doradcy rolni zatrudniani w ośrodkach doradztwa oraz ośrodki doradztwa rolniczego stanowią zasadniczy łącznik między sferą nauki a praktyką rolniczą. Doradcy rolni przekazują rolnikom bieżące informacje, wskazują z jakich źródeł można skorzystać, gdzie szukać ważnych informacji, skąd pozyskiwać wiedzę, a także w jaki sposób ją zastosować.

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