

INNOVATIONS IN AGRICULTURE IN POLAND - THE ROLE OF INNOVATION BROKER IN THE OPINIONS OF FARMERS

Aleksandra Płonka¹, Jakub Piecuch², Piotr Rachwał³

University of Agriculture in Krakow^{1,2,3}

Institute of Economic and Social Sciences

Al. Mickiewicza 21 Krakow, Poland

e-mail^{1,2,3}: a.plonka@ur.krakow.pl; jpiecuch@ar.krakow.pl;

piotr.rachwal@urk.edu.pl

Abstract

The main aim of the investigations was an assessment of the state of knowledge and learning farmers' opinions about agricultural knowledge and information system in Poland. Farmers' perception of the presence of innovation brokers in the agricultural advisory system and their expectations towards brokers were studied. The main research tool was survey questionnaire, which included several dozen of respondents. Obtained research results corroborated the Authors' surmises that present system of agricultural advisory in Poland does not bring satisfactory results for farmers, particularly concerning the implementation of innovative solutions on farms. Farmers rightly identified increase in innovativeness as one of the main needs on the way to development of Polish agriculture. Moreover, they positively assessed including so called innovation brokers in the agricultural knowledge and information system. They indicated their key role in dissemination and upgrading knowledge and skills of farmers in relation to the application of innovative solutions in the process of production and farm management.

Keywords: consulting, innovation broker, innovations in agriculture

JEL Classification: O31, O39, Q19

1 Introduction

The aim of currently functioning agricultural knowledge systems is supporting public activities for the development of innovativeness in agriculture. Agricultural knowledge systems developed in this way form specific relations networks among organizations, enterprises and persons (in the first place farmers) focused

on economic use of new products, techniques and technologies and new organizational forms together with public institutions and state or formation policy (e.g. the European Union) (Kania, Drygas, Kutkowska & Kalinowski, 2011). The subjects forming the relations network influence the way in which its individual members affect building the knowledge resources in the agricultural sector. Using the accumulated knowledge for their own needs and sharing it with other interested parties, they become the creator of agricultural knowledge and information system in a way determining its scope, functioning and the level of provided services.

1.1 Agricultural knowledge and information system in Poland

The agricultural knowledge and information systems in most European Union member states are dominated by the public sector. In case of Poland, the state higher education institutions and research institutes with their experimental stations were assigned the key importance for creating and development of knowledge in this system. The ideas which arise in these units are then transferred to public units of advisory services to be finally passed to their final recipients, i.e. farmers maintaining direct contacts with agricultural advisors (Figure 1). In Polish agricultural knowledge and information system the strongest cooperative relations occur only between farmers and advisors from the Agricultural Advisory Centres (Kiełbasa, 2016). The links between the other participants of the system, e.g. between a university and farmers or research institute and agricultural enterprise may be considered slight or even indicated as non-existent. Therefore, agricultural advisory system as the element closest to a potential purchaser of innovations, has been ascribed the key informative and applicational role in the agricultural knowledge and information system (Kania, 2014).

Figure 1 Elements of agricultural knowledge and information system in Poland



Source: KANIA, J. (2014). System wiedzy i informacji rolniczej w rolnictwie polskim. Research Papers of Wrocław University of Economics, 360, p. 55-62. doi: 10.15611/pn.2014.360.06

Considering the fact that agricultural advisory plays a key role in the information flow within the national system of agricultural knowledge, it becomes a kind of intermediary between the sphere of research (i.e. representatives of research and science) and agricultural producers, who are potential recipients of suggested innovative solutions serving farm development. Therefore, agricultural advisory centres start cooperation with various scientific units. They direct knowledge obtained in this way straight to farmers, who translate it into practical sphere and implement innovative solutions concerning, among others, organization of farm production, efficiency of applied production technologies, development of farms and their management (Piecuch & Płonka, 2017).

However, it is worth to mention that in the face of the dominant role of agricultural advisory in the agricultural knowledge and information system, the importance of the other elements of the system cannot be disregarded. Representatives of the scientific community have the responsibility to update the current knowledge and seek new and original solutions, targeting directly farmers and units from the environment of agriculture. Therefore, owing to the sphere of science, extending and upgrading knowledge in a widely understood area of agriculture is possible. The rank of importance in the agricultural knowledge and information system should be also emphasized with reference to farmers themselves. It should be remembered that very often the source of innovation in agriculture are problems emerging during the process of production, which may remain unnoticed or be omitted while developing new solutions and which a farm or processor is unable to solve using the knowledge or technology they possess at the time. Therefore, a need for mutual information flow arises between science-farmer-science and introducing some changes based on it, either in production technology and work organization, or for the improvement of marketing and sales (Piecuch & Płonka 2017). Keeping in mind the existing and constantly emerging new problems, there is an obvious need for transferring modern and already known organizational or technological solutions to practical applications on a large number of farms.

1.2 Innovations in agriculture

The concept of innovation is one of the most complex and ambiguously defined terms in the theory of economics. The term innovations is widely understood and refers to all spheres of life, starting from new solutions in the area of economic or social life and ending with new currents of thought and culture (Janasz & Koziół, 2007). The literature of the subject offers a wide variety of approaches defining the term of innovations. According to Shumpeter (1960), innovations are solutions concerning creation of a new product or marketing the goods with new

properties, introducing a new method of production, opening new sales market or conducting re-organization of economic processes. Kotler (1994) argued similarly, referring innovations to goods, service, methods or idea perceived by someone as new, and Rogers (1983), who thought that innovation is an idea perceived by a unit as new. According to Fagerberg (2005) innovations are new and better solutions than applied by people before, which influence socio-economic living conditions. Freeman (1982) presented a slightly different opinion on that matter. Basing on the Mansfield's (1968) definition treating innovation as the first application of an invention, narrowed its meaning to the first commercial application of a new product, process or device. According to Koch (2004), innovation is a change bringing profit. On the other hand, Silverberg (1994) stated that innovations are the result of the impact of internal factors, such as expenditure allocated by the domestic economic entities on R+D activities or investments in education of human capital (Górka, 2015).

The term of innovation applied to agriculture also reveals a variety of interpretations. Considering the definition by Maziarz (1977), agricultural innovations are new creations, production measures or ideas, which serve to raise the social prestige and stimulate teamwork. According to Michałowski and Wiśniewski (2008) innovations in agriculture are the changes purposefully introduced by farmers, replacing former methods of production or products by new, more effective and useful in given conditions. On the other hand, Kałuża and Ginter (2014) add, that agricultural innovations are not only production technologies, allowing for a more rational utilisation of the farm resources and lower consumption of agronomic inputs, but also activities connected with the dissemination of biological progress on farms (among others introduction into cultivation of new more prolific cultivars, resistant to diseases and unfavourable natural conditions, implementation of advances in breeding as new and more productive animal breeds, but also measures for improving animal welfare).

However, irrespective of the definitions quoted above, it should be emphasized that a characteristic feature of implementing innovations in agriculture is the necessity to consider the specific conditions of this sector of economy, including the biological and spatial character of production, dependence of the production on the quality of agricultural productive space or seasonality of production (Kałuża & Rytel, 2010).

2 Data and Methods

The paper presents a fragment of research results focused on the state of knowledge assessment and learning farmers' opinions about the agricultural knowledge

and information system in Poland. Particular attention was attached to the identification of agricultural producers attitudes towards innovations in agriculture. It was studied how farmers perceive the presence of innovation brokers in the national system of agricultural advisory and what are their expectations from it.

The main research tool was authors' own survey questionnaire containing questions about, among others, the assessment of the current state of agricultural knowledge and information and innovativeness of Polish agriculture. Respondents were also asked to express their opinions about the necessity for changes in this area and for indicating key tasks, which an innovation broker in agriculture should face. The survey questionnaire was filled up by 76 respondents from the area of southern Poland. The group comprised farmers possessing agricultural holdings and conducting agricultural production, as well as persons closely connected with agriculture.

The studies were initiated in June 2017 as a part of the research project Capacity building in agricultural innovation services in CEE countries realised by the Hungarian "Discovery R&D Center, The Mendel University in Brno (Czech Republic), Wageningen University (The Netherlands), Slovak University in Agriculture in Nitra (Slovakia), Huddersfield University (Great Britain), Szent Istvan University (Hungary), Felso-Homokhatsag Videkfejlesztési Egyesület Local Action Group (Hungary) and the University of Agriculture in Krakow (Poland). The main objective of the project was addressing the emerging needs for developing the sector of innovative services for agriculture, including strengthening the cooperation between research units creating innovations and potential users of the conducted research results, through elaborating effective materials and training tools aimed to create, undertake and improve the activities connected with capacity building in the area of innovation services in the Central East European countries. Moreover, an attempt was made within the project to determine the expectations of so called final recipients (particularly farmers) concerning agro-innovation services.

3 Results and Discussion

One of the most serious encumbrances to building modern agriculture, capable of meeting the challenges of contemporary world markets is a relatively low level of rural dwellers' education (Table 1). The results of the National Census of 2011 show that the level of rural dwellers' education in Poland greatly differs from education of city inhabitants. However, the positive changes which have taken place over the recent years should be emphasized. In comparison with the beginning of the 21st century, the number of people in rural areas possessing tertiary

education increased. Still, persons with basic vocational and primary education prevail in rural areas in Poland constituting over a half of local dwellers.

Table 1 **Population aged 13 and more by education level (in %)**

Educational level	Urban areas			Rural areas		
	Total	Males	Females	Total	Males	Females
Tertiary	21,4	19,5	23,2	9,9	7,7	12,1
Post secondary and secondary	35,4	33,1	37,3	25,5	23,1	27,9
Basic vocational	18,6	24,2	13,8	26,6	33,5	19,6
Lower secondary	4,3	4,8	3,7	6,0	6,5	5,5
Primary	13,7	11,8	15,4	25,6	23,5	27,8
Primary not completed	0,9	0,7	1,0	2,1	1,6	2,7
Unknown educational level	5,7	5,9	5,6	4,3	4,1	4,4

Source: GUS, Rocznik Statystyczny Rzeczypospolitej Polskiej 2015, Warszawa, pp. 210-211.

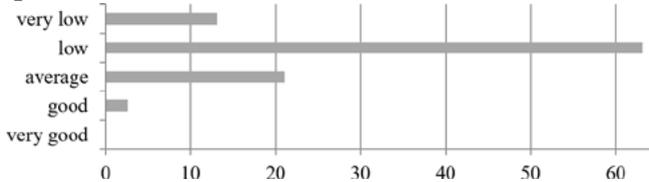
The data presented above correspond with the results obtained in the conducted survey investigations. It was noticed, that respondents with secondary education made up the highest percentage of the studied sample, i.e. 66% of the total surveyed number. Over 10% of farmers finished their education on vocational school level.

The level of farmers' education indirectly translates into their willingness for innovation. According to Rogers (1983) farmers may be divided into five groups by their inclination towards changes. Innovator farmers (Innovators), pioneers (Early Adopters), Early Majority, Late Majority and Laggards. Such division assumes that only a small part of farmers – innovators and early adapters possess a sufficient knowledge and skills, which actively contribute to the transformations happening in agriculture. These are the ones who, through seeking and implementing innovations on their farms make possible knowledge and information spreading among the other farmer groups, usually less educated and with a lesser need for action.

The farmers included in the studies came into ownership of their farms mainly by way of inheritance. Among the discussed number of respondents almost 60% were farm owners aged below 25. The others were characterized by the average age about 40, which according to Kałuza and Ginter (2014) and Lewczuk and Bórawski (2000) means that they are at the highly mature age and emotionally attached to their farms owing to a long-term practice and huge amount of work they invested in them.

All farm owners participating in the studies assessed their farms positively regarding them as developmental. However, they did not present optimistic attitudes concerning the assessment of the level of Polish agriculture innovativeness. Comparing it with other West European countries, they mostly regarded the state of Polish agriculture development as low or at most average (Figure 2). None of the respondents assessed the development of domestic agriculture on a very good level, whereas only two persons indicated “good” category. The respondents emphasized strong diversification of innovativeness development depending on the size or economic power of farms, indicating a higher level on big and very large farms (of several hundred ha and bigger) and very low level on the smallest farms, with the area below 5 ha.

Figure 2 Assessment of the level of innovativeness in Polish agriculture acc. to respondents (in %)

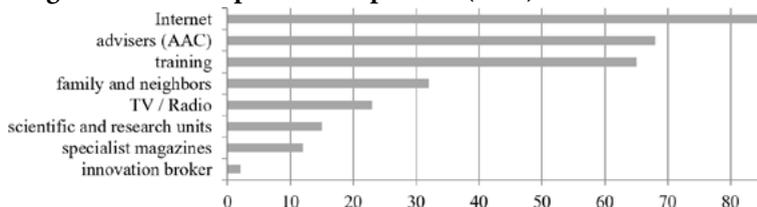


Source: Own studies.

The respondents saw the causes of such low assessment of innovativeness in Polish agriculture in the first place in the lack of knowledge about modern solutions applied in agriculture (particularly in the area of technological consultancy) and low level of cooperation between the science and practice. Another important issue emphasized by the farmers were problems with access to financial means offered to farmers on preferential terms and ensuring the continuity of funding, without which any investment which requires considerable outlays became in the eyes of farmers fraught with too big risk or even impossible to realize. Further, the respondents indicated the issues of farmers’ unawareness of the necessity to introduce innovations, which is a direct outcome of low developmental needs among the owners of the smallest farms, low education level usually hindering making the proper decision in response to contemporary challenges of the European and world agricultural markets, and finally low openness of farmers to changes (Piecuch and Plonka, 2017). Obtained research results corroborated the Authors’ assumptions that the current agricultural advisory system in Poland does not produce the results satisfactory for farmers, particularly concerning the implementation of innovative solutions in agricultural holdings.

The respondents were definitely cautious while assessing their own skills and the state of knowledge about seeking and introducing changes on their own farms. They declared general knowledge on the subject, still it is far from comprehensive and detailed to be regarded as fully satisfactory. However, they perceive the necessity for upgrading the level of their knowledge, skills and professional competence as a necessary element of knowledge transfer for implementing new solutions. Therefore, a vast majority of them have already taken some actions in this direction, seeking knowledge and information in various possible places. Internet proved the basic source of knowledge for farmers (86% of respondents). Over 65% of farmers participated in trainings offered by various institutions (Figure 3). These were usually basic trainings, rarely specialist ones. Another important source of information (mainly in the area of agricultural production and CAP financial support) for almost 70% of the surveyed were Agricultural Advisory Centres. As has been mentioned before, such big role of these types of information results from farmers' trust in the consultants and their competences. Still, the respondents emphasized that in the framework of these consultations they did not receive sufficient information about modern technological possibilities and current educational offer, particularly in the field of technological consultancy. The information passed by the rural communities, including the neighbours and family also proved helpful. Seeking new solutions and farmers cooperation with universities and R&D units constituted a very small share in knowledge transfer. Only 9 respondents were using the subject literature, whereas only one person actually met an innovation broker.

Figure 3 Sources of knowledge and information about innovative solutions in agriculture in respondents' opinions (in %)

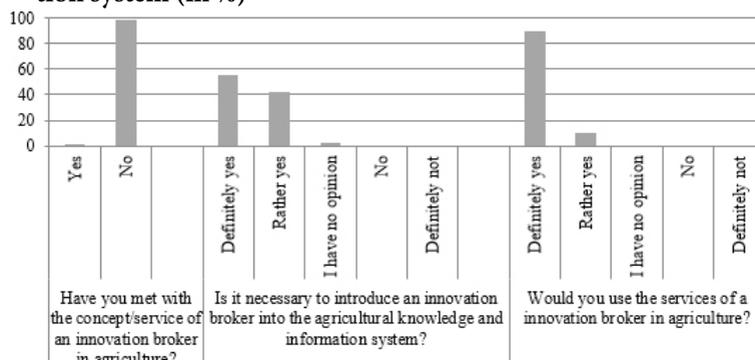


Source: Own studies.

Conducted studies allow to notice that 99% of the respondents never encountered in everyday life either the innovation broker term or innovation broker in person. Only a single farmer indicated that he used the services of this specialist (Figure 4). The others have never used this type of assistance or undertaken collaboration with public or scientific institutions, where a broker would intermediate. On the

other hand, once the “figure” and role of innovation broker in agriculture were explained, the respondents unanimously highlighted the necessity to refine the present system of knowledge transfer by adding the broker link. None of the respondents objected to it, therefore confirming a perceptible gap in the information flow and cooperation between the sphere of research (i.e. representatives of research and science world) and agricultural producers. A similar distribution of answers was noted for the questions concerning the respondents’ willingness to use the services offered by innovation broker in agriculture. They unanimously indicated that, if the person of innovation broker appeared in the currently functioning knowledge transfer system and were available to them, they would definitely use his services, expecting a systematic cooperation and assistance in solving problems on farms.

Figure 4 **Respondents’ opinions on the recognizability and necessity to introduce innovation broker into the agricultural knowledge and information system (in %)**



Source: Own studies.

In the light of the expectations presented towards innovation brokers in agriculture, the respondents revealed a wide variety of recommendations. Emphasizing the key role of brokers in dissemination and upgrading farmers’ knowledge and skills concerning application of innovative solutions in the process of production and farm management, they indicated the necessity for trainings, information transfer and promoting the examples actually affecting the profitability of agricultural production. They sought the possible increasing of farmer willingness for seeking and implementing innovations in workshops, field trips and presentations of innovative solutions in practice. Among the tasks realized by innovation brokers for agriculture and farms were also financial issues, perceived as

increasing accessibility to the EU assistance funds, grants for innovative solutions or granting preferential loans.

4 Conclusion

Despite the existing agricultural knowledge and information system in Poland, one cannot help feeling that it does not utilise its full potential. This unfavourable situation is in the first place due to a most limited collaboration and links between its individual elements, which would make possible their interaction and functioning as a whole. In result agricultural knowledge usually remains in total isolation from real needs and expectations of its recipients, i.e. agricultural producers. On the other hand, universities and research institutes, because of a lack of cooperation with farmers, are unable to fully utilise their potential, which might serve the very necessary process, such as marketization and improving effectivity of agri-food economy. Therefore, despite the size and high quality of possessed intellectual potential, the effects of agricultural knowledge transfer system functioning are worse than might be expected.

On the basis of conducted studies it was found, that there is a need to disseminate the knowledge on innovations and their implementation process on farms. The respondents assessed the level of Polish agriculture innovativeness as low in comparison with other West European countries. The farmers emphasized that the knowledge in this area available to them is usually general and without support from the practical side. Lack of knowledge in the field of modern solutions applied in agriculture, insufficient financial means, low level of cooperation between the science and practice and low openness of farmers to changes were regarded as key barriers to the development of Polish agriculture innovativeness. The respondents rightly identified the increase in innovativeness as one of the major needs on the way to their farms and whole agricultural sector development. Moreover, they assessed positively introduction of innovation brokers to the agricultural knowledge and information system. They pointed to their key role in promotion and upgrading farmers' knowledge and skills for the application of innovative solutions in the production process and farm management.

Acknowledgements

This paper was created within the project *Capacity building in agricultural innovation services in CEE countries*. Project registration number 2016-HU01-KA202-022944 - 16/1KA202/22944 (P6-P1).

References

1. GÓRKA, M. (2015). Wybrane poglądy na temat innowacji jako czynnika konkurencyjności podmiotów gospodarczych. In LENIK, P. (Ed.), *Efektywność zarządzania zasobami organizacyjnymi* (pp. 31-55), Krosno, Państwowa Wyższa Szkoła Zawodowa w Krośnie.
2. FAGERBERG, J. (2005). Innovation a guide to the literature. In FAGERBERG, J., MOWERY, D. C., NELSON, R. R. *The Oxford Handbook of Innovation* (pp. 55). Great Britain, Oxford University Press.
3. FREEMAN, C. (1982). *The Economics of Industrial Innovation*. London, F. Pinter.
4. JANASZ, W., KOZIOŁ, K. (2007). *Determinanty działalności innowacyjnej przedsiębiorstw*. Warszawa, Wydawnictwo PWE.
5. KAŁUŻA, H., GINTER, A. (2014). Innowacje w gospodarstwach rolniczych młodych rolników. *Research Papers of Wrocław University of Economics*, 361, p. 89-98. doi: 10.15611/pn.2014.360.06
6. KAŁUŻA, H., RYTEL, M. (2010). Innowacyjność w świetle studium przypadku gospodarstw rolniczych z gminy Mokobody, *Roczniki Naukowe SERiA*, XII(5), p. 68-69.
7. KANIA, J., DRYGAS, M., KUTKOWSKA, B., KALINOWSKI, J. (2011). System transferu wiedzy dla sektora rolno-spożywczego – oczekiwane kierunki rozwoju. *Polish Journal of Agronomy*, 7(2011), p. 23-24.
8. KANIA, J. (2014). System wiedzy i informacji rolniczej w rolnictwie polskim. *Research Papers of Wrocław University of Economics*, 360, p. 55-62. doi: 10.15611/pn.2014.360.06
9. KIEŁBASA, B. (2016). Overcoming barriers to efficient farm management: The role of knowledge and information management in the rural advisory sector. *Conference proceedings "International Scientific Days (ISD) Conference on Agri Food Value Chain - Challenges for Natural Resources Management Society*, p. 758-768. doi:10.1016/j.obhdp.2007.08.002
10. KOCH, J. (2004). Innowacje siłą napędową rozwoju. *Jakość, innowacyjność i transfer technologii w rozwoju przedsiębiorstw* Materiały Konferencji Naukowo-Technicznej, p. 123-132.
11. KOTLER, P. (1994). *Marketing: analiza, planowanie, wdrażanie i kontrola*. Warszawa, Wydawnictwo Gebethner & Ska.
12. LEWCZUK, A., BÓRAWSKI, P. (2006). Sylwetka zawodowa i społeczna właścicieli gospodarstw rozwojowych w rolnictwie północnej Polski. *Zeszyty Problemowe Postępów Nauk Rolniczych*, 514, 205-2018.

13. MANSFIELD, E. (1968). *Industrial Research and Technological Innovation*. New York, W.W. Norton
14. MAZIARZ, C. (1977). *Andragogika rolnicza*. Warszawa, Wydawnictwo PWN.
15. MICHAŁOWSKI, K., WIŚNIEWSKI, E. (2008). Innowacyjne produkty rolnicze w rejonie północno-wschodniej Polski. In ADAMOWICZ, M. *Innowacje i innowacyjność w sektorze agrobiznesu* (pp. 21-30). Warszawa, Wydawnictwo SGGW.
16. PIECUCH, J., PŁONKA, A. (2017). Situation Analysis of Agricultural Innovation Services in Poland. In. P. Goda & M. Kis, *Situation analysis of Agricultural Innovation Services in Europe* (pp. 132-157). Gödöllő, Szent István University Press.
17. ROGERS, E. M. (1983). *Diffusion of Innovations*. New York, The Free Press.
18. SCHUMPETER, J. A. (1960). *Teoria rozwoju gospodarczego*. Warszawa, Wydawnictwo PWE.
19. SILVERBERG, G., SOETE, L. (1994). *The Economics of Growth and Technical Change*. Aldershot Edward Elgar, Brookfield.