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Lifelong learning for farmers: enhancing competitiveness, knowledge transfer and innovation in the eastern German state of Brandenburg

Farmers must continuously adapt production and management systems in order to maintain and enhance the competitiveness and sustainability of their businesses. The development and implementation of innovations require both information and the farmers' willingness to change daily work routines. Learning and knowledge transfer among farmers, technology developers, experts and university teams ensure the development and application of innovative ideas which are crucial for a sustainable growth in food (and non-food) production. The paper presents results from three transdisciplinary research projects that are part of a wider initiative aimed at establishing a farmer-university network in the north-east of Germany where economic and farming conditions are unfavourable. A team from Eberswalde University facilitates the network. The partners in the network are agricultural farms, agricultural organisations of Berlin-Brandenburg and federal research institutes. The results obtained to date indicate that lifelong learning approaches are promising tools to foster agricultural innovations and thus contribute to the resilience of the agricultural sector. Lifelong learning helps to engage with farmers who are not normally reached. The success of joint learning projects depends among other factors on the relevance and quality of offers, professional management of the network and facilitation of activities. Farmer-university networks function effectively if all involved see themselves and work together as equal partners.

Keywords: lifelong learning, innovation networks, agricultural innovation, knowledge transfer, farm development, education, qualification

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Introduction

In the European Union as well as globally, conditions and requirements for agricultural production are changing. On the one hand, the agricultural sector has to increase production and productivity in order to respond to the significant growth in global food demand; on the other hand, farming systems have to improve sustainability and resource efficiency and address environmental issues (such as biodiversity loss). Farmers face the challenges of not only to produce more, but also to produce in a better way (Dwyer *et al.* 2012; EC, 2012)

The conditions for agricultural production are rapidly changing due to urbanisation, growing inequities, human migration, globalisation, changing dietary preferences, climate change, environmental degradation, a trend toward biofuels and an increasing population. Unprecedented challenges are ahead in providing food within a global trading system where there are other competing uses for agricultural and other natural resources (Anderson *et al.*, 2008; Dwyer *et al.* 2012).

Under these conditions, farmers need to adapt production and management systems in order to maintain or even enhance the competitiveness of their businesses. Though farmers have always had to adapt, they are now confronted with more complex and better known challenges than in the past. Decision makers in agriculture need to have an in-depth understanding of their production systems and the related ecosystem. They rely on appropriate farm management information and tools. Innovations are expressed in structural changes (farm size, cooperation, land ownership, labour/income organisation, equity capital and borrowed capital ratio, infrastructure, market structure) and in farming practices (intensity, productivity and specialisation/diversification of existing systems, new products and tech-

nologies, management innovations). Agricultural information, knowledge and the ability to learn are preconditions to handle change successfully. A very good knowledge of innovative technics and processes is crucial when a farmer plans to:

- increase productivity of traditional production system e.g. by introducing new technology (intensification);
- produce new crops, animals or services (diversification);
- reduce the scope of farm products (specialisation);
- alter the farm's orientation e.g. towards organic farming;
- change the farm's size (e.g. full-time versus part-time farming, family labour versus employees etc.)

Agricultural knowledge and information systems aim to support the knowledge exchange between farmers, technology developers, plant breeders, universities and researchers. They consist of institutions and organisations that generate and disseminate knowledge and information to support agriculture production, marketing and post-harvest handling of agricultural products and management of natural resources (World Bank, 2012). If researchers, advisors and other experts communicate appropriately, effective knowledge exchange is achieved. At the core of such effective knowledge exchange are three basic and interconnected components: Firstly, participants who are interested in innovative ideas; secondly, the relevant and sufficiently complete knowledge which must be pitched at a level appropriate to the currently held knowledge of participants and, thirdly, the environment of the knowledge exchange (location, facilities, ease of access, time, time set aside by each person and other factors that can facilitate or constrain).

Strong partnerships between public authorities, universities, food processing industries, farmers' organisations, farm-

ers and farm employees constitute an agricultural knowledge and innovation network, often located within a particular region. In general, public or private organisations, focussing on advisory services or professional education, are the main drivers of a knowledge and innovation network. Network initiatives are best facilitated by brokers who understand and approach the development of the network from both an economic and a social point of view (Knickel *et al.*, 2009). They are often triggered by issues perceived as a problem or difficulty (Huggins, 2000). However, any strategy to foster networks must take into account the constraints of network participation: restricted entrepreneurs' time available for networking activities and 'the autonomy of independence' typical of business owners (Malecki and Tootle, 1996).

Lifelong learning helps to obtain qualifications, and extend knowledge and understanding. It is about gaining new skills and competences or enriching personal growth (EC, 2009). Lifelong learning is based on training and education for working adults who already have fundamental education and/or experiences, aiming to enhance professional competence (Ojala, 1993). The Leuven Communiqué emphasises the concept of lifelong learning: 'Faced with the challenge of an ageing population Europe can only succeed in this endeavour if it maximises the talents and capacities of all its citizens and fully engages in lifelong learning as well as in widening participation in higher education' (EC, 2009, p.1).

The implementation of lifelong learning initiatives tends to be based on strong partnerships between relevant actors from education, business and/or societal groups. Lifelong learning methods recognise and build upon prior learning. The focus is on learning outcomes regardless of whether the knowledge, skills and competences were acquired through formal, non-formal or informal learning paths. Lifelong learning requires adequate organisational structures and funding (EC, 2009).

The programme and research presented in this paper comprises an action research initiative (consisting of several projects) and a set of monitoring and evaluation activities. The latter employ qualitative and quantitative social science research tools. The paper starts by presenting the impacts of changing natural, structural, economic and other conditions on farms in the Federal State of Brandenburg which is situated in the north-eastern part of Germany. Based on the theoretical concepts and the challenges farmers are facing in the region, the paper analyses the network activities of the Eberswalde University for Sustainable Development (HNEE) which aim to build an agricultural knowledge and innovation network for organic farming. HNEE is an independent non-profit institution focussing on sustainability issues with a strong regional focus. For that reason, it is well placed to organise and facilitate a farmer-university network and the related activities.

The first research results from three research projects with different orientations which contribute to such a network are presented in this paper. They include data from a first evaluation round and a preliminary identification of limiting and enabling factors in farmer-university networks and lifelong learning. The lessons learned so far from the HNEE engagement in farmer-university networks are discussed.

Challenges for the agricultural sector in Brandenburg

In Brandenburg, apart from difficult physical conditions for farming with poor quality soils and low annual precipitation, farmers face constraints related to:

- A lack of skilled young people. Young and qualified people migrate due to professional training and employment opportunities in the western or southern federal states of Germany (Staatskanzlei Brandenburg, 2011; Landesamt für Bauen und Verkehr, 2011). Especially in fruit and vegetable growing, farmers rely intensively on permanent and seasonal workers, traditionally from Poland. Since well organised networks in Poland and other eastern European countries organise the labour exchange, job offers from Brandenburg have to compete with offers from Ireland, United Kingdom or France (Hagedorn, 2011).
- Pressure on producer prices resulting from a globalisation of markets and concentration in retail chains, and coupled with changes in the demand for food and non-food products. Since cereals, oil crops and beef are traded internationally, global markets set price levels and trends (Witzke *et al.*, 2008). Expected rising returns of arable crop and animal production (FAO-OECD, 2011) might partly vanish due to increasing energy costs that also occur in rising fuel, fertiliser and feed costs. In addition, farmers will have to deal with increasing price volatility, as markets for agricultural products are expected to become even more volatile.
- Rising land prices and prices for rented agricultural land. The proportion of rented land is very high at nearly 70% (MIL, 2010) and after 20 years of reunification, many farmers have to renew their leases, forcing them to reflect on the cost-effectiveness of their present production systems. Farmers with low-intensity production – which is very common in Brandenburg – need to either raise intensity levels of animal or crop production or reduce the size of the farm and release labour.
- Environmental degradation and the need for more sustainable farming practices, as well as rapidly increasing demands related to climate change mitigation and adaptation. Increasing incidence of extreme weather events such as droughts and floods are affecting Brandenburg (MUGV, 2011). Global warming impacts on water cycles, not only by changing regional precipitation and temporal variability but also by affecting water flows and soil moisture dynamics. Agricultural structures and production systems need to be adapted with resulting challenges and costs (Hagedorn, 2011; Holsten *et al.*, 2009).
- Even with a high proportion of specialised crop farms, nearly every farmer has some grassland. Often, the economic exploitation of pastures and meadows is restricted due to nature or landscape conservation standards. Low-intensity grazing or forage production for beef cattle, sheep and horses is characteristic of Brandenburg's remote rural areas.

In addition, the sector has to face serious changes in education and qualification systems, and in administration, as well as in research. A lot of these changes have to do with pressure on public budgets and the need for cost savings. Part of it is still related to the transition from a socialist system to a market economy based on private ownership and reduced government interference in production and markets. Rural areas of Brandenburg are sparsely populated except those areas neighbouring Berlin. The state's economic potential is relatively low due to a lack of production and service industries.

Despite the increasing challenges for the agricultural sector, professional training and education opportunities and research have received less public funding because of these financial pressures. Owing to the lack of funding, farmers and farmers' associations are experiencing a reduction in regional specific expert knowledge. For the same reason, there is less applied research and development, although farmers are also asking for results of field studies and for scientists with farming experience. The state's budget for agricultural administration and research with regional orientation has declined because the economic potential of Brandenburg is relatively low owing to a lack of production or service industries. Consequently, independent research or testing institutions have closed down and agricultural experts have left the region or changed duties. In return, testing and research of large agro-industrial enterprises has become more important as they have become the only available information source for innovative technologies (Achler, 2009).

Regarding management and farm economics, farmers nowadays rely on private advisory services that only large or successfully run farms are able to afford. As the region's farming systems are relatively low yielding, Brandenburgian farmers' budgets are low in comparison to farm businesses in the neighbouring states. For that reason, private advisory services or branch offices of large agri-business enterprises are located for example in the federal states of Mecklenburg or Sachsen-Anhalt and serve customers in the state of Brandenburg. It is particularly difficult for farmers in Brandenburg to develop and implement innovative approaches. New forms of knowledge transfer are therefore actually needed.

The Knowledge and Innovation Network for Organic Businesses in Brandenburg

University teams at HNEE noticed the problems of the Brandenburgian agriculture caused by the withdrawal of expert knowledge at an early stage. In response, they started to develop an agricultural knowledge and innovation network. The initiative aims at developing a transdisciplinary network for organic businesses that will close the communication gap between farming business, private advisory services, agricultural research and university studies as well as administrative and policy bodies. HNEE will serve as a knowledge brokerage institution aiming to enhance the sustainability, competitiveness and resilience of agricultural farms in the state of Brandenburg. The knowledge and innovation network will support farmers in the process of tack-

ling the forthcoming challenges of agricultural production, processing and marketing.

The network initiative operates at different levels and consists of several projects implementing the overarching methodological approach. Firstly, a bottom-up multi-stakeholder process, facilitated by a professional innovation network manager, helps to formulate the needs for innovation of individual farmers and of rural regions as a whole. Annually, the stakeholder group identifies topics of core relevance. Secondly, the university team develops the most appropriate format of cooperation: student projects and graduation theses at different levels of expertise, business internships, on-farm research projects, farmers' seminars related to technological, economic or management innovations, field days, and cooperation within larger research projects that rely on external funding but are relevant to a larger group of entrepreneurs.

Under the umbrella of the HNEE network initiative, three teams work on innovative research projects:

- The transdisciplinary 'Study Partner Network for Organic Businesses' (*Netzwerk Studienpartner Ökobetrieb*), established in 2004, mainly serves as a teaching and research resource. In the beginning, it was a unique teaching approach among German universities. Based on an intensive and trustful knowledge exchange between university teams and entrepreneurs of the organic food and farming sector in the region, the network was further developed over the years towards an innovation network;
- The project 'Innovation Network Climate Adaptation Brandenburg Berlin' (INKA-BB) is one of two projects that focus on knowledge exchange related to innovative farming practices among farmers and between agricultural experts and farmers. The INKA-BB project contributes to the development of farm adaptation strategies to climate change and is part of a national research project of climate change adaptation research (ZALF, 2012). A small expert group consisting of six arable farmers, the organic producers' organisations Bioland and Naturland, regional experts (farm advisors) and researchers develops adaptation strategies to climate change impacts on crop farming. Together, the group implements the projected field trials at selected agricultural sites in Brandenburg and evaluates them;
- The 'Lifelong Learning in Organic Farms in Brandenburg' project also focuses on knowledge exchange related to innovative farming practices. It is funded by the European Social Fund (ESF) and the Ministry of Science of Brandenburg, and since April 2011 has supported production specific networks in Berlin-Brandenburg by bringing together farmers, agricultural researchers and regional and national experts. Although the title suggests a purely organic orientation, conventional farm participation and studies of non-organic food production are included, aiming to facilitate comparative analyses.

The three key research questions addressed with the HNEE network initiative are: Firstly, how can the shift from linear innovation processes (the conventional approach used

in the first stages of the industrialisation of agriculture) to a more network driven approach be implemented? Secondly, how do effective farmer-university networks function? Thirdly, what are the main limiting and enabling factors for the network development?

The two related hypotheses are: firstly, that a shift from linear innovation processes to a more network based approach is not only possible, but it is actually needed in order to meet the demands on agriculture in a modern post-industrial society. A second hypothesis is that the successful establishment and functioning of farmer-university networks is possible if some clearly identifiable organisational issues are managed appropriately. Universities and transdisciplinary research projects (including students' Bachelor and Master projects) can play a significant role in such networks.

The research approach used to address the above questions builds on a set of monitoring and evaluation activities that accompany the farmer-university networks. Qualitative and quantitative social science tools, including case studies, participant observation, expert interviews, focus groups and more formal questionnaire surveys are used. Some of the research is implemented through students' Bachelor and Master theses.

Results

The data presented in this section are derived mainly from feed-back given by participants of annual meetings, field days and workshops. The 144 student theses prepared in the Study Partner Network were examined in terms of focus and approach. Twenty-nine experts and farmers participated in face-to-face interviews. Other information sources included the interest and number of participants in different offers and comments received after completion of a study project. The results obtained so far are of a preliminary nature because the programme, monitoring and evaluation activities are continuously evolving. The discussion comprises the following areas: (a) content matters; (b) experiences with the lifelong learning project; and (c) integration of students' research projects.

Content matters

Learning offers need to be perceived by farmers as immediately relevant to their needs. Climate change and adaptation, for example, are still of little concern to farmers. Much more important is in particular the immense economic pressure on farms.

Joint work and analyses therefore focus on farm management and economic questions. One tool used for the economic analysis of the impacts of policy programmes on (typical) farms is the *agri benchmark* approach of the vTI (Deblitz and Zimmer, 2005). The approach is based on an international network of beef, sheep and arable farmers and a data-based comparison of production systems, income and costs structures annually. What matters most for the farmers is not the data base as such but the question of how they can relate their own situation to the comparative data. A data base often seems abstract for them – especially for farmers without formal agricultural education. Productiv-

ity and adaptation strategies emerge from the discussion of economic results in the Brandenburgian farmer groups only if they have the opportunity to relate to their own situation and if this process is appropriately facilitated. The result of evaluations indicates that:

- 80% of participants found such meetings helpful;
- 65% of participants liked half-day workshops, 35% voted for longer workshops;
- 70% had a particular interest in the international comparisons.

Since the beginning of the project, 29 interviews with agricultural experts and farmers have taken place. These interviews dealt with farm structures and specific problems in Brandenburg, competitiveness of present systems, the need for information and for innovative farming practices. Since the interviews were based on an open question approach and invited the interviewee to point out highly relevant issues, not all topics were covered by all interviewees.

- 76% of farmers/experts said that farmers need more and better information to develop their farming business; thereof 90% emphasised the information related to production systems and farm economics and, in addition, 50% emphasised the relevance of information on future policy programmes;
- Nearly 60% of farmers/experts said that organisational issues such as travel time, travel costs or the availability of a replacement on the farm/in the household are of core importance for participation in an information event;
- 63% of farmers/experts said that trust in the information source and in the organisers/facilitators of the information event (workshop, field day, seminar etc.) is of core relevance for participation and for learning success. A third of the interviewees emphasised that information events need to encompass practical components;
- Most interviewed farmers (96%) were interested in cooperation with HNEE. Some of them had already good experiences from participating in former projects of the Study Partner Network.

The interviewed experts and farmers provided positive feed-back: The objectives of the ESF project are adequately defined and the cooperation with the university is welcome. The most important finding, however, is that all learning offers need to be perceived as relevant by farmers. This seems obvious but experience shows that sometimes too little attention is paid to professional approaches and the quality of data and materials.

Lifelong learning related to farming practices

The ESF project 'Lifelong Learning in Organic Farms in Brandenburg' concentrates on the competitiveness and resilience of typical farming systems in Brandenburg and on farmers who are not normally reached by extension services and industry. The focus is on enhancing different production-specific networks: a cereal farming group, a beef cattle group, a sheep farming group and a dairy farming group.

Learning from each other, efficient knowledge transfer from researcher or advisor to farmer and vice-versa are main elements of the approach. The project team organises workshops and discussions aiming to foster knowledge exchange on present farming problems. Innovation needs - expressed by participants - are addressed and farm development strategies discussed.

As part of the evaluation activities of the INKA-BB project a wider circle of farmers and the participants of the field days are invited to 'think outside the box' and to open their mind towards the upcoming challenges driven by climate change impacts. The evaluation of the project reflects the diffusion of innovative ideas and new technologies among participants. Currently, the increasing number of interested farmers may be taken as a proxy indicator of its impact/success so far. Even if not intended in the beginning, the involved organic associations wanted to take over the responsibility for the field days independently, aiming to provide their members with highly relevant field study results. Consequently, not only the core group consisting of around 15 farmers and experts profits from the project's results but, in addition, around 30 farmers regularly follow the upcoming experiences of the alternative farming practices.

Trust is of crucial importance for success. It is a precondition for knowledge transfer from researcher to farmer and between farmers and therefore fosters the application of innovative ideas and technologies: When participants have good experiences with cooperative projects, they come back with new ideas. The reliability of the network organisation and the quality of the information are key factors for increasing trust and enhancing the network's development.

A challenge for lifelong learning in agriculture is habits. Many farmers stick to well-established routines. Daily routines in agriculture often show a remarkable persistence due to cultural or family traditions; and of course they are 'safe'. Innovation in farming relies on the farmers' and researchers' attitudes towards joint learning. Lifelong learning in agriculture is, as everywhere, closely linked to the ability of people - farmers, researchers, regulators, advisors, etc. - to try new approaches. Farmers, however, are those who have to manage the related (economic) risks.

Lifelong learning helps to engage with farmers who are not normally reached. Successful projects depend on a number of factors that are discussed further below.

Integration of students' research projects

Within the BSc study programme Organic Farming and Marketing, since 2004, 137 projects were realised as a compulsory part of the curriculum; thereof two thirds (89 projects) in the module 'Project for Organic Partner Farms' for year 1 students from 2005-2012 and one third (48 projects) in the module 'Farm economics - strategy planning' for year 3 students from 2008-2013. In this format, relevant innovations for individual farms have been elaborated in transdisciplinary cooperation between entrepreneurs, students and university researchers. The study partner projects are facilitated by specific methodological inputs supporting the involved stakeholders at different points in time by the professional innovation network manager.

For example, a young farmer was assisted in the process of introducing organic farming management practices as an innovation to his farm. The value added by the cooperation was the specific expertise on the organic farming system of the students and university staff, while the farmer created awareness of the limiting factors of the conversion process. Other groups worked on the development of alternative calf fattening systems, nitrate level analyses of the soils of an organic farm, alternative processing of vegetables and many more topics.

The HNEE team receives very positive comments from the involved entrepreneurs on about 80% of this type of cooperation project. These comments are collected during the feed-back rounds of the annually held Study Partner Network meetings. In addition to these verbal expressions, cooperating entrepreneurs usually come back with new ideas regularly and - by word of mouth - new farmers become aware of and join the network every year. Thus, although the network's contribution to the final adaption of the innovation by the individual farmer cannot be measured yet, this seems to be a very good proxy indicator.

In addition to these study projects, graduation theses at the Bachelor and Master levels also reflect the innovation processes driven by the Study Partner Network. In total, 144 theses from the years 2007 to present have been elaborated. The analysis of these shows that 25% focus on practical innovations for individual enterprises; they are based on the farms' conditions and aim to jointly find answers to the farmers' questions. Close linkages and trust between university teams and farmers are preconditions for these study theses focussing on farm-specific innovations. Around 50% of the theses work on regional innovation needs; they are based on data or qualitative information of a partner farm and aim to produce results for the agricultural sector in the region. The remaining 25% of theses are generic with recommendations related to organic farming sector issues; they are usually based on the cooperation with organisations such as organic farm associations (i.e. plural) that also contribute to the Study Partner Network.

Farmers profit from the cooperation even when they sometimes do not have the opportunity to implement the projects' results immediately. Experiences show that approximately 30% of cooperation partners express new innovation needs immediately after finishing a cooperation project. Approximately 50% of cooperation partners come back with new ideas within a year. Both indicators reflect the network's and the study projects' success.

Universities and transdisciplinary research projects (including students' Bachelor and Master projects) can play a significant role in such networks.

Discussion

Here we come back to the three research questions posed earlier and the related hypotheses. Where relevant, we will expand a little more on further work. We reflect on better measures for evaluation in innovation processes and networks. A final section on the importance of lifelong learning concludes the paper.

Towards more networked approaches

Information in the industrialisation of agriculture tended to flow top-down from industry or expert to the farmer. A large part of the conventional agricultural information and knowledge system still functions in that way. The much more complex challenges of today and the uncertainties related in particular to climate change demand different approaches. The HNEE network teams can be considered to be pioneers in the field of farmer-university network development because they already have experience from projects starting several years ago. Since access to professional expertise and advice has been declining continuously in Brandenburg in recent years, HNEE was able to (re)establish more future-oriented agricultural innovation networks.

The experience gained with the overarching network initiative and its constituent projects clearly indicate that the shift towards more networked approaches is actually needed. The demands on agriculture in a modern society as reflected in urban-rural relations and the demands related to the resilience of agricultural systems cannot be addressed in meaningful ways through conventional top down, disciplinary or linear approaches (Knickel *et al.*, 2009). The experience also shows that universities can play a major role in the implementation of network driven approaches.

Limiting and enabling factors of farmer-university networks

The successful establishment and functioning of farmer-university networks is possible if some clearly identifiable organisational issues are managed appropriately:

- *Interest in innovations*: Farmers' information needs for farm development and adaptation strategies. A lacking interest in changes and innovations reduces farmers' motivation to engage in network activities.
- *Farm structure and coverage*: Farm types that are not served (well) by extension services and private consultants tend to be more interested. More professional farmers working already successfully tend to be less interested in knowledge and innovation networks because they have sufficient information available. Small and part-time farmers need special appropriate offers in terms of timing and content (times of peak labour demand need to be avoided; a short distance to venues and limited travel times and costs increase participation).
- *Network management*: Participants value events with professional facilitation and room for discussion of results, both are crucial for long-term network participation. Farmers have limited time and are only willing to invest it when they really benefit. Network establishment tasks are hard to manage if projects are only short-term. The establishment of a well known series of events with a good reputation takes longer than research projects funding periods.
- *Learning approaches*: Methodologies used need to be appropriate; practical learning tools (e.g. farm visits, field experiments and field days) are often more useful. Participation in research projects raises inter-

est and increases trust in results. When farmers and researchers organise research projects cooperatively in a transdisciplinary approach, the engagement of farmers as well as interest and trust in the results tends to be higher. An average lower level of education and media competence needs to be taken into account.

- *Trust*: Active involvement and interaction as partners increase trust in (new) information. Facilitation needs to enhance the partnership character of joint activities and attenuate the often critical attitude towards universities and experts. Word-of-mouth recommendations among farmers are important for network development.

Better measures for evaluation in innovation processes and networks

Accompanying monitoring and evaluation can contribute to the further development of farmer-university networks. The HNEE team evaluates the network projects' engagement and success annually. Based on the experiences gained so far, future evaluations of the HNEE innovation network will take into account:

- *Active engagement*: The actual level of involvement of farmers in network activities (e.g. active members in the core group and enlarged group of innovation development; regular participants of events; passive members such as irregular participants of information events).
- *Cooperation intensity*: This can be based on the quality of cooperation, the frequency of contacts, study projects etc.
- *Formal evaluation procedures*: Related to workshops and field days additional data can be collected from participants for in-depth analyses.
- *Interviews*: Regularly organised interviews with advisors or other experts can help to capture the actual diffusion and implementation of innovations in the regions.
- *Study projects*: The related analyses would evaluate the interrelations between information network participation and the farms' investment strategies and behaviour.
- *Network analysis*: Network linkages and the intensity of information flows in the region could be analysed using formal tools for network analysis.

Lifelong learning should play a much bigger role

Lifelong learning helps to obtain qualifications, extend knowledge and understanding which is what the farming sector needs at this time of manifold challenges. Moreover, lifelong learning strategies require strong partnerships which can be enhanced by transdisciplinary networks focussing on knowledge exchange and innovations; and it requires adequate organisational structures providing facilitation and reliability.

The HNEE initiative related to the establishment of a 'Knowledge and Innovation Network for Organic Businesses in Brandenburg' contributes to the implementation of

transdisciplinary approaches and, in the terminology of the European Commission, innovation partnerships. The focus on competitiveness, sustainability and resilience of agricultural production, and the interrelations between them, is very high on the political agenda (Dwyer *et al.* 2012). It needs to move much faster into practice and it needs to reach farmers who are normally overlooked. A vast majority of farmers in Europe is of increasing age and many have never received formal agricultural education.

Farmers need information on new developments, new opportunities and potential strategies for adaptation. They introduce innovative practices and technologies when they have the ability to learn continuously. However, experiences show that some farmers are difficult to reach with lifelong learning approaches and participants of workshops and seminars learn differently. Learning methods need to be adapted to different levels of professional education. Topics that are highly relevant for some farmers are of little interest to others. Traditional methods of education, training and management have to be scrutinised, aiming to ensure that farmers and other members of the agricultural sector participate in lifelong learning activities.

Mixed groups of farmers are challenging and promising at the same time. Innovative and successful farmers can provide a substantial input into the group and are welcome multipliers of innovative know-how.

Farmer-university networks function effectively if all involved see themselves and work together as equal partners. Researchers and university staff need to recognise that there are different types of knowledge (tacit, explicit; personal/experiential, procedural, propositional, etc.) and that these different types are complementary (Knickel *et al.*, 2009).

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