Studies on the Agricultural and Food Sector in Central and Eastern Europe

Challenges of education and innovation

Proceedings of the Fourth Green Week Scientific Conference

Edited by
Kelly Labar, Martin Petrick and Gertrud Buchenrieder

LEIBNIZ-INSTITUT FÜR AGRARENTWICKLUNG
IN MITTEL- UND OSTEUROPA

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The papers contained in this volume were selected from the pool of presentations at the conference and were subjected to a blind review process. The input of the reviewers is gratefully acknowledged. Responsibility for the paper's contents, figures and citations remains with the authors.

Halle (Saale), September 2010

Kelly Labar, Martin Petrick and Gertrud Buchenrieder

ABOUT THE MACE PROJECT

The MACE Project (http://www.mace-events.org/mace/mace.html) is financed in the frame of the European Union Marie Curie Actions. It seeks to enhance the capacity for agricultural research in the scientific community of the Central and Eastern European Countries and thus to contribute to managing the process of rural modernisation in these transition countries. The MACE project entails a coherent series of conferences, summer schools, and training courses for junior researchers who want to join an international network. These events were jointly organised with partners in Bulgaria, the Czech Republic, Germany, Hungary, Poland, Romania, Russia and Slovakia. It is coordinated by Humboldt-Universität zu Berlin (Germany) and jointly conducted with the following partners:

- Leibniz Institute of Agricultural Development in Central and Eastern Europe Halle (Saale) (Germany)
- Institute of Agricultural Economics and Information Prague (Czech Republic)
- Warsaw University (Poland)
- Corvinus University Budapest (Hungary)
- Slovak University of Agriculture Nitra (Slovakia)
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- Institute of Agricultural Economics Bucharest (Romania)
- Institute of Agricultural Economics Sofia (Bulgaria)
- Russian State Agrarian University – Timiryazev Academy (Russia)

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APPLYING AN E-TEAMING APPROACH IN MODERN AGRIBUSINESS EDUCATION

ELENA G. KASHTANOVA[*], *ELKE M. LEEDS*[**]

ABSTRACT

Agribusiness education should reflect the complexity of the processes in the national and international food chain and should offer flexible models with just- in-time access to the information in combination with different areas of study. Interactive E-learning, in particular the E-teaming approach used in interactive online students projects, helps prepare students for the complexities of the environment through easy access to international learning sources, interdisciplinary competencies training and the creation of the professional networks. Online teaming offers the same learning experience to a variety of students. Students with different professional backgrounds from various countries of origin participate in the same virtual environment. Students are challenged to find professional similarities, effective work solutions and functional communication mediums. These are some of the same challenges commonly found in today's agribusiness environment. Students get access to face-to-face or video lectures and digital libraries, interact with faculty and student cohorts via online meeting collaboration tools, and develop and submit course deliverables as team output through a course management system. They expand their learning potential through group interactions and an extended international perspective. The collaborative online teaming projects of Anhalt University and Kennesaw State University in Georgia (USA), along with some additional Eastern European partner institutions provide students with an opportunity to participate in agribusiness related global virtual research projects. This use of E-teaming increases students' professional competencies, intercultural and interpersonal skills, and introduces them to the complexity of international projects in agribusiness.

Keywords: Agribusiness, Global virtual teams, E-learning.

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1 INTRODUCTION

Modern agribusiness is challenged by the complexity and interdependencies of the food chain. This is evidenced by quality requirements, traceability, and the interdependencies of the producers and consumers. Subsequently, the growing scope of agriculture requires better business solutions in the production chain, logistics, marketing, and new product development. This situation is a primary driver in the movement towards modern international agribusiness. Future managers are now required to have a different skills set, with a strong focus on critical problem solving, interdisciplinary understanding, network and communication skills, and intercultural competencies. Compared to other fields of business, E-learning and collaborative E-teaming projects in agricultures are still in the early phases of adoption (LEARY & BERGE, 2006). The Food and Agricultural Organization (FAO) of the United Nations recognizes that agricultural education needs to be redesigned to reflect changes in technology, global supply chains, market and health challenges, on-farm and off-farm employment, environmental changes, and enterprise development. These changes will play a signifiant role in the strategy to improve global food security (ACKER & GASPERINI, 2009).

Like in other businesses, globalization, increased competition, and uncertain economic climates motivate firms to consider international projects, partnerships, and opportunities (SCHWAIG, LEEDS, & GILLAM, 2006). Many of the challenges associated with these projects are from issues directly related to communication, cultural differences, processes, and project management skills (WARE, 2003). International activities can be a cause of major business risk and as a result, the need for professional competence in this area is high. More than ten years ago, the University of California, Los Angeles (UCLA) international center noted education in global literacy is of unprecedented importance (HANSEN, 1998).

Today, with economic challenges at an all time high, and the worldwide recognition of the importance of agribusiness for food production sustainability, international professional competencies, communication skills, and cross-disciplinary work projects are even more important.

Collaborative international E-teaming projects offer students an opportunity to learn about the business environments in other countries, develop the intercultural competences, build networks, and prepare students to understand and manage the risk and diversification of the agribusiness environment. The modern technologies and experiences in E-teaming make it possible to create a new generation study environment. The integration of traditional study content, team training, intercultural communication, and special elements of agricultural research offer a rare and valuable

combination for students desiring to meet the needs of the modern agribusiness market.

This paper describes concisely the application of the E-teaming approach in a collaborative project on International Market Entry Strategies between Anhalt University and Kennesaw State University. It describes how online education allowed geographically separate students to participate in one classroom environment to expand their knowledge base and complete a complex market entry strategy project in agribusiness. Students engaged with each other and facilitated a knowledge exchange with different cultural backgrounds and business experiences. They formed international virtual work teams and produced a market entry strategy for an assigned country and agricultural product. Starting with a common understanding of the project goal, they developed a project work plan, addressed cultural differences and structured communication requirements virtually. Additionally, they shared skills, knowledge, and experience. This collaborative course offered an international team of students with a strong orientation to modern agribusiness projects and took the first step in preparing them for a future career in a demanding and changing environment.

2 THE E-TEAMING APPROACH

Close to four million students in the United States were taking at least one online course in the fall of 2007. According to the 2008 Sloan Survey of Online Learning, U.S. online course enrollment has increased by 12 % since then and it is expected that even more students will participate in online learning experiences in the U.S. and around the world (ALLEN and SEAMAN, 2008).

The expansion of online learning and the uses of information and communication technologies (ICT's) in the European Union universities are now also rapidly progressing (DUMORT, 2000).

Projects like Minerva[1] that resulted from the Open and Distance Learning (ODL) action of the European Commission's Socrates program, support online and distance educational programs that are centered on projects with a consortium of transnational partners (HODGSON, 2002). E-learning, and the associated practices are becoming more familiar in academic and business environments. The academic and learning experiences offered to students are preparing them for a more challenging business environment.

The establishment of virtual teams and learning communities in online courses may significantly improve student's social competencies. In many cases virtual learning communities are a collaborative social process where personal relationships are a

[1] For further information on the Minerva initiative, please see: <http://minerva.dtic.mil/>.

key component (ANCAR, FREEMAN, & FIELD, 2006). Work within a team, collaborative deadlines, frequent interaction with the team and the course leader gives the students a feeling of the socialization within the class. The creation of the multinational virtual teams introduces students to intercultural communication challenges and allows them to experience and solve complex communication issues in a pre-work environment. E-teaming projects in colleges and universities expose students to the facets of international work teams and the challenges that arise. Communication is more complex in an international context due to dispersed team members, time zone, and cultural differences (RAMARAPU & PARZINGER, 1997; KLIEM, 2004). Adding to the complexity are different communication norms, language, and the willingness of team members to communicate.

Typically, a U.S. worker or student asks questions freely and voices an opinion. Other cultures may view this as a sign of disrespect (SCHWAIG, LEEDS, & GILLAM, 2006). Vacation and work break times also differ culturally. The U.S. worker or student often maintains communication access over weekends and during holidays. The European student is more likely to go on holiday or university break without maintaining team interaction. Additionally, access to technology in all places is not equal. In many countries the internet speed at universities (Russia), or some country restrictions (China), do not allow the use of complex content management systems like WebCT Vista ® or MOODLE®. European students have more difficulty obtaining access to resources unless they are provided from the university. Purchasing textbooks is uncommon and often not budgeted as part of university education in the EU. In contrast, the purchase of textbooks and the access to university research libraries is common for students in the U.S. These issues were all taken into consideration in the E-teaming approach used in the joint International Market Entry Project of the Anhalt University and Kennesaw State University. Communication schedules, protocols, free access resources, and alternative meeting technologies were made available.

3 THE E-TEAMING PROJECT

In August of 2009, the E-teaming project on International Market Entry in Agribusiness was piloted in order to mirror the professional challenges in the modern agribusiness environment. The course enrolled twenty-five master students, sixteen from the U.S. and seven from Germany. It combined (1) international agribusiness, (2) project management, (3) leadership, (4) cross-cultural communication and (5) global virtual teaming using E-teaming for a geographically dispersed group. The main purpose of the course was to simulate a complex international project as practiced by modern agribusiness firms. It used a case study approach to apply project management skills in an international teaming experience. Global virtual teams and project management

skills can be used to create viable foreign market entry strategies to mitigate risk. Students benefit for the synergy of work teams and the diversity of global teamwork. They also have access to communication technologies and critical information. As suggested by the FAO, these skills are necessary to redefine agricultural education and protect the future of global food security. (ACKER & GASPERINI, 2006)

Prior to the start of the project, the students were provided with virtual collaboration tools, internet based resources, video lectures and report templates to allow for complete focus on the learning activities. The World Economic Forum Global Competitiveness Report and instructor prepared case studies were provided to facilitate project work. Each team was assigned a foreign country and product to analyze the strategic business opportunity. The first two parts of the project were delivered using different formats for the two different groups of students. The German students received 2-days of training about global business and international project management at Anhalt University in Germany. This helped to address the time zone difference on the first few days of class interaction. The students enrolled at Kennesaw State University participated in three days of face-to face classroom lectures. These lectures were recorded on digital video and distributed via the web for German students. Virtual teaming exercises were conducted on days four and five online in one pre-scheduled synchronous meeting. Students were assigned roles in a virtual teaming activity by Harvard Business School Press where they worked together to solve three project problems in a Mt. Everest simulation[2]. The simulation required leadership, information sharing, communication, and critical problem solving skills. Results were discussed and analyzed in class and recorded in an electronic forum. This simulation has been very well received in similar pilot studies at Kennesaw State University. Students also completed the Jung Typology Profiler for the Workplace3 to learn about themselves, each other, and the implications for their team. This was a very important component of the E-teaming experience. Students were able to learn about each other.

They recognized strengths and weaknesses of one another in communication, decision-making, information processing and leadership. After discussing and analyzing results with the students, instructors reviewed the simulation results of the students to ensure the teams were functioning well together. Some suggestions on communication protocols were made prior to promoting the simulation teams to project teams.

After student teams were formed; projects were assigned. Students researched and investigated topics on milk production in Ukraine, bio-diesel in Chile, Bionade in South Africa, and poultry in Romania. From this point onward, all work related activities were virtual. Students used document sharing programs, video conferences,

[2] <http://forio.com/harvard-everest-leadership-teamwork-simulation.htm>.
[3] <http://www.humanmetrics.com/cgi-win/JTypes1.htm>.

IP telephony, and discussion forums to share ideas, review resources, and offer project information. Professors did not join into discussions or offer suggestions. The E-teaming project was designed to mirror an independent work environment. Professors did review project drafts at regular intervals and provided work related feedback. Students experienced many of the challenges associated with international virtual projects. A post project survey captured the experiences. One student wrote "We found the time differences both a challenge and a help. The biggest issue we had was often in scheduling meeting times we would pick a time, and then remember that it would not be a good time for the entire team. Once we started to learn how to work with the time differential, we learned how to use it to our advantage and pass work from one group to the other, so we had fresh ideas and concepts for each group, while the other part of the group attended to other matters." Another seconded the challenge with time zone differentials, but added that the benefits of "more flexibility, new methods, better self-timing, a lot of contacts and the experience gained in project management, teaming and international business made up for other challenges". While the work quality of the projects was very high, several students were challenged by the virtual nature of the project. They did not have previous experience with online activities and would have benefited from a virtual technologies orientation. Several others needed more direction in the management of a complex project, but found that they were able to rely on their teammates, even though they had only virtual technology options.

5 CONCLUSIONS

The E-teaming project objective of simulating the complex project environment in modern agribusiness was met. Students were able to produce the strategy reports for market entry strategy for agricultural products examine international markets.

The key factors for success were (1) the teaming process using personality profiles tools and the Mt Everest team decision simulation; (2) usage of the project management tools, which structured good communication and planning for project execution; and (3) prompt and detailed feedback from the professors for the interim deliveries. For international teams, addressing the issues of international communication was a special advantage. The responses of the participating students were positive, although preliminary reasons for participation were diverse and ranged from getting knowledge on international communication to international agribusiness exposure to project management. The technology of E-teaming provided quicker and better interaction between students, professors, and the study process. This facilitated more active participation and a sense of greater responsibility within project team. E-teaming as a pedagogical method could be widely applied in national and international education

programs in agribusiness. It may enhance better interdisciplinary learning, knowledge transfer, and project based applications for technology and managerial skills.

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Challenges of education and innovation for agricultural development
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THE MISSING LINK: CHALLENGE TO DEVELOP PRACTICING SMALLHOLDERS AS PROFESSIONALS AND AGRIPRENEURS

WILLIAM M. RIVERA [4]

ABSTRACT

This paper highlights the lack of connection between adult continuing post-secondary educational opportunity and practicing smallholder farmers. Providing educational opportunity for smallholders so that they can become more professional and advance their potential business talents is a significant challenge. It is a challenge that requires innovative thinking about the development of adult agricultural education. The present paper's argument is that this adult educational challenge cannot be sufficiently met by traditional public extension services, contract farming inservice-training services, or the training services provided by producer cooperatives – as these are generally limited to advice about one product or one way of processing. *What's missing is practical education that teaches farmers a range of basic agricultural sciences and systems.* In essence, it is argued that smallholders would benefit from greater knowledge about production and value-chain processes and from information that helps them to expand their business horizons – by changing their attitudes towards themselves and their work and by motivating them to develop their business potential. In the present paper two innovative international approaches are underscored as illustrative of programs that seek to educate farmers to become professionals in modern agriculture. These two international approaches serve to underline the potential and need for an expanded view of adult post-secondary agricultural education. The present paper puts forward a number of recommenddations along with an innovative framework for expanding the current systems of post-secondary agricultural education.

Keywords: Adult post-secondary agricultural education, smallholders, agripreneurs, rural society.

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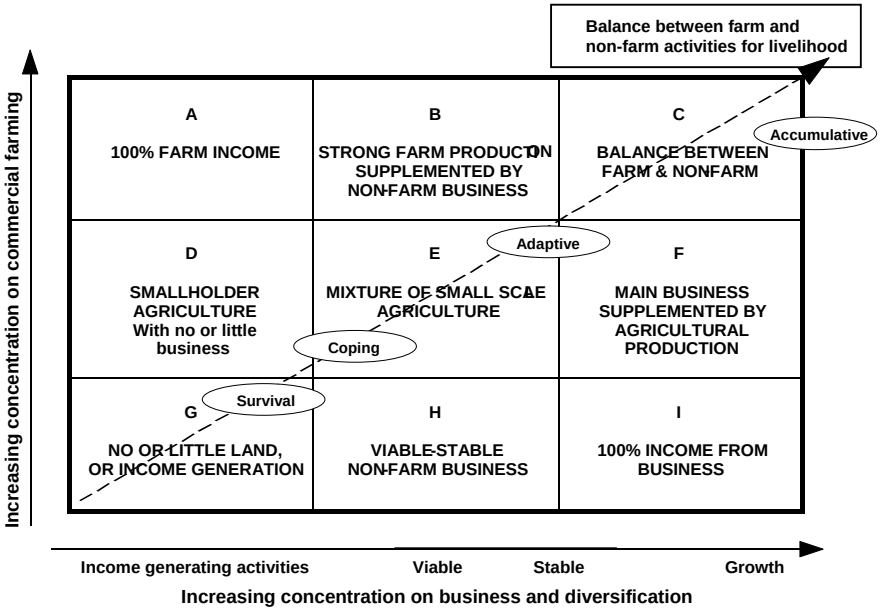
1 IMPERATIVES FOR SMALLHOLDERS

The "power shift" from public to private sector hegemony in agriculture during the 1980s and 90s (MATHEWS, 1997) has itself shifted; it has melded into pluralistic private/public approaches. Innovations – technical and e-technological, along with institutional, managerial, and commodity changes – are being adopted worldwide. Big business is increasingly transnational and basically controls production and sales of commercial products for agribusiness, food and pharmacy (GENET, 1991; HEFFERNAN, 1999; SPITZER, 2003; HENDRICKSON and HEFFERNAN, 2007).

Greater commercialization of agriculture, increased trade liberalization, and dramatic advancements in technology, dictate the need for better capacity on the part of the agriculture workforce, including frontline practicing smallholder farmers (RIVERA and ALEX, 2008). As a result, two imperatives appear to be central particularly to the advancement of practicing smallholder farmers. Neither imperative is entirely new; what is new is their urgency and degree of priority. They are (1) the knowledge imperative, which is associated with globalization and efforts to promote innovation (WORLD BANK, 2006), and (2) the market-link imperative, which calls for changing the focus and role of development from food security to increasing farm income and rural employment (SWANSON, 2006). Thus the practicing smallholder farmer confronts two challenges: the need to generate income and to keep up with the pace of new knowledge.

Throughout this paper the phrase "practicing farmers" is used because there are different types of farmer and farm owners with distinct relationships to agriculture and microenterprise, as illustrated in Table 1 (ORR and ORR, 2002). Following an in-depth study in Malawi, Orr and Orr found farmers whose income is 100 % from farming and at the opposite extreme those whose income is totally from microenterprise, as well as others with various gradations in between. The differences among farmers are important to consider prior to committing to an educational program for smallholder producers. As HAZELL et al. affirm (2007, p. 3): "Policies for smallholders need to vary by context."

Table 1: The relationship between agriculture and micro-enterprise



Source: ORR and ORR (2002).

2 THE MISSING LINK

The missing link, as my title suggests, refers specifically to the lack of connection between adult continuing post-secondary educational opportunity and smallholder farmers. The 2009 FAO publication on "Pathways to Success," states that "Supporting smallholder farmers is one of the best ways to fight hunger and poverty" (FAO, p. 5). Smallholders and their families represent two billion people, that is one-third of the world's population (FAO, 2009); and most of them live in poverty. I argue that these farmers and their families would benefit themselves, their local communities and the agricultural industry as a whole if provided access to basic and advanced practical agricultural education. The challenge is to develop access by these frontline agricultural producers to education that helps them become better farmers and possibly "agripreneurs" (INDIA, BANARAS HINDU UNIVERSITY, 2009). Given institutional development to meet this challenge, research is needed to determine the benefit of smallholder education.

Even in the United States, the agriculture, forestry, and fishing industry is characterized by a large number of workers with relatively low levels of educational attainment. Almost 30 percent of this industry's workforce does not have a high school diploma, compared with only 12 percent of all workers in all industries

combined. The proportion of workers without a high school diploma is particularly high in the crop-producing agricultural sector, where there are more labor-intensive establishments employing migrant farm workers (U.S. BUREAU OF STATISTICS, 2005).

Educational opportunities for practicing smallholder farmers to become professsionals and to advance their potential business talents is a significant challenge for the future development of agriculture and society, not least for rural society.

At present, there are basically three foremost vehicles for providing practicing farmers with new knowledge and skills. They are the public sector agricultural extension services, the private training and advisory services provided by contracting companies for the purposes of standardizing and marketing the products farmers produce, and the private sector producer marketing cooperatives that deliver information and guidelines to their members for the purposes of their producing for market. None of these training programs provides comprehensive or adequate farmer education in modern agricultural techniques or commercial enterprise.

What's missing is practical education that teaches farmers the basic sciences of agriculture, including those that cover modern production and process sciences, expands their horizons by changing their attitudes towards themselves and their work, and opens their aspirations toward developing their business potential. "Experience gained from growing up on or working on a family farm is the most common way farmers learn their trade. However, modern farming requires increasingly complex scientific, business, and financial decisions, so postsecondary education in agriculture is important even for people who were raised on farms" (U.S. BUREAU OF LABOR STATISTICS, 2009, section of Training).

The educational opportunities just mentioned – public extension services, contract farming inservice training and the training provided by producer cooperatives – are generally limited to advice about one product or one way of processing. Over time in "deceptive (contract) arrangements" (IBON, 1998) farmers become comparable to machines in a mechanized operation where repetition and ongoing indebtedness are the norm. Even in economically advance countries, contract farming rules are only gradually being re-designed to better protect growers (USDA, 2009). Nonetheless, contract farming has the potential to improve the welfare of smallholders although, as SIMMONS points out (2002, p.1) "it is not a sufficient condition for such improvement."

3 INTERNATIONAL INNOVATIONS

Why seek to educate farmers in modern agricultural developments and help them organize to become more commercially viable and business oriented? The answer goes beyond the general reference to liberalization and change. It has to do with the basics of development (SEERS, 1981). According to the Human Development Report 1996 (UNDP, 1996) human development is the goal, economic growth a means. Although there is no automatic link between economic growth and human

development, when these links are forged with policy and determination, they can be mutually reinforcing….(UNDP, 1996, iii). While programs to assuage hunger and poverty are needed, as the recent FAO publication on "Pathways to Success" states (2009); equally important are programs that help farmers to understand modern agriculture, to learn more about generating income and to become agripreneurial, that is, entrepreneurs in the agriculture sector.

In meeting the challenge is to develop institutions and projects that cater to the educational needs of practicing farmers, two international projects merit attention. Both have initiated institutional innovations to foster farmer learning in agricultural and commercial enterprise. One helps farmers learn to establish commercially viable businesses and the other seeks to educate farmers to become professionals in modern agriculture.

IFAD in East Africa: A Pro-Poor Business Model. Over the last five years IFAD has invested over two million US dollars in three projects all directed towards developing commercially viable market access services for small farmers in Kenya, Tanzania and Uganda. The services provide locally relevant market information and facilitation of fair and secure trading in agriculture, horticulture and livestock markets. Continuous development of services is provided through a people-centered knowledge management approach called Linking Local Learners (www.linkinglearners.net) provided by a business model know as RAVI (Rural African Venture Investment).

According to the Linking Learners website, business-to-business learning by commercial operations necessitates a balance of face-to-face interaction and online mentoring, coupled with vigorous peer-to-peer sharing of experiences. The Linking Local Learners methodology seeks to achieve peer-exchange at acceptable costs for many widely dispersed entrepreneurs as it cuts down on meetings and workshops. Online mentoring with immediate feedback of experiences into ongoing business operations results in rapid progress and creative solutions for different locations.

Services are delivered through a network of small businesses located in main and rural markets as well as in production areas. The businesses use modern ICTs, especially mobile phones, solid-state laptops and the internet, to gather and share market information and arrange trading deals.

Modern communication technologies like SMS (Short Message Service) allow the interchange of short text messages between mobile telephone devices.[5] Mobile communication systems, using standardized communications, email and the internet help cut through the prevalent distrust along marketing chains and help clean up the inefficiency of marketing for small farmers. These mobile communication systems also help to scale up business operations.

[5] SMS text messaging is the most widely used data application on the planet, with 2.4 billion active users, or 74% of all mobile phone subscribers sending and receiving text messages on their phones.

This Linking Learners business model ensures that poor people benefit from business, both as clients and as entrepreneurs. Small farmers get better prices for their produce and get better 2access to lucrative markets. Small farmers have an opportunity to establish and operate commercially viable business themselves. (See: <www.linkinglearners.net>)

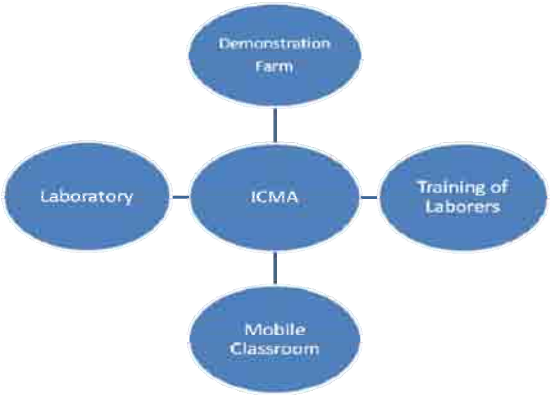
GTZ: Partnership Farming. The GTZ is advancing a Partnership Farming concept based on initial explorations in India's Gujarat state. The concept proposes to establish a new kind of institutional relationship with experienced and also young farmers as well as agricultural laborers. To promote a positive and profitable relationship for farmers the conceptual framework will assist farmers access to markets and promote their practical education through the establishment of an Indian Center for Professional Agriculture (ICPA).

The ICPA is planned for development in Rajpipla, Gujarat, India, to cater to the practical agricultural education needs of farmers in and around Gujarat state. It is conceived as a key instrument in fostering the Partnership Farming approach. This approach includes in addition to semi-formal education of farmers, the advancement of farm laborers through better relations with the farmers for whom they work and also via training programs carried out on the farmers fields. The ICPA is structured to remain flexible in its teaching program and open to others seeking to advance their professional knowledge and skills in the agricultural sector.

Partnership Farming is intended to enable farmers to develop a market-driven production plan as they adopt modern agricultural practices. This enhancement is expected to improve the livelihoods of farmers, to promote sustainable use of natural resources and to test the feasibility of the Partnership Farming approach for upscaling to other states within India and eventually to other developing countries.

Figure 1 illustrates that the Center's farmer school includes a mobile classroom arrangement and a special unit for training farm laborers on the farms where they work. The Center is conceived as having two main pillars. The first pillar is concerned with the systematic teaching of basic knowledge and best-management practices in the use of soils and plant care, farm management and agricultural business. Emphasis is on basic knowledge, attitudes and skills and the transfer of best practices in each subject. Additional courses may be added to the main curriculum to cover special interests, such as the organization and management of farmer owned and operated producer organizations. The second pillar is dedicated to agricultural innovation including R&D for local adaptive development, the laboratory, and commodity development.

Figure 1: The general concept of the farmer-school Center (ICPA)



Source: GTZ. Gujarat, India project working document (2009).

The GTZ approach also offers farmers not only a connection to market access, but provides capacity building programs that may link them to local agricultural industry. In the long term, the approach seeks to combine an alternative to contract farming and through its Center for Professional Agriculture to provide basic and practical education that leads to farmer advancement both within the farming profession and with connections to commodity and business arrangements that may contribute to their income generation and professional status.

The GTZ project is additionally interesting from a research perspective in that it is carrying out a baseline study of smallholders in the area, to assess the outcome and impact of the Partnership Farming approach. The baseline study is to be followed by annual evaluations of changes in smallholder practices as well as any agri-business opportunities that might result from instruction provided by the Center and its research and advisory activities.

The Center plan is to link with the inservice training programs operated by local companies and the advisory services provided by both public and private entities. Its modular training courses aim to teach modern agricultural methods as well as basic economics so that farmers begin to view farming as a profession. Linkage to the private sector is an important component of the school, to encourage farmers to think of producing higher quality products and use better production methods.

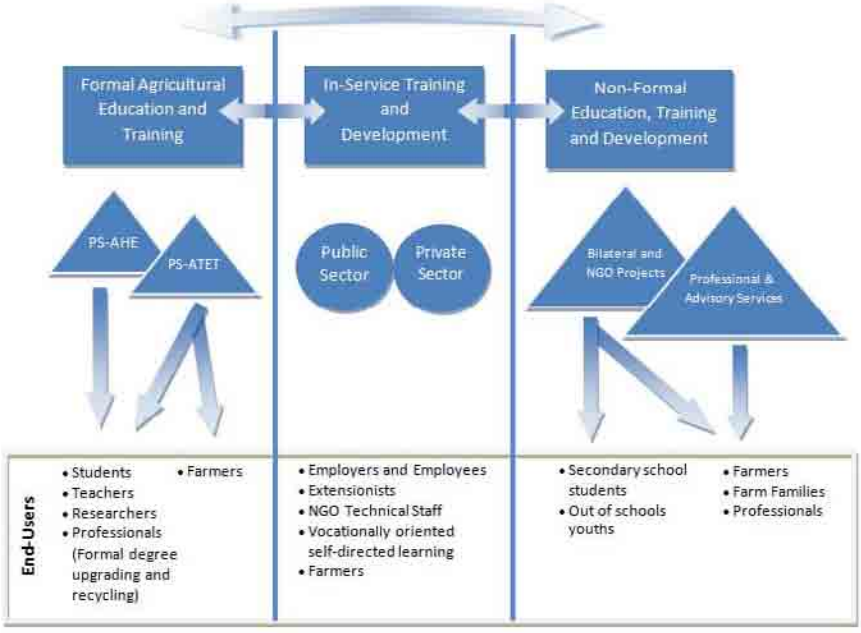
The GTZ initiative posits an alternative concept of post-secondary education. Its market-oriented and knowledge acquisition priorities make one wonder if post-secondary-type institutions ought to be reformed or else that new institutions be created, such as the GTZ Centers for Modern Agriculture, to serve experienced but not necessarily formally educated farmers.

While highlighting and applauding the above two international projects that are organized to promote pro-poor and practicing farmers to become professionals, it brings into question whether national policy for agricultural education deserves review with the goal of revamping these institutions to serve the needs of practicing farmers. In the final analysis an expanded view of post-secondary agricultural education appears to be recommended to promote farmers as professionals and agripreneurs.

The GTZ initiative poses an unspoken challenge to post-secondary education and in particular post-secondary agricultural technical education and training (PS-ATET). An alternative view of this PS-ATET institution deserves consideration; there is in fact a growing literature on the need for PS-ATET institutions to provide practical education for farmers (DAVIS et al., 2008; KROMA, 2008; RIVERA, 2006; RIVERA, 2008). Figure 2 suggests an innovative framework.

Figure 2: Elements of an integrated agricultural education network

Systems and End-Users



Source: Adapted from RIVERA (1995).

The alternative suggested in Figure 2 might be to build distinct institutions such as centers for professional agriculture. But the question remains whether contemporary post-secondary agricultural training institutions in less economically developed countries can direct their curriculum and activities toward education of smallholder

farmers in the basics of modern agriculture? Can public sector traditional PS-ATET institutions be reformed to accommodate smallholder farmers? If the public sector cannot do it, then perhaps private sector agricultural education may be the answer.

Can public sector traditional PS-ATET institutions be reformed to accommodate smallholder farmers? If the public sector cannot do it, then perhaps private sector agricultural education may be the answer.

Access to knowledge is required for growth (BOZEMAN et al., 2003; NAGEL, 1979), "but if the content is not right, or farmers' access is not inclusive, such growth will not lead to well-balanced development and certainly not to pro-poor development" (WENNINK et al., 2007, p. 12). This kind of practical thinking has fallen by the wayside to a large extent, however, in part because of the traditional international commitment to invest mainly in universities and to agricultural higher education schools within universities.

Policymakers and researchers are challenged to consider what would constitute an expanded view of post-secondary agricultural education and training. A new perspective might link interchanges between formal, inservice and non-formal advisory systems, as Figure 2 suggests.

By developing an expanded view of post-secondary agricultural technical education and training, a network of educational resources rather than separate systems might be created. The three systems of formal, inservice and non-formal education would become three resources for educational development. This broader view of traditional agricultural education and training would embrace a more comprehensive "small-farmer agripreneur education system" directed toward frontline human capital development.

4 CONCLUSION

The ever-increasing globalization of systems of production and business has resulted in a shift away from "traditional" sectors and toward "high tech" sectors (MYTELKA, 2004).

While emerging institutional innovations are already in the works to promote practical agricultural and agripreneurial education for smallholder farmers along with responsive basic education for laborers, these innovations exist on the edge of traditional education systems. Can governments rise to the challenge to educate frontline farmers and laborers? Or, will the task be left to international organizations and the private sector? Whatever the final outcome, economic and social progress depends on the advancement of frontline producers in the 21st-century's innovative agricultural sector.

This is a relatively untouched area of research: to determine the economic, social and individual progress that might be achieved through advancing the education of frontline producers about modern agriculture and agro-business. What are the

contributions of the international projects to the modernization of smallholders and that encourage them to become business-oriented? What are the rates-of-return on investments to advance smallholder knowledge and skills in modern agriculture? What is the value of modifying farmers' attitudes toward agriculture as a profession and stimulating their aspirations to take a greater part in an innovative agricultural sector?

Ultimately the challenge is to policymakers and development professionals to explore institutional innovations and alternatives that connect the missing link between education and frontline producers.

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EXTENSION SERVICES

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SOCIAL AND POLITICAL CONTEXT OF AGRICULTURE ADVISORY SERVICES IN THE REPUBLIC OF TAJIKISTAN

ANDREAS MANDLER[*]

ABSTRACT

The former Soviet Republic Tajikistan is a low-income, food-deficit country with a high contingent of rural poverty. Agriculture plays a major economic role and is of high importance to ensure rural livelihoods. Agriculture advisory services are considered as promoter of productivity, but are not adequately developed. Often the available expertise causes little economic effects. Despite various efforts to enhance learning and information sharing, farmers' overall access to knowledge and options to exchange and use knowledge are weak. The present article investigates the social and political context of agricultural advisory services in the country, asking for most influential factors.

Tajikistan has been described as a hybrid state, where local governance processes tend to be dominated by powerful actors. Local elites are heterogeneous; they consist of previous kolkhoz leaders, state administration, religious figures or former warlords. Agricultural production is heavily influenced by local governance, as it regulates for instance the distribution and use of resources. The present article argues that local governance has also key importance for the exchange of knowledge. It outlines the role of local governance for the distribution and use of knowledge in rural areas, thus emphasizing the political context of agricultural advisory services in Tajikistan. The present research is based on literature and project experiences from development organisations. It is assumed that in order to achieve future growth, local elites need to change their approach towards agriculture advisory services and should foster knowledge exchange processes.

Keywords: Tajikistan, Agriculture, Local governance, Advisory service, Elites.

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1 INTRODUCTION

Among the 15 successor states of the Soviet Union Tajikistan is the one with the lowest per capita gross domestic product (GDP). Although the Central Asian country has experienced steady economic growth since 1997, about two-thirds of the population continue to live in poverty (UNDP, 2009). Around 75 % of the population lives in rural areas, poverty is therefore mainly a rural phenomenon. Cotton and wheat are the main cash crops in Tajikistan, who alone contribute almost 25 % annually to the GDP. However, the overall volume of Tajik agricultural output is not sufficient to ensure food security (WFP, 2010). Despite growth, the performance of the agricultural sector remains well below its potentials (FAO, 2008, ROBINSON et al., 2008; LERMAN et al., 2009a, 2009b). Tajikistan's political culture has been described as authoritarian and neo-patrimonial (WIEGMANN, 2009), where patrons use private and public resources to secure the loyalty of their clients. Informal patron-client relationships are prevalent; they can reach from very high up in state structures down to individuals in small villages. This leads to a perception of the Tajik state as hybrid state (ZUERCHER, 2005; KOEHLER, 2004), which is not equally present in rural areas. However, this does not mean that Tajikistan is a weak state. In selected areas, as security, internal politics or the cotton industry, the state is considerably strong. However, in other fields, as education, health or energy supplies, the state delegates much of its competencies to other agencies and actors. On local level, a mixture of state and other actors as NGO, international organisations or local elites steer local affairs through local governance processes. The outcomes of such decision-making processes do have enormous impact on agricultural matters, as they regulate for instance the distribution and use of resources. Decisions made in these processes are not always balanced between the diverse interests. Partaking and assertiveness of farmers is volatile, often their interests tend to be neglected. Against this background, the experiences of extension projects left a rather mixed picture, with varying success and impact in the different provinces of Tajikistan. The present paper seeks to outline current forms of agricultural knowledge exchange in Tajikistan and identify factors that influence advisory work.

2 SOCIAL-ECONOMIC SET UP IN RURAL AREAS

The transition process from Soviet command economy to a market-oriented, private economy stagnated in Tajikistan in the late 90´s of the previous century and led to a mixture of both. Political efforts to move the society towards a market economy culminated in a set of land reforms (ROBINSON et al., 2008; SPOOR, 2007; PORTEOUS, 2005; GERBER et al., 2005) that produced a vast number of people with heterogeneous access to land. Great deals of these new farmers possess only limited knowledge about farming (WALL, 2006; ESHCHANOV et al., 2007). Due to specialization of farmers within the kolkhoz/sovkhoz system, they rarely possess the skills to run a farm in a private market system. "A consequence is that

agricultural extension and other forms of adult education have a more important role to play in [former communist] countries than elsewhere in the world." (VAN DEN BAN, 1999: 121). The major part of the rural population are smallholder, who own very small household land plots, but accumulate on average 1 to 2 ha through tenure and other leasehold mechanisms. The annually available farmland for a family household allows only limited production, which alone does not secure livelihood (HERBERS, 2006; FAO, 2008). Instable access and high insecurity of land property prevents farmers from necessary investments in technology or soil protecting measures (ROBINSON et al., 2008). It has been stated that most of these smallholders will never manage commercially competitive farms; however recent studies underline their growing productivity (LERMAN et al., 2009; FAO, 2008).

Currently the structure of agricultural enterprises in Tajikistan consists of highly interdependent farms of various sizes: Big agricultural enterprises, private farms (Dehkon farms) and smallholders with household plots (LERMAN et al., 2009; ROBINSON et al., 2008; МАШРАБОВИЧ, 2008). According to the Tajik State Statistic Committee (2005) 65 % of arable land is owned by private farms. The figure is misleading as especially big private enterprises only changed by name, while continuing to work kolkhoz-alike. "Unreformed (enterprises and collective dehkan) farms still hold over half of sown land in Tajikistan." (FAO, 2008: 7). Especially in cotton growing areas, individual private farming is marginal (ROBINSON et al., 2008). Still, collective kolkhoz or sovkhoz successor enterprises control most farmland, with the bulk of the rural population employed on these farms. They basically continue to produce in the kolkhoz manner, although on lower levels as input, machinery and advice is lacking or not appropriate. At the same time, the quality of natural resources is rapidly declining (OXFAM, 2010; MIKHALEV, 2008). According to the policy of the Government of Tajikistan, land resources of collective enterprises are to be privatized. Privatizations are implemented by the collected farms themselves, together with the district government body *Hukumat*. However, the heads of large farms pursue a very reluctant privatization strategy (PORTEOUS, 2005). For the time being, many of these farms maintain the hitherto, i.e. soviet, business concept (ROBINSON et al., 2008) and their future development is barely predictable.

Individual Dehkon farmers, who are believed to become the motor of commercial farming, possess on average between 1 and 10 ha of farmland (ROBINSON et al., 2008; HERBERS, 2006b, 2006a). It is mainly the economic environment that causes dependencies. Dehkon farmers are impelled to work in close symbiosis with kolkhoz and sovkhoz successor enterprises in order to accomplish basic forms of industrialized farming and to ensure proper access to irrigation and other input. Apart from that, private farmers deal with interferences by state administration, local governance or farmer associations, for example with regard to cropping decisions (PORTEOUS, 2005; WALL, 2006; ADB, 2008). In cotton growing areas, most Dekhon farmers must obey to a hidden quota regulation, so that they plant e.g. 70 % own crops and 30 % cotton on their soil. In addition, marketing of cash crops as cotton or wheat is managed by the same collective farms or related enterprises that channel

profits into the pockets of its leading personnel (BLISS, 2008; ATTA, 2008; ICG, 2005). At the same time, the marketing of other produce is hindered by the small amounts produced (WFP, 2005). Only a small surplus is available for the market, as the major part of produce is needed for household consumption (SPOOR, 2007). Additionally, high transaction costs prevent market access, thus local and regional commodity markets remain weak (LIVINETS, 2007; FAO, 2008). Agriculture commercialisation in Tajikistan provides often very limited income. Eventually, revenues of Dehkon farmers are not significantly higher than smallholders and wageworker earnings, so that some farmers even abandon private farming (HERBERS, 2006a; ICG, 2005).

3 LOCAL GOVERNANCE

Local societies rule their affairs, e.g. make decisions, through negotiations held between institutions and agencies or actors. "Local governance is political organisation of social order in a local context which reflects coherent interactions of different actors through historically and culturally embedded power structures and networks." (BOBOYOROV, 2009: 16). Often, it is not the state that controls local affairs. Decisions are made through local governance processes that are executed according to the set of institutions and takes place in a given social arena. The latter is called "social order". The term encompasses the particular constellation of institutions and agencies or actors which can be found in one moment of time (SCHETTER, 2009). It describes an underlying system of flexible norms that is obligatory to all members of the community and which has been relevant even in times of the complete absence of state (SCHETTER, 2009; MIELKE, 2007). Institutions, famously described by NORTH (1990) as "rules of the game", are framing the political processes (governance) and are enabling and constraining the implementation of political contents. Social order however, forms the framework of institutional arrangements in which all rural organizations as *Mahallas* (neighborhood associations), professional associations, rural municipalities and kinship groups are included. Traditional collective actions as *hashar, sadaqa*, *qars, uschr or hums* are mobilized through social order.[6] Thus, local governance processes are embedded in social order. There is a variety of variables influencing both, the shape of social order and local governance. For example institutions or the multiple, fluid and dynamic nature of collective identities (BOBOYOROV, 2009).

Within this framework, decision-making processes in local communities take place. Not all institutions and actors are considered equally important, their potential depends on the relation to power (LAUTH et al., 1999). In many cases, rural communities are dominated by powerful actors (elites) that derive their dominant position from land property, key positions in the local administration or personal

[6] Some informal community institutions are: Hashar – collective harvesting; sadaqa – money collection for people in need; qars – local tax to finance marriages, diseases, departures to working migration; uschr, hums – local tax to finance community projects.

prestige (WIEGMANN, 2009; GRUNDMANN, 2004). In Tajikistan, especially smallholder farmers are hardly able to lobby effectively for their interests (LIVINETS, 2007; FAO, 2008; SEHRING, 2006); "the majority of the rural population is excluded from information and decision making in the villages" (SEHRING, 2009: 74). Nevertheless, elite figures are not acting outside local governance. On the contrary, they are well represented in local agencies and organisations in order to steer decision-making processes. The local governance process is affected by variables as legitimacy, knowledge management, institutions etc. Elites tend to dominate the local governance process by controlling a few variables at the same time. "In different rural settlements the Soviet *kolkhozi* elites, who have maintained the leading positions in rural organisations, are actively reinventing and reinterpreting their economic and political rights." (BOBOYOROV, 2009: 1). Due to the inconsistent, hybrid distribution of power within the Tajik state, the public administration does not play a compensating role in local governance processes, e.g. as guarantee of the rule of law. Its influence changes broadly within the provinces and sub regions. Some researchers argue that the aforementioned unstable conditions generate formal and informal income opportunities for the elite and provide extra ways to exercise power (CHRISTOPHE, 2005; ZUERCHER, 2005). This applies to agriculture production, in some areas elites tend to bloc changes and innovation in order to keep the *status quo*. It is thus in the interest of elites to conserve an established agricultural praxis that works in favour of their basis of power, e.g. nourishing clients under their patronage and one's own financial interests. Collective bodies as buyer and supplier units or farmers associations are often times coopted by local elites and do not act in favour of their clientele (ROBINSON et al., 2008; HERBERS, 2006a; WALL, 2006).

4 AGRICULTURAL ADVISORY SERVICE AND LOCAL GOVERNANCE

Research and advice have been identified as a potential boost to Tajik agriculture and is highly welcomed by both, agronomists and farmers (CACAARI, 2009; IMF, 2009; WASON, 2002). However, specialized agricultural knowledge is rarely available. The current situation of agricultural research and extension in Tajikistan is weak, as previous institutions and knowledge management structures deteriorated. Agricultural expert knowledge that was integrated in Soviet research structures, is partly lost or became outdated (WALL, 2006; MORGOUNOV et al., 2001). However, the remains of this knowledge form the basis of current cultivation praxis that often times has not changed much. That is especially true for the cotton industry, where Soviet praxis is deliberately maintained (ATTA, 2008; ICG, 2005). Currently, no centrally steered advisory system for all provinces of Tajikistan is in place. Instead a mix of state and private service providers is in place, which is in most cases initiated by international organisations and NGO (WFP, 2005). With regard to agricultural extension in Tajikistan, at least four different ways of distribution can be found:

1. State extension officers, who are attached to the Ministry of Agriculture or to regional or provincial governments.
2. Private advisory services run by NGO's, international organisations and private companies.
3. Internal advice within collective Dehkon farms and non privatised enterprises, e.g. in the cotton sector.
4. Local forms of knowledge exchange and mutual consultation inside the *Mahalla.*

Although the various ways of knowledge exchange do exist in rural Tajikistan, agricultural extension is far away from being "a series of embedded communicative interventions that are meant, among others, to develop and/or induce innovations which supposedly help to resolve (usually multi-actor) problematic situations" (LEEUWIS et al., 2004: 27). Instead, local governance interferes in both, farmer's communicative interventions and their exposure to innovation. These two points appear as main drawbacks to advisory services in Tajikistan at the moment.

Firstly, due to Tajikistan's mountainous geography it is difficult to communicate in general. In the course of the grave deterioration of the country's infrastructure, since 1991 the information flow between the regions came to halt. Currently there is no common informational space in the country. Taking the example of the media, as a cornerstone of public communication, there is no nationwide newspaper, only one channel of Radio and TV for several hours a day (BENZMANN, 2007). Media are only present at a minimum in rural areas (WASON, 2002). Apart from infrastructural and economic limitations, Tajik media faces harsh political restrictions[7] and is only sporadic capable to cover agricultural issues (LOERSCH, 2000; NANSMIT, 2009).

Secondly, innovations in agriculture are massively hindered, as farmer potentials to decide and act independently are very limited. Communication and joint decision-making faces even on local level many difficulties. The above named nexus between knowledge and innovation in agriculture is challenged by the interests of the state and local elites. Unlike western extension systems that rely on free choice of farmers regarding their farm practise (RÖLING, 1994) farming innovations are delicate issues in Tajikistan, monitored closely by the state and powerful local actors. Especially in cotton growing areas, private farmers are bound to crop quotas, production techniques, input supplies and marketing mechanisms (ATTA, 2008; BLISS, 2008). In cotton and wheat areas a system of knowledge governance is in place, which manufactured negative incentives for innovation (WALL, 2006;

[7] One example: "Zafar Murodov, a reporter for Kulyabskaya Pravda, was detained for an hour by police on 23 January, when he was covering a demonstration by a group of market vendors outside the local government building, in the town of Vosei, southern Tajikistan. Murodov believes that police, who were forcibly trying to disperse the demonstration, wanted to prevent him from reporting the events." Reported by IFEX, 2006, retrieved 03/2010 at <http://www.ifex.org/tajikistan/2006/01/27/journalist_detained_prevented_from/>.

HERBERS, 2006a; ICG, 2005). As indicated above, pressure on private Dehkon farmers and smallholders is exerted through economic dependencies and ambiguous land tenure rights (ROBINSON et al., 2008; HERBERS, 2006a).

However, apart from cash crop regions the modus of local governance is likely to change, being more liberal and representing better farmer's interests (GRUNDMANN, 2004; WIEGMANN, 2007). The differentiated local political set up may also explain the mixed picture of extension conditions. Limitations, regarding the access and use of agricultural information vary broadly. Agriculture in Gorno-Badakhshan Autonomous Province (GBAO) with ca. 100 % of smallholder farmers, benefited to a large extend from regional advisory service and achieved strong gains in productivity and post harvest processing (BLISS, 2006; FAO, 2008). Instead, efforts to improve productivity through an extension project in the Region of Republican Subordination (RRS, cotton and wheat production) were minor effective (WASON, 2002). Conditions for advisory work change soundly in these two regions. In the case of GBAO one positive indicator is the much advanced privatization of land. Additionally, the set up of new municipal councils led to transparent local governance processes. Mountainous areas of intensive smallholder cultivation as GBAO are economically of minor importance. These areas abstain to a large extend from market production, partially traditional farming practices were reintroduced to ensure subsistence farming (BLISS, 2006). Constraints to advisory services in RRS derived from state interferences on farmer knowledge sources, as media or farmers associations. Farmers in the RRS province were subsequently prohibited to apply new production practises or rather to address certain issues as land rights, loans, market prices or livestock and crop protection (ROBINSON et al., 2008; WASON, 2002). In contrast, experiences in the northern province Sugd display a positive ground for advisory service, although effects in terms of increased income remains to be seen (MEDA, 2006).

5 CONCLUSION

The present article links the heterogeneous picture of agricultural extension in Tajikistan to the varying local governance set up throughout the country. It is argued that difficulties in communication and the implementation of innovations are major constraints to advisory services. Rural knowledge exchange is steered by local governance that is itself influenced by state policy and elite interests. However, traditional forms of mutual exchange do exist, but are cut off from external input. Especially the economic development of the group of Dehkon farmers is key for the future growth of the Tajik agriculture. The article emphasizes that this group has limited potentials to benefit from advice, as their work is subject to interferences by elites or large agricultural enterprises. With regard to the above quoted consideration of VAN DEN BAN (1999) on the importance of agriculture extension in former communist countries, Tajik policy and local elites need to recognize the nexus between knowledge and innovation as boost to agricultural productivity.

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PUBLIC AND PRIVATE AGRICULTURE EXTENSION SERVICES IN ALBANIA – CURRENT SITUATION AND FUTURE PERSPECTIVES [8]

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ABSTRACT

Agriculture extension services in Albania have undergone drastic changes from the time of the state-organized economy to the market economy, as private extension services have also emerged. Public extension services were restructured during 1990 and donor organizations have played a key role in this respect. Despite improvements in some private and public services, such as cattle insemination and vaccinations, other services are poorly provided, or even non-existent. Relatively little research work has been carried out on extension services in Albania, and further research on this subject is needed, as the availability of quality extension services is seen as a key factor for achieving agriculture competitiveness in the context of recent sector and market changes for final agri-food products. This study intends to cast light on the current situation and future perspectives of both supply and demand for public and private agriculture advisory services in Albania. The study is based on a survey using semi-structured interviews and focus groups with all main stakeholders of the agriculture sector in Albania, as well as secondary data review.

Keywords: Agriculture extension services, Albania.

1 INTRODUCTION AND METHODOLOGY

The current state of agriculture extension services in Albania is deemed as poor, and the availability of quality extension services is seen as a key factor for achieving agriculture competitiveness, in general, and some agriculture subsectors specifically, such as in the case of the olive and olive oil subsector (SKRELI et al., 2009; USAID's AAC, 2009), and the vineyard and wine subsectors. This is also the case for the

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Medicinal and Aromatic Plants (MAPs) subsector, which is important for rural development and poverty alleviation in mountainous areas in Albania (IMAMI et al., 2009).

Economic growth and improvement in the standard of living, as well as rapid urbanisation and trade liberalization, have recently led to a rapid evolution of consumption behaviour and lifestyle in Albania, and consequently to the gradual segmentation of the food and beverages market, similar to other transition countries. Demand from the emerging urban middle-income class of consumers, combined with the gradual consolidation of the retail sector and the recent establishment of the first supermarket chains, have had strong implications for the agrifood market, which in past years was almost exclusively based on price. Thus, there is an increased demand for quality and safety standards, consistent quantity, diversity, etc.

These changes have strong implications for the Albanian agriculture production base. Therefore, the role of extension services is instrumental in assisting agriculture producers in satisfying recent consumer demand trends and facing the increasing competitiveness and emerging challenges in the context of international trade liberalization and European integration, as well as the abovementioned retail trade transformations. According to the Household Budget Survey data of 2007, farms that have access to extension services were 72 % more efficient than farms which do not (WB (b), 2007).

In Albania, both the demand and supply sides of extension services are undergoing a substantial change. According to the Rural Development Strategy of Albania (MAFCP, 2007), approximately 30 % of the farm holders have an agricultural education background. Normally, the young generation of farmers has limited relevant experience and know-how. The further transition of land use to the new generations' farm holders is expected to further increase the demand for extension services. Whereas on the supply side, a major challenge for the future is the shortage of young professionals, as the most qualified human resources are more interested in other activities and professions.

The objective of the study is to analyze the dynamics of both the public and private extension services in the agricultural sector in Albania, and to identify challenges and potentials for interventions, mainly in terms of capacity building in the near future.

In our study, which took place throughout 2009, we conducted a comprehensive market survey, analyzing both individual suppliers and demanders of services in the agriculture sector in Albania, primarily targeting the fruits, vegetables and livestock subsectors, including actors throughout the whole value chains. We used different semi-structured questioners for each of the targeted groups – service providers versus clients.

The study is based on a comprehensive market survey, analyzing both individual suppliers and demanders of services, gathering quantitative and qualitative data,

using two different types of questionnaires. In order to complement information from the key informed stakeholders, we also posed open-ended questions and had discussions to obtain insights on the relevant issues. Moreover, three focus groups with experts and farmers were organized in the regions of Fier, Shkoder and Kukes.

The data were entered in existing software through which different indicators were produced in order to assess market growth, the range of products and services mostly provided and demanded, network densities and centralities, etc.

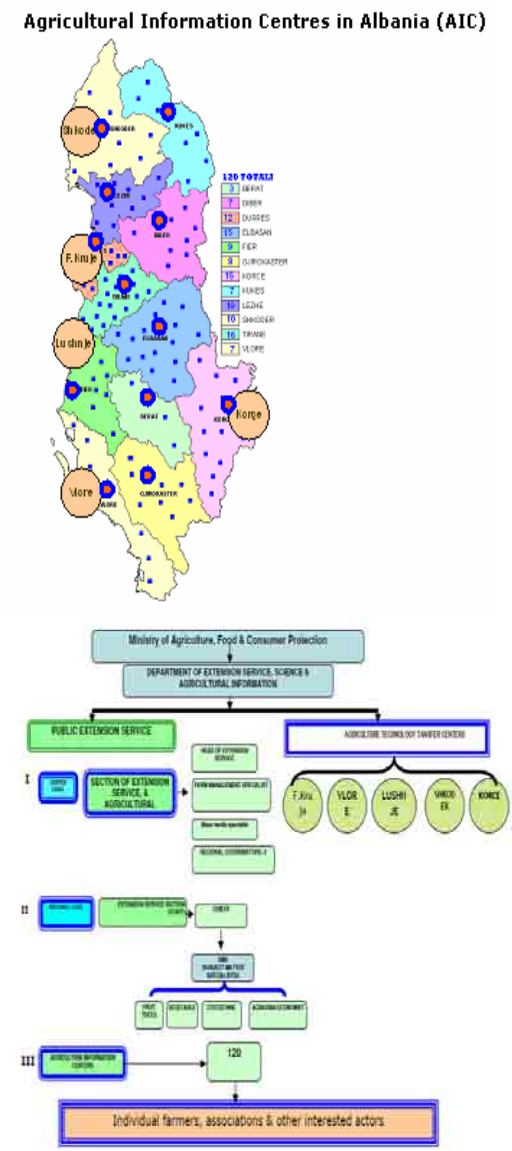
A total of 153 service providers and clients were interviewed, of whom 81 were service providers, including regional input suppliers and leading services providers (i.e., agronomist, veterinarians), as well as representatives of NGOs/ associations, and 72 were clients (fruits, vegetables, livestock farms and processors, wholesalers, etc.) in the regions of Korca, Shkoder, Fier, Dibra, Kukes and in Tirana. The list of people to be interviewed was compiled with the assistance of selected experienced agriculture experts operating at both national and regional levels. The sample included some of the most experienced service providers and senior agriculture experts at the national level, as well as some of the largest farms in the relevant regions. In addition, interviews were held with key stakeholders in the enabling environment, such as the Ministry of Food, Agriculture and Consumer Protection (MAFCP), as well as donor organizations, to obtain information on policy and capacity development trends.

The survey was complemented by secondary data and the review of the limited relevant literature on the case of Albania, focusing on gathering additional data on market size, growth drivers and funding streams.

2 PUBLIC VERSUS PRIVATE EXTENSION SERVICES

Prior to 1990, agricultural extension did not exist as a separate organization, but was rather a link among research institutions and agricultural units of production (State Farms and Cooperatives) (DAKU, L., 1997, QAFOKU, N., 1995). The position of extension services in this framework was reasonable, given the low number of farms and their large sizes. With the land reform of 1991, another approach to extension services was implemented through Donor projects (EU-PHARE, Dutch Bilateral Aid, etc.) in 18 districts (WB (b) 2007; EBRD-FAO, 2007).

Figure 1: Diffusion of AIC in Albania and institutional structure of State Agricultural Extension Service



Source: DISHNICA, T. (2007).

At present, public extension services are extended throughout Albania and are part of the MAFCP. The total budget is limited to 3-5 % of the total MAFCP

spending. Currently, this division employs 245 agricultural specialists in 120 information centers, which covers the country's rural households (34 % of rural households) (WB (b), 2007). The public extension structures, in addition to providing direct technical assistance related to production, also provide assistance to farmers willing to apply for subsidies offered by MAFCP, help organize events such as fairs, field demonstrations, and trainings, and facilitate relations between different stakeholders.

Despite the potentials and the role of the public extension services, the effectiveness of the public extension system is limited due to quantitative and qualitative limits of available human resources. Furthermore, based on anecdotal evidence and similar to other components of the public sector, a diffused practice of appointments linked to political affiliation appears in the extension service staff recruitment and promotion. As a result, the public extension services play a relatively small role in providing support and technical assistance to value chain operators (i.e., farmers and other agri-business operators). All sources (including the service providers themselves) confirm that the field activity of MAFCP extension specialists is quite limited and that other sources of technical assistance and information are more popular among farmers[9]. Similar to previous studies (DAKU, 1997), the mission of state extension services is more focused on acting as a "tool" for the implementation of the national agricultural strategies (Law on Agriculture and Rural Development No.03/L098, 2007), and is not perceived by beneficiaries as an advocator of farmers in the case of inappropriate top-down agricultural policy interventions.

In addition to MAFCP extension services, municipalities also employ agronomists and veterinarians. The municipal agronomists mostly deal with land use, production practices and tenure arrangements, while veterinarians mostly deal with food safety in urban areas, market surveillance and controls. Private operators and donor organizations have played a key role in filling that gap, and in some areas are considered as the main source of technical assistance. The main demand of qualified services comes from donor-funded development projects. The most qualified service suppliers agree that the demand coming from private enterprises is too small to justify a full-time engagement.

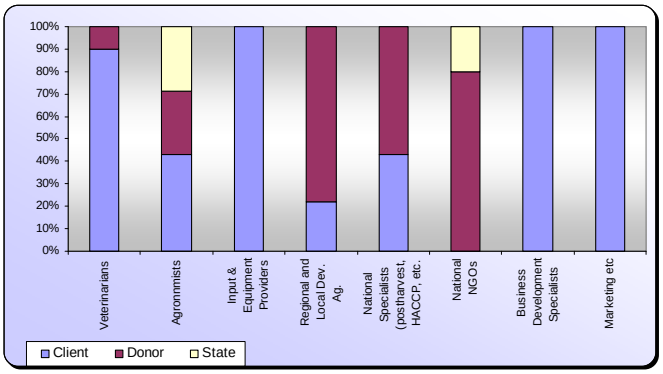
The outcomes of the survey carried out with 81 service providers shows the relative importance of each category of purchaser:

1. **Private clients**: 63 % of service providers ranked clients as the first source of income, and 17.5 % of them ranked clients as the second source of income.

[9] An analysis of the impact of assistance provided by dealers of fertilizers and pesticides as compared with other sources of information and technical assistance was performed in 2002, and showed that the members of the Albanian Fertilizers and Agri-Business Dealers Association (AFADA) were considered as a source of information on different fields by the majority of interviewed farmers (with a range between 56% to 68% according to the topic), while public extension services were considered as a source of information by one-third of respondents (ANDROULIDAKIS et al., 2002).

2. **International donors and donors-funded projects**: 29.5 % of service providers ranked donors as the first source of income, and 9.4 % of them ranked clients as the second source of income.
3. **The State**: 8 % of service providers ranked the state as the first source of payment, and 6.7 % of them ranked clients as the second source of income.

Figure 2: Most important source of payment by category of service provider



Source: Authors survey.

When analyzing the responses by category of service providers, we see that categories of providers that supply higher qualified services are more dependent on donor funding (Figure 2). Local development agencies, national specialists, national agriculture organizations and marketing specialists are included in this category.

Veterinarians, input and equipment providers, and business development specialists rely on clients as the main source of payment and are not dependent on either donors or the state. The category of agronomists is the most dependent on state funding.

The state service places a priority on the most intensive agriculture areas, as well as those oriented to livestock. The Household Budget Survey of 2006 shows that the services are accessed much less by poor households (28 % in Northern Mountainous Areas) than by the upper-income ones in the coastal area (41 %) (WB(b), 2007). The situation is particularly dire in northeastern areas. Interviewed stakeholders in Kukes and Peshkopi confirm that there are few experts available, and there is little interest for young people to study agronomy or other agriculture-related subjects. This situation is also confirmed by many interviews in other parts of Albania. Indeed, this generation gap of specialists will become obvious and threatening in the near future.

3 MARKET OVERVIEW

The market for agriculture services in Albania is still very limited, but includes a very wide range of services and is slowly developing.

Agriculture services can be grouped into three broader categories, and a few more specific ones. The three broader categories of service suppliers are the following:

1. ***Professional or semi-professional providers of agronomic and veterinary services, input and supplies***, including privately-operating agronomists and veterinaries, public extension services (MAFCP extension service and municipal agronomists), and the suppliers of agricultural inputs and farm machinery, who mix consultation on practices related to the use of inputs and machinery with consultation on production and pest defense practices.
2. ***Non-professional suppliers of services for agriculture***, including farmers who obtained a certain specialization in pruning trees, farmers who own farm machinery and rent it or perform mechanical work for a daily fee, and a few specialized service providers who obtain most of their revenue from operating farm machinery for farmers or breeders.
3. ***Providers of administrative and financial services***, including accounting, legal and fiscal advisors, as well as professionals involved in the preparation of business plans for loan applications, and land and farming asset surveyors in charge of assessing the value of assets for mortgage purposes.

In addition to these three clusters of service providers, there are also other, more specialized categories:

4. ***Specialists in maintenance and construction of equipment and farm machinery.*** This group is mainly comprised of mechanical workshops repairing or upgrading farm machinery, but also includes a few specialists in cold storage equipment installation and maintenance.
5. ***Engineers, suppliers of food processing equipment, certifying bodies, specialists in HACCP***. There are very few service suppliers in this field.
6. ***Specialists in communication and other marketing services.*** At present, these service providers are exclusively demanded by food processing companies and development projects dealing with farmers' cooperatives and associations, and/or with consumer awareness programs. A growing number of service providers is available for developing simple information/promotion tools, such as logos, leaflets, etc. The market of advertising agencies is quite concentrated, with a few firms getting most of the work. There are also a few specialists in marketing advisory services, personal selling and professional sales agents.

4 FACTORS OF MARKET SEGMENTATION AND SEGMENTS OF SERVICE PROVIDERS

Analyzing the structure of the market of service providers for agriculture, two elements emerge as factors of market segmentation:

1. ***Frequency of demand***. Some technical services are recurrent or perceived as such, for example specialized pruning (formation pruning of new orchards,

renovation pruning, pruning of vineyards, etc.), advice for the use of fertilizers and pesticides, accounting, etc. Other services are needed less frequently, mostly in relation to capital investments. Frequency of demand affects the number and location of service providers (providers of frequently needed services are more numerous and available in most areas, while providers of less demanded services are mostly located in Tirana and in a few other cities, such as Korce, Fier or Lushnje). Frequency of demand has no evident impact on the farmers' willingness to pay – it is noticed that when a service is functional or related to an input supply, the cost of the service is usually included in the supply cost. Competition is obviously higher for frequently demanded services, and stability of prices from place to place and time to time can indicate the size of the market for a specific service and of the frequency with which it is required.

2. ***Degree of specialization and qualification***. The different level of specialization and qualification of service providers is linked both to:
   - The level of specialization: advisors and suppliers of post-harvest facilities are more specialized than suppliers of farm machinery, as there is almost no market for complex farm machinery, while the simplest post-harvest facility is already complex enough.
   - The demand pull effect: the demand is rapidly growing for some specialized services (for example, the preparation of business plans), thus causing an increase of supply and a consequent decrease of specialization, as the service becomes more common and more providers, not necessarily highly qualified, or even highly qualified ones that leave other services, enter the market.

Specialization and qualification are strongly linked to location and source of revenue: qualified service providers are located in the main cities, mostly in Tirana, and their income mainly comes from development projects or the government. Based on the conducted interviews, some of the most qualified service providers never worked for a private customer.

For the purpose of our work, we defined as semi-professional those service providers who have a lower degree of specialization and qualification, and normally have some education related to agriculture (i.e., agriculture high school). There are also some service providers included in this group who do not possess specific education in agriculture, but have acquired specific and valuable technical skills and assets, such as pruning or owning and operating farm machines for themselves and for other farmers, for a fee.

The combination of the two above factors leads us to identify four market segments, as described in the table below (Table 1).

Table 1: Supply and segmentation of main services for the two analyzed value chains

	Recurrent services	**Extraordinary services**
Commonly available supply or supply provided by semi-professional suppliers	**General purpose** Supply and maintenance of simple farm equipment and machinery Supply of fertilizers and pesticides Accounting Fiscal services Transport **Livestock production** Artificial insemination Animal health and vaccination Animal feed suppliers and service providers for manipulation of silage Veterinary pharmacies **Fruits and vegetable production** Pruning (1) Advisors for agronomic practices/ agronomists Service providers for mechanized agronomic practices Materials, equipment and projects for tunnels Supply and maintenance of farm equipment and machinery Common pest control Supply of plastic containers and crates	**General purpose** Legal advisors **Livestock production** Supply and maintenance of shop refrigerated counters **Fruits and vegetable production** Establishing tunnels Supply of stainless steel containers
Scarcely available supply or supply provided by highly professional services suppliers	**General purpose** Supply and maintenance of complex farm machinery **Livestock production** Screening of quarantine diseases Advisors for animal feeding/zoo technicians specialized in breed advising Supply and maintenance of refrigerated milk tanks Marketing **Fruits and vegetable production** Pruning (1) Marketing and choice of varieties Optimizing energy use and crop rotation in greenhouses Specific pest control/laboratory analyses Analysis of water and soil Organization of logistics	**General purpose** Preparation of business plans/support for loans applications (2) Fiscal advisors **Livestock production** Supply of milk processing equipment Processing units engineering, including HACCP Certification of organic productions **Fruits and vegetable production** Following new orchards/plantations Equipment and projects for large tunnels/greenhouses Post-harvest practices and equipment Technical design and construction of storage and post-harvest facilities Supply of cold storage and post-harvest treatment equipment Production of stainless steel goods Certification of organic production
No services available	**Fruits and vegetable production** Use of by-products and environmental protection	**Livestock production** Technical design and construction of slaughterhouses

Source: Authors.

5 DEMAND OF SERVICES

5.1 General trends and main drivers of demand

The consolidation process that characterizes the Albanian agricultural sector after 2000 enables more competitiveness and efficiency, but also makes external technical assistance more indispensable on the one hand, and more affordable on the other hand, as medium-size operators also start to use more services. Further, thanks to the needs of the agro-industry, some additional services are being provided by processing companies and wholesalers.

Together with the increase of size, there is also a tendency for specialization (i.e., livestock versus other agriculture activities, such as fruits versus vegetables, etc.), in line with the market demand evolution, which further raises the need for more specialized and professional (external) assistance.

For example, the number of mixed farms (crops with livestock) has reduced by almost one-half, whereas the number of farms with crops only has increased by almost 73 % over the last 3 years, and the most significant increase (as percentage) is of the farms larger than 2 ha.

That is also important, because according to the survey results, a farm may absorb and pay external services when it has at least 1 ha (fruits or field vegetables).

The field survey shows a still limited and weak market for services, based on both private and public demand for recurrent services (this last being represented by the services provided for free by development projects and by MAFCP), and a largely public demand for non-recurrent and specialized services.

The number and size of development projects has fallen in recent years, and the growth of government investments, which mainly went to subsidies for expanding production, has not balanced the reduction, with the result being that the market for *non-recurrent and specialized services* as a whole is stagnating or even regressing. Nevertheless, there are some areas in which private demand is growing, such as administrative and financial services, which includes accounting and support for the preparation of loan applications.

The market for *recurrent services* is slowly growing, with some new services, such as pruning, starting to be provided by non-professional providers who received some training and/or acquired practical skills.

The driver for the introduction of new practices and the demand for new services is still the application of techniques learnt abroad by emigrants returning home, the informal exchange of information between farmers and the advice of input and machinery suppliers.

As is common in many traditional rural environments, newly-established farmers, especially those with no farming experience, are more likely to ask and duly apply

advice, having better results than seasoned farmers, who mainly rely on their practice and traditional know-how.

An important difference that emerged in the survey is between services that include materially doing something instead of the farmer, which provides immediately visible results (such as treating animal diseases, artificially inseminating animals, pruning, etc.) and services that are more focused on the transfer of know-how (such as diagnosing plant diseases, advising about proper fertilizing, helping to choose varieties and rootstocks for new plantations, etc.). Farmers are willing and accustomed to paying for the first category of services, while they remain convinced that the second category of services has scarce value or should be provided for free. This is also partially due to the fact that the cost of receiving advice on the use of fertilizers and pesticides is usually included in the price of inputs.

5.2 Parameters to appraise the market potential of private demand

5.2.1 Economies of scale

Subsistence farms usually obtain advice and other services for plant growing only indirectly, i.e., from services whose value is included in the cost of an input supply; normally they receive such advice only in the shop, thus not benefiting from field visits by experts (who sell such inputs).

In livestock production, even subsistence farmers need to pay for veterinaries, with an estimated average cost per livestock head of 5,000 Albanian Lek (ALL) per year.

For receiving services for a fee calculated per day, per hour or per call (e.g. plowing a field or mechanically spraying a plantation to combat plant diseases) there is a minimal size that makes the provision of service economically cost-effective for the farmers.

According to the interviews and focus groups carried out during the survey, the minimal size required for making it profitable to pay for services are the following:

- 1 ha of vegetables in open field;
- 10 cattle;
- 100 small ruminants.

This appraisal is based on the experience of interviewed service providers and value chain operators, as well as on empirical analysis, since Optimal Enterprise Analyses have never been performed in Albania.

An impact analysis of technical assistance performed by FAO in Durres in 2006 (FAO, 2006) shows that vegetable growers receiving technical assistance increase their profit per year (excluding costs of technical assistance) by at least 35 %, corresponding to more than 100,000 ALL/ha on the least profitable crop analyzed, and more than 500,000 ALL/ha for the most profitable vegetable crops. Considering the costs of receiving regular advice from qualified private agronomists, a benefit

of 100,000 ALL is to be considered the minimum trade-off justifying additional investments and efforts. According to the analysis, even considering the most profitable open field vegetable crops, delivering technical assistance for increasing productivity would make technical assistance not cost-effective under 0.75 ha.

5.2.2 Estimate market size

The value of input supplies, considering only fertilizers and pesticides, is estimated to be about 5.1 billion ALL (about 42m Euro) MAFCP (2009). This estimate is considered a conservative one, and represents a 28 % growth as compared to a 2005 estimate (MAFCP, 2006; 2009).

The size of the market and the (slowly) increasing competition make it profitable for the input dealers to provide some technical assistance, especially to larger customers. The outcomes of the interviews show that input suppliers provide the largest customers 5 to 6 days per year of in-field technical assistance.

The market related to animal production supplies 4.6 billion ALL (about 39 million Euro), of which 60 % is animal feed. Without considering animal feed, the demand of other inputs is rather stable, having recorded an increase of 2.6 % between 2005 and 2008.

There are few specialized cattle farms with 10 heads or more: 2008 MAFCP statistics record only 630 farms of this type, out of 2,900 specialized livestock farms.

At any rate, 84 % of the Albanian farms also have livestock (298,000 farms out of 356,000 in 2008) and interviews with operators confirmed that practically all livestock owners provide at least the most basic veterinary care practices to their livestock, with an estimated yearly expense for head of about 5,000 ALL. Both the absolute number and share of farms with livestock is decreasing (there were 340,000 farms with livestock, or 91 % of the total, in 2005), but the number of cattle and small ruminants is rather stable, thus confirming the average growth of cattle head (MAFCP, 2006; 2009).

Considering the above and excluding the value of animal feed, it is possible to conclude that the market of services for veterinary care of livestock amounts to 2 to 5 billion ALL per year, including the cost of medicines and other non-food inputs and services.

As a conclusion, the market of services for livestock production is more developed and articulated than that for fruits and vegetable production, which is mainly linked to the services included in the cost of input supplies. However, the perspectives of expansion of services for fruit and vegetable growers are better, the farms' size is increasing, as are the expenditures for agricultural inputs, while expenditures for animal breeding inputs (except food) remain stagnant.

5.3 Perceived quality of services

Interviewed farmers complain that the agronomists/specialists working for the local and central public institutions do not offer them services, and sometimes they don't even visit them. On the other hand, specialists working for public institutions claim that they lack the resources to provide services to the high number of farms.

Some interviewed farmers said they need experts who live close to their villages, who can come and visit their farms more than just occasionally.

Communes also employ specialists (agronomists or veterinarians); usually, each municipality has at least an agronomist. As a principle, communes' agronomists should take care of all issues relevant to land use and property rights, while veterinarians should take care of market surveillance and ensuring the safety of retailed food. In fact, these officers also provide some advice to farmers, especially in smaller municipalities. In larger towns and cities, veterinaries are or should be mostly involved in controlling the origin and quality of retailed animal products (meat, cheese, milk, etc.).

The number of communes' specialists is generally considered by the users to be below the needs of the farmer population, and moreover, the appointments are often politicized. It is not compulsory for the commune to represent all categories of experts (agronomists versus veterinarians), thus the specialists of some communes may be only veterinarians or only agronomists.

Interviewed officers and beneficiaries also complain that there are no incentives to provide more services within the public extension services – it does not make a difference (for the payment, etc.) for an expert employed by a public institution (whether agriculture directorates, or municipalities) to assist 10 or 100 farmers.

There is also a strong need for technical assistance for farm management – including the planting structure. The capacity of the public extension service to provide technical assistance in this field is quite low, according to MAFCP representatives interviewed. Thus, overall the public extension service has a vague market orienttation approach.

Some farmers claim they have no trust in public institutions, including laboratories – but that seems a conclusion rather in the context of a general lack of trust for public institutions, rather than just for the laboratories.

6 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Agriculture extension services in Albania have undergone drastic changes from the time of the state-organized economy to the market economy, as private extension services have also emerged. Public extension services were restructured during 1990, and donor organizations have played a key role in this respect. Despite improvements in some private and public services, most services are poorly provided or non-existent.

Both demand and supply for services to agriculture and animal production are limited in quality and size. Demand for highly qualified services comes almost exclusively from the government or from donor-funded projects. Donor-funded development projects and public demand in general have been the main driver and the almost exclusive source of income for the most qualified experts in the country. Local experts would not be able to charge private operators the same rates they charge international development projects, regardless of the quality of their services. Further, a poor mentality of the farmers, combined with poor financial resources, and small-farm size and fragmentation, are deemed as key factors to lowering the demand and payment capacity of the farmers for advisory services, all of which contribute to the current situation of agriculture and services development.

On the supply side, the effectiveness of the public extension system is limited, due to both quantitative and qualitative limits of available human resources. Furthermore, the mission (tool for top-down strategy implementation), the coverage (low coverage in mountainous/poor areas) and the operational inefficiency (low market orientation) of state extension services are not responding to the new agricultural trends and demand for services. In this context, private operators and donor organizations have played a key role in filling that gap, and in some areas are considered as the main source of technical assistance.

However, the consolidation process that characterizes the agricultural sector in Albania during the last decade enables more competitiveness and efficiency, but also makes external technical assistance more indispensable on one hand, and more affordable on the other. Thus, demand is expected to grow very slowly in the future and in the short term could even decrease, as increasing expenditures from the private sector are not yet offsetting the decreased public demand, mainly due to the reduction of development project activities.

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THE ROLE OF AGRICULTURAL EXTENSION AGENT NETWORKS IN KNOWLEDGE PROVISION FOR FARMERS IN EASTERN HUNGARY

KRISZTINA DAJNOKI[*], *KÁROLY PETŐ*[*], *NORBERT GRASSELLI*[**]

ABSTRACT

Changes in recent years in agriculture caused the transformation or abolishment of information and communication systems in Hungary. At the same time, small-scale enterprises formed (family farms, small-scale producers, native producers), whose need for information highly increased. Adequate communication systems have not been established and the conditions required for their operation do not exist, even though daily farm management requires a considerable amount of information. This raises the question of how to make the professional communication system more efficient and effective in transition. We aimed to identify, considering practical experiences, the most important tasks that interviewees had to perform day-to-day, the information producers' needs and their most effective forms of communication. This article represents the results of a survey of agricultural extension agents in three counties in eastern Hungary. Results emphasized the increased role of daily connection and technical support. Farmers have a high demand for information concerning administration and applications. The most effective manner of transferring information is during organized consultancy hours and local consultancy possibilities. Implications of the findings may contribute to the better reconstruction of the current extension system.

Keywords: Agriculture, farmers, consultancy, agricultural extension, information.

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1 INTRODUCTION

The past decade generated great changes in all fields of economic life in Hungary, the effect of which is still hard to estimate, and caused new challenges for managers (KEREKJARTO, 2001). We assume that changes still influence traditional internal and external corporate communication methods. Communication still has a vital role in the transmission of professional information, and it fundamentally determines the realization of visions in both governmental and professional institutions. BORSOS (1997) considers the farmers' assistant system for education and information supply important due to the rapid change of knowledge in farm management.

When information management is less efficient and effective, it causes competition drawbacks, which may result in the weakness of a corporation's position and a strengthening of the competitor's position (SZABADOS, 2003). It is vital how a central administration can represent and introduce a vision for professionals and productive organizations. It is also essential that such connective associations and co-operations operate more and more efficiently, which plays an important role in the harmonization and cooperation of productive activity. Productive associations and distributional organizations are structures with objectives that are promoted by the government. These organizations aim to validate organizations and co-operations of agricultural entrepreneurs and enterprises. Producers must recognize their private interests to get involved. Unfortunately, mistakes made in the 1950s and 1960s still impact the judgment of cooperation. Earlier, cooperation was built on urged communication, violent persuasion and in many cases enforcement. Current organizational problems are explained by former communication mistakes. Communication that is built on persuasion requires considerable patience; this is why it is an extremely time-consuming procedure. The realization of associations and co-operation among organizations requires a different kind of communication, the vital element of which is to persuade producers, since it is in their private interest. Associations and co-operations not only express common interests to new entrants, they also accept entrants' personal economic interests and intend to validate them. These arguments have to be justified by professional and economic facts in the process of communication. Moreover, those benefits which are achieved by associations have to be introduced.

PETO and NAGY (1999) believe that a new organizational model of agricultural extension was launched in the early 1990s, the process of which is largely determined by changes. UMALI-DEININGER (1997) examined the roles of the public and private sectors in agricultural extension. Extension services are classified by their economic characteristics to identify areas where opportunities for private (for-profit and non-profit) participation will arise. KOCSONDI and KOCKSONDI (2001) analyzed the development of the system of agricultural extension, including the enhancement of forms and methods.

According to SZABONE (2000), agricultural consultancy is a service that supports producers in developing production flows with training methods. Hence, it helps to increase the standard of a producer's living, as well as the social standing of rural life. Others consider agricultural extension as an activity by which adequate forms of opinion and decision-making may be supported. Consultancy is able to promote the development of rural areas by other institutions and organizations (POCS, 2001). MOSHER (1996) still believes that agricultural extension does not solely contribute to the development of the agricultural sector, though its functions are essential to promoting effective farm management. LAURENT et al. (2006) claims that farmers need to face new challenges in agriculture (environment, rural development, etc.), for which appropriate knowledge has to be applied.

Interpersonal communication is the most effective form and fundamental aspect of the extension agent's job. BERNYINE and REKE (2000) believe that establishing a personal connection and the acquisition of a regional approach is vital for enterprises of some regions to become competitive. ANDERSON and FEDER (2004) provide a framework of information need for farmers in their article. WALLENDUMS (2001) considers professional education, agricultural extension and research to be vital elements for developing the Hungarian agricultural sector – which was especially true prior to EU accession.

These authors all suggest that agricultural extension is a communication process, the objective of which is not purely the transfer and exchange of information, but also to meet educational and approach-transforming objectives. There are many ways to realize agricultural extension in the agricultural sector. The most effective form is the method based on direct connections. A basic condition here is to promote farm managers. At the same time, the power of agents is limited to influence managers, whose job is based on the belief that agents can and intend to help farmers achieve their objectives (BERDE, 2003).

After the change of regime, in a radically changed situation with private farms, establishing a promotional organization for entrepreneurs and administrative governance became necessary. Agricultural extension was once known as the application of scientific research and new knowledge to agricultural practices through farmer education. This is the reason why the system and its leverages demand consideration from a scientific point of view. GALYASZ et al. (2001) have found, through the study of agricultural extension, that the most effective communication leverage is its presentation, and many extension agents believed that producers mainly require daily consultancy.

2 PRECEDENTS AND APPLIED METHODS

Research was carried out as part of the "Functional examination of agricultural corporate management" research program, which was established in 1994 by the Department of Management Sciences at the University of Debrecen in Hungary. Here, we compiled the data of 118 questionnaire interviews. The exercise

examinations asked about the everyday activities of interviewees. The groups of factors were defined by professional literature, by the activities that were determined for agricultural extension agents on the homepage of the Ministry of Agriculture and Rural Development, and by our own experience. In the information survey, we asked for the information demands of farmers and the role of different information sources.

Preparations and analyses were based on descriptive statistical methods: division and precedence examinations were undertaken by classifying criteria and analyzing variance, as well as main component analysis and cluster-analysis. Reliability of the data was tested with the Chrombach alpha index.

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{I=1}^{k} s^2{}_i}{s^2{}_T}\right),$$

where: k = the number of items

$s^2{}_i$ = item variance i of k

$s^2{}_T$ = the total test core variance.

The index values for every questionnaire are over 0.90, which were higher than the defined 0.7 value (BARRETT, 2001). We thus found data suitable for further analyses.

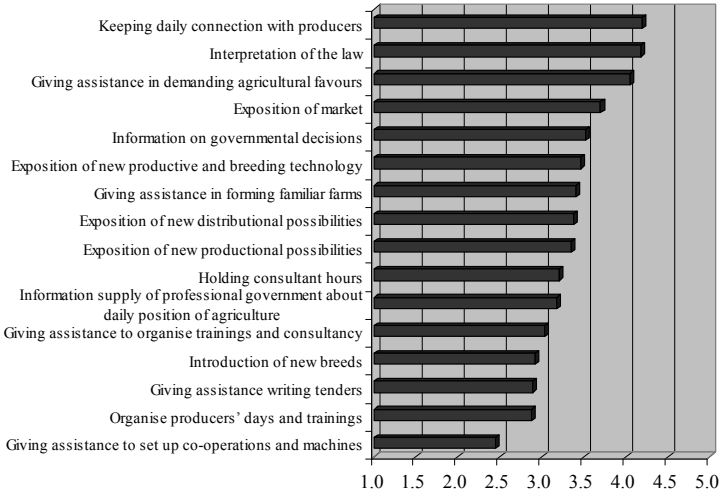
3 MAIN RESULTS

We attempted to answer how often examined activities were presented in the activities of agricultural extension agents, what was the relative importance of these activities, and what kind of differences could be experienced in their job (Figure 1). Factors for examination were composed by professional suggestions, private experience and the homepage of the Ministry of Agriculture and Rural Development. Despite interviewees being astonished by the quantity and content of the listed tasks, it justifies the assumption that the flow of professional information between the productive and institutional sector is inadequate. Obviously, this is the reason for the lower average value of some task factor.

Through the results of summarized averages, interviewees evaluated squarely with the highest points having a daily connection and support in the interpretation of the law. This is followed by, with an average concrete value above four, the role of providing assistance in demanding agricultural advocacy. Information supply on market-related conditions received a lower qualification, since the position of producers is primarily determined by the market. Thus, it is not accidental that they consider daily information access important.

Regarding the answers, we found that farmers demand the assistance of agricultural extension agents for writing tenders the least. Assistance with forming subsistence farms received a higher ranking for agricultural extension agents, and giving assistance in forming co-operations and machinery was largely ignored. Thus, asking for assistance in forming farms was preferred over assistance in forming co-operations.

Figure 1: The most important activities of agricultural extension agents



Source: Authors.

In information examinations we attempted to discover what kind of information farmers were interested in, what information agricultural extension agents needed to provide correct answers, and what kind of sources they used (Figure 2). We also found that administrational information and information about tenders and calls for tenders were ranked as the most important by respondents. Market and profession (kind, technology) were ranked third and fourth by the respondents. Producers are well-informed about landed property rights and financial information by the data, so this information has been ranked the lowest.

The objective of the communication examination was to reveal what communicational forms are preferred by agricultural extension agents on a daily basis. In this case, we tried to measure their future position beside the current one, so we could determine which conditions the interviewees intend to change (Figure 3). Based on the results, the current role of consulting hours show the highest value, followed by the importance of local agricultural extension. The benefits of the communicational forms are personal connection and immediacy. Interpersonal communication enables farmers to pose questions, and provide a chance to answer related problems. Other communicational forms were not preferred, and were given a value of approximately three. Announcements are rarely applied during the routine of the agents.

At the qualification of future roles, it seems obvious that all interviewees intend to increase all forms of communication. The order only changed in the first ranking, i.e., in the future they want to increase the role of local consultancy.

Figure 2: Farmers' information demand

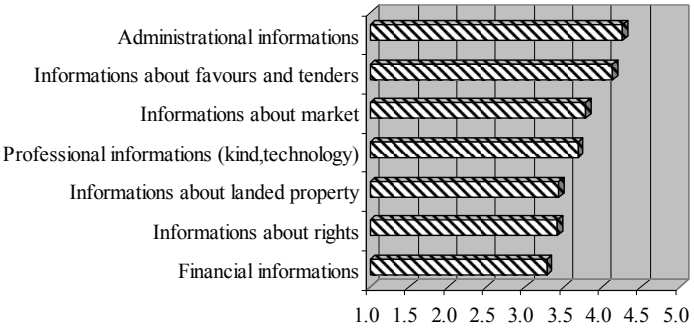


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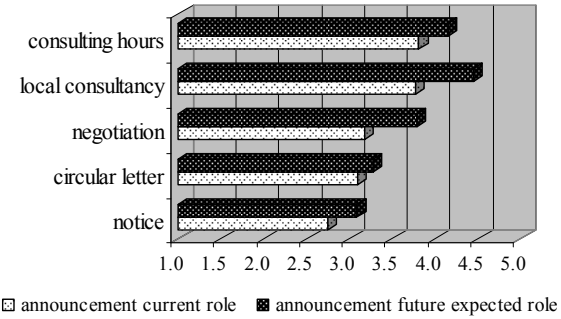
Figure 3: The role of communication forms in the present and in the future



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Through agricultural extension agent's questionnaires, we compressed information for every question group to the least number of components. Thus, entrepreneurs were classified into one component that mostly coheres by their variance. The data set included 12 different coherent groups of questions, which we tried to explain by the least main components so that interpretation, communality and other conditions would be met. We differentiated 17 main components by examining agricultural extension agent's questionnaires. We applied the KMO-test to determine whether partial correlations would stay within a reasonable scale during the creation of main components. The Bartlett-test was made parallel with the KMO-test so as to control whether a variant's pairs were uncorrelated.

Data for agricultural extensional agent's questionnaires were subject to cluster analysis by all questions and then we examined in which components the groups differ by variance analysis. Groups were different by the following main components:

1st help in projects, tenders, agricultural favors, help of family farms

2nd providing assistance to set up co-operations, consulting hours, organize producers' days

3rd new production channels, information of market conditions

4th central professional information, information on governmental decisions

5th legal, vocational information, information about projects, tenders

6th financial, market information

7th at present: media, vocational connections, programs

8th at present: professional programs, courses, law, degree

9th at present: internet, friendships

10th in the future: friendships, internet, vocational connections, programs

11th at present: circular letter, notice, negotiation

12th at present: meeting, order, consultation

13th in the future: meeting, notice, circular letter, negotiation

14th in the future: consultation

15th personality of superior partner, organization structure

16th lack of information, difference in status

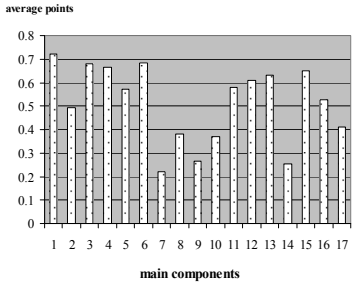
17th qualification of receiver partner, technology, fullness of information

According to the main components, four groups of agricultural extension agents were differentiated (Figure 4).

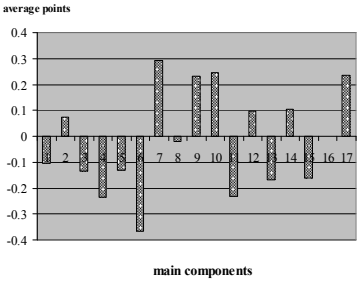
In total, 17 % of the respondents belong to the first cluster. This includes those interviewees for whom all factors seem important, the so-called positive group. Based on the results, work-related questions are extremely important, these are factors of the 1st main component.

The largest portion of the questionnaires (40 %) pertains to the second group. These respondents considered the role of factors belonging to 7 components important. The average value of the 7th main component is outstanding, which means the information sources currently important are the role of the media and professional connections and events.

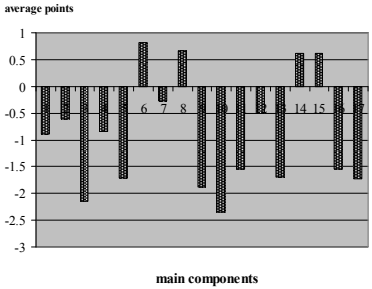
Figure 4: Cluster analysis of agricultural extension agents



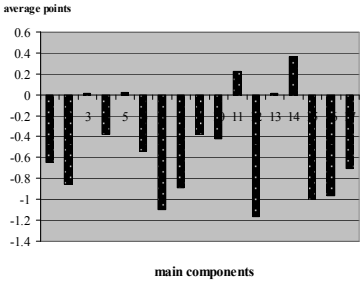
Cluster 1. "positive"



Cluster 2. "ambivalent - positive"



Cluster 3. "ambivalent - negative"



Cluster 4. "negative"

Source: Authors.

Overall, 13 % of the questionnaires are classified as the "negative - ambivalent" group. Respondents preferred the financial-market information requirements, which belong to the 6th component.

The fourth cluster (30 %) refers to those factors which are not important to the agents; this is the so-called negative group. Two main components still seem essential, the current role of circular letter, announcement and negotiations (11); in the future, local extension will be an important form of communication (14).

4 CONCLUSION

Organizational structure and modes of internal communication have a basic role in information flow, as the influential factor analysis shows. The stability of consultant structures and the structure and stabilization of communication is of primary importance in professional communication. Changes of the last few years in agriculture have caused the transformation and abolishment of these information and communication systems.

Research results indicate that the most important role of agriculture extension agents is having daily connections and supporting the interpretation of law. Farmers

mostly demand information concerning administration and application. The most effective manner of transferring information is conducting consultancy hours and hosting local consultancy possibilities.

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EDUCATION AND DEVELOPMENT

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CULTURE AS A TOOLKIT TO INVESTIGATE EDUCATIONAL PROCESSES IN DEVELOPMENT PROJECTS

STEFAN WOLF [*]

ABSTRACT

This contribution offers a new approach to the investigation of educational processes in development projects. The discussion in the *International Knowledge Network for Sustainable Development* (IKN-network) has shown that one key factor helping to avoid a failure of technical innovation for projects in developing countries is an integrated qualification of the beneficiaries. To both generate and improve this qualification measure, satisfactory toolkits are needed that can deal with the varied influences impacting qualification projects. The findings were generated by an analysis of a significant number of studies on development policy. The interpretative basis of this analysis was the theoretically grounded concept of culture as a dynamic result of interactions between social actors. In presenting this dynamic concept of culture and applying it as a heuristic toolkit, the author will show how we can arrange the clutter of factors that influence the educational processes in development projects. After a short overview of this new approach, the paper will outline the four main categories that emerge from the application of this approach to the factors influencing educational processes. The purpose of this paper is to first demonstrate how the new theoretical approach of a dynamic concept of culture functions works, and moreover its advantage in organizing existing and additional factors that influence qualification projects. To do so, provisional examples from the application of this heuristic toolkit in a field study on a rural Cuban development project will be discussed. The heuristic toolkit showed great potential to improve integrated qualification measures in technical innovation projects. However, in order to fully establish the new theoretical approach for the improvement of development projects, further research is necessary.

Keywords: Qualification Measures, Culture, Educational Processes, Development Projects, Training.

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1 INTRODUCTION

How culture is understood in development policy is often shaped by the dichotomous relationship between tradition and modernity. Here culture is frequently identified with tradition. Therefore, the concept of culture is often seen as a constraint or limitation on the success of global development projects.

In discourses on development policy regarding the importance of culture and progress that emerged in the early 1980s, it became clear that cultural dispositions would be abused as a means to realise the modernisation projects and the progress following the modernisation theories (KIDD et al., 1980; GILMAN, 2003).

Similarly, in the field of international politics, culture is seen as static and part of the strict basis of political organisation of the homogenised social order. Popularised as a "clash of civilization," this static understanding of culture has been used as a means to serve political interests (ABU LUGHOD, 1991).

Both understandings of culture are essentialist, an expression of the anthropologic substance to organise the view of world. This hegemonic view of a concept of culture that is static leaves us with fewer possibilities to understand learning and knowledge transfer processes. To improve the understanding of knowledge transfer and learning in different societal and cultural contexts, we need a different view led by a reflective observation of cultural things. We need a dynamic concept of culture, which provides a deeper understanding of the different forms and means of knowledge acquisition and knowledge internalisation. These learning processes are clearly influenced by a large set of different factors. With a dynamic concept of culture we can classify the multitude of influencing factors of learning processes in different social and cultural contexts and arrive at a better understanding. This new comprehension will and can facilitate and improve qualification measures and learning processes in a more appropriate design.

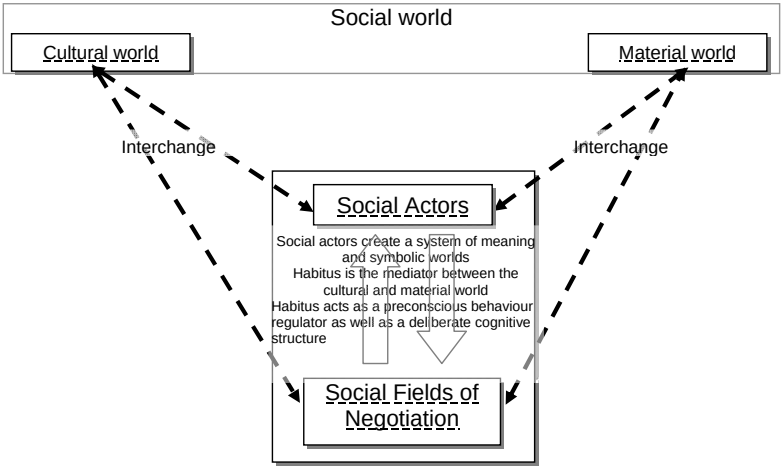
Through an analysis of a number of studies on Germany's development policy from the early 1980s to the mid 1990s, the author will draw attention to the different factors that influence development projects. With a focus on the specific role of Germany's development cooperation in the area of vocational education and training (VET), his study analyses the factors influencing development processes in the VET-field. To gain the above-mentioned results, it was first necessary to formulate a theoretical approach of culture as a dynamic concept that can be used as toolkit to investigate empirically the factors of influence of qualification projects. This theoretical approach was grounded empirically in the reality evident in the second analysis of a number of studies of German development policy (WOLF, 2009b).

2 CULTURE: A DYNAMIC CONCEPT

To use the concept of culture in the context of education, it is helpful to place the social subjects at the centre of the analysis, yet this should be done without

assigning the subject too much autonomy. The subject and the social world are interdependent and mutually influence each other (ELIAS, 1976). Culture is a result of this interdependent social process. Humans – social subjects – interpret the social influences around them; thus, they construct new or altered symbolic worlds and structures of order (GEERTZ, 2003) and with these new symbolic forms interact again with the social world. This interaction between social actors and the social world takes place in highly contested social fields, in which the constructed cultural system of meaning and the symbolic world show their effectiveness on different levels as demonstrated in the graph below.

Figure 1: A dynamic concept of culture



Source: Author.

Following Bourdieu (e.g., BOURDIEU, 2000), the social world can be analytically divided into a world of goods and groups; in other words, the material world and the cultural world. Social actors are subject to the influences acted upon them by both of these "worlds." In order to secure the subject's place in a social field, as well as to improve the subject's circumstances, the subject reinterprets the external influences acted upon him/her from both of these "worlds." Culture here is understood as a dynamic outcome of a social process of interaction that is internalized as pre-conscious regulator of behaviour as well as a deliberate cognitive structure. From this level of interpretation on the part of the social actor arise new, different and possibly unfamiliar and unknown cultural elements that can be called alter-cultural factors of influence. Similarly, the cultural and material influences interplay with the subject's social field of negotiation – the contested social fields (WOLF, 2009b). This model is still complex and does not lend itself to any easy further reduction. However, this model makes it possible to classify the multiplicity of influence factors in the social world that have been identified through the analysis of a number of studies in the realm of development policy and vocational education

and training cooperation. Employed as a heuristic tool, this cursory overview of culture as a dynamic concept made an analysis of this multitude of factors possible.

Firstly, this cultural perspective is useful in understanding the dynamics of cultural disposition of social actors and rejects the essentialist approach to culture. Secondly, this cultural perspective is useful in empirically examining the factors that influence qualification measurement and learning processes.

3 FACTORS OF INFLUENCE OF QUALIFICATION PROJECTS

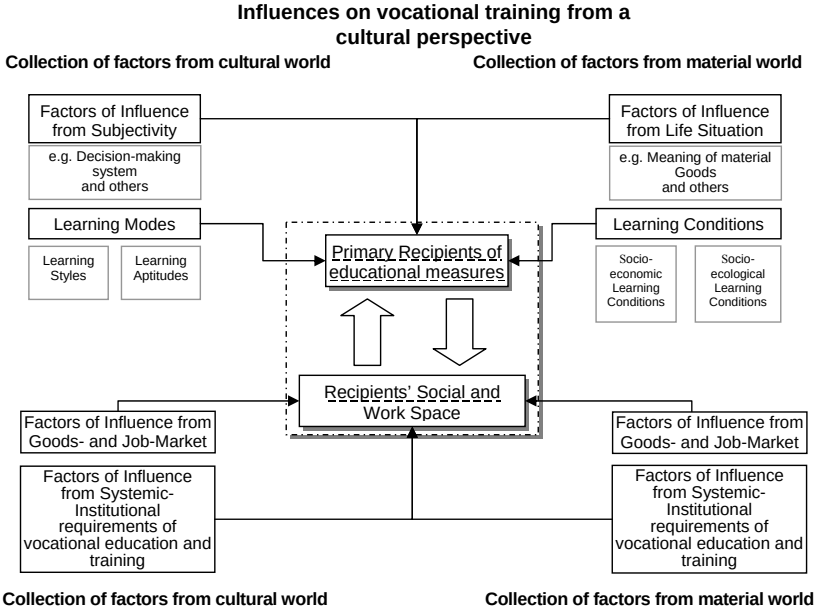
In order to make use of the above-mentioned dynamic concept of culture as a heuristic toolkit to investigate qualification projects, we need to clarify its general concept.

First, the assumed general social actor now stands for the primary recipients of educational measures. The social field of negotiation now refers to the social and workspace of the recipients. We can identify a large number of factors, but now – as a heuristic purpose – they can be categorised in two different ways. The first category denotes the influence on either the primary recipients or on the social and workspace. The second category is the origin either in the cultural part of the social world or in the material part of the social world. To create a qualification project design for rural areas, it is useful then to consider the oft- different cultural dispositions of rural peoples (HANN, 2000; BLUM, 1998; ADOMßENT, 2004) in transition countries and elsewhere. More importantly, it is crucial not to fall into a trap of assuming predominant understandings of western knowledge as universal general knowledge. To design an appropriate qualification measure, it is important to investigate the circumstances and contexts of the specific areas in a pre-study and to accurately research the influences to these measures.

3.1 Factors of influences impact on the primary recipients

In reference to the cultural world, these factors are factors of subjectivity that are linked to the qualification measures to be researched, e.g., the decision-making systems, belief systems, traditional world views or the disposition to innovation and others of the target groups. The learning modes that have a strong and direct influence on qualification measures can be divided into the learning styles and the learning aptitudes of the primary recipients. Learning styles convey internal dispositions as an outward expression of the social subject's mental, physical and societal conditions. This could include e.g., such phenomena as low self-esteem, uncommon social behaviour, a lack of or little motivation and a lack of autonomy and self-responsibility (WOLF, 2009a). Learning aptitudes, that is, externally perceived aptitudes, skills and knowledge refer to the community knowledge concerning the rural agricultural conditions or the different meaning of nature (ADOMßENT, 2000). The factors of the material world are factors of influences from life situations e.g., the meaning of material goods, the behaviour of upward social mobility, the economic sentiment (BLISS, 1999) or the social activity and others.

Figure 2: Cultural factors of influence on vocational training



Source: Author.

Learning conditions here are grouped into socio-economic and socio-ecological learning conditions. Family income is considered a *socio-economic factor* that directly influences access to knowledge and information. Similarly, the need to contribute to the family income can also hinder a student's school attendance or the possibility to pursue further training. Financial stress, and the inability to cope with it, also invariably has a negative impact e.g., the lack of sufficient credit to finance the next sowing. The family situation and living environment are also included under *socio-ecological learning condition*, which impact the learning process. One could also include the difficulty in negotiating encounters with government offices and authorities such as the police or justice system. Health, nutrition and hygiene issues can be counted here as well. Also the technical equipment that is available in the rural environment to train and deepen new knowledge is counted in this cluster of factors (WOLF, 2009a). With this short sketch of factors of influence that direct the primary recipient, I will move on to a discussion of a specific example. A precise analysis of these factors is only possible if a specific rural area and its target groups of the qualification measures are known. Only then can the inventory based on qualitative research begin.

3.2 Factors of influence impact on the social and work space of the primary recipients

Now I will shift to a discussion of the factors that are directly related to the social and workspace of the primary recipients. I will discuss two main categories: the first, factors of influence from the job market and the market for goods and second, factors of systemic-institutional requirements of qualification measures. The meaning of time and the ethics of work, the gendered division of labour, the modes of mobility and others are included as factors relating to the job and goods market and the social group's cultural world. Factors from the systemic-institutional requirements to mention here are traditional leading structures, networks of loyalties and supplements. The economic exchange relations, similar to the technical capabilities of the target groups, are located in the material world as factors related to the job and goods market. The transportation capabilities, the infrastructure, the laws and rules of vocational and further training, the structure in the field of training companies are examples of factors from the systemic-institutional requirements but are also located in the material world.

3.3 First experiences with the toolkit in field research

In the field of development cooperation, the main purpose of the dynamic concept of culture is its application as a planning support for qualification projects. Technical innovation projects in developing countries are often planned only as far as technical transfer projects without considering the societal and the cultural circumstances in the receiving country. This disregard to the cultural context in which the technical innovation is applied often results in a failure in the overall application of the technical innovation. One key issue in avoiding such an error is to consider an integrated qualification of those people who are meant to benefit (WOLF, 2007). For example, to improve the implementation of decentralised renewable energy supplies in rural areas in the Cuban province of Sancti Spiritus, a multidisciplinary research team applied the toolkit for a short pre-study for further project planning. Due to the short amount of time allotted for this pre-study, the team focused only on one set of factors that were based mainly on observations. The factors from the material world that influence the recipients' social and workspace (see Figure 2) are the infrastructure, the existence of material goods in the households, the houses and the goods for productive activities. The investigation of these other factors requires more time, for example to use a questionnaire in order to interview rural people in the area. Similarly, one should also interview key persons in the community and the responsible persons from the local energy sector or from the state administration. The team was only able to conduct short interviews with inhabitants of the community in their own houses. The provisional questionnaire was developed on the basis of the theoretical grounded dynamic concept of culture and referred to factors of life situations and for factors from the cultural world that influence the recipients' social and work space (see Figure 2). To investigate the factors that are more important to the world of the social actors, as mentioned here, we need a different design for the research field. To develop this design on the

basis of the dynamic concept of culture is one of the aims of the multidisciplinary research team. This comes with the expectation of improving integrated qualification measures in the implementation of decentralised renewable energy supplies.

4 DISCUSSION OF THE RESULTS

This cursory overview of the analysis of development policy literature shows that it is possible to classify the cluster of factors that influence educational processes (WOLF, 2009b). But this new approach to the concept of culture cannot provide the complete answer as to how an appropriate qualification project for rural areas in developing countries can be designed. Rather, it leads us to an understanding of the complex phenomena of cultural dispositions and to an understanding of the inter-dependence between influences from the cultural world and material world. To shape our own world through a re-interpretation of the cluttered influences from the social world make it difficult to operationalise culture for empirical research and to use it as heuristic toolkit to shape educational processes.

However, as I demonstrate, it is possible to identify and to classify factors that influence educational processes. But the partial collection of factors I have mentioned here reveals that with this dynamic concept of culture, we have a tool to research factors of influence that impact educational projects in particular cultural contexts. But we do not yet have an answer on how we can apply this concrete teaching and training in rural areas. Therefore, we need to expand our research to investigate the links between the cultural factors of influence and the training measurements. With the new understanding gained through the application of the dynamic concept of culture, we are now able to improve our training and teaching in a reflective manner and to improve step by step our didactics and teaching methods. Yet we also require a type of research behaviour for the social scientist working in this field that falls under the paradigm of interpretative research (SCHRÖER, 1994; SCHNETTLER and STRÜBING, 2004; GIDDENS, 1984) to identify and to classify the existing factors in the given areas. A combination of methods to research and to accurately identify the needed factors is recommended as well as a cross-disciplinary approach. There is a need for further empirical research to establish the theoretical approach developed thus far and to expand the potential of this dynamic concept of culture (WOLF, 2009a).

The approach is relatively new in the field of educational sciences and also in the field of VET-cooperation, but it would be fruitful to consider working in a cross-disciplinary way with those in the agricultural sciences. The approach to culture discussed in this paper would help improve projects in the agricultural sciences that deal with areas of progress.

If the approach discussed here proves to be useful for research and development projects in the agricultural sciences, it should be proved by an empirical investigation in the field, e.g., in development projects that aim to introduce decentralised

renewable energies to rural areas in Cuba with an undeveloped infrastructure, such as Sancti Spiritus province.

5 CONCLUSION

The dynamic concept of culture used to investigate education and training in qualification projects introduced here has potential to shed light on educational processes from a cultural perspective. We are able to identify, order and understand the large scale of tangled factors that influence educational processes in development projects. As I have mentioned above, some examples of factors of influence from different categories are given. Further research is necessary in order to elucidate what the additional factors of influence from the cultural and material world would look like and which of these factors would play a role in the educational process. A first clue is the insight gained from the results drawn from studies on development policies. The related factors should help explain from the concrete field of intervention where the educational processes are located. Scientific research following the paradigm of interpretative sociology is used to deploy various methods of qualitative research. However, it still has to be proven whether these results are suitable for educational processes. And how – as a new research stream – we can improve our didactics and teaching methods regarding the results gained from the research of educational processes with the dynamic concept of culture as a heuristic toolkit. Additionally, it is important to explain the ways in which trainings can have a positive impact on the factors of influence that students bring with them, and to identify the position the trainings might be in to change the habitual disposition for students' educational success.

Yet another, more theoretical conclusion is needed. Until now, there is no concept of culture that serves as an appropriate tool to illuminate teaching and learning processes from a cultural perspective in schools or in trainings. It does not help that the concept of culture is a controversial one in the German field of education research. Moreover, when the concept is applied, it often serves to reveal the behaviour and views of pupils. (YILDIZ, 2008; ABU LUGHOD, 1991; STANAT, 2009) In Germany, educational studies that employ culture as a category of analysis almost always end up focusing on the experiences of migrant children, even though the deficiencies briefly outlined in this paper are found across the German social spectrum. The cultural model outlined in this paper should be further developed and empirically examined in order to help expand the research focus in the field of education.

As the first but still provisional results from the field studies showed, the concept of culture employed as an analytic toolkit will fit. We need now to try and to develop the toolkit in field research, not only in the Cuban project of decentralised renewable energy supplies in rural areas, but also in other integrated qualification projects to improve the social and economic situation of rural peoples.

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EDUCATION AS A DETERMINANT OF THE ECONOMIC ACTIVITY OF RURAL INHABITANTS ON THE POLISH LABOUR MARKET

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ABSTRACT

Recently, Polish rural inhabitants have been facing many challenges connected with the economy's transformation, including a decrease of the primary sector's role and the development of other, non-agricultural functions of rural areas. These processes contribute to changes in the labour market. The level of education, suitable occupation, and additional qualifications are three of the key factors facilitating adaptation to the new situation. These factors' importance has been stressed in economic theories, for example in the human capital theory. The aim of the paper is to identify the extent to which the educational achievements of rural inhabitants in Poland act as determinants of economic activity on the labour market. In order to realize this objective, research was carried out in 1000 rural households across the country in 2006. Information on 3034 adult members of the surveyed households formed the basis for statistical analysis. An estimated logistic regression model proved that a higher level of education, some acquired professions (professionals, technicians and associate professionals, service and sales workers, craft and related trades workers), as well as additional skills, are important factors influencing the probability of economic activity on the labour market. These aspects should therefore be taken into account in the process of programming and implementing polices in rural areas.

Keywords: Education, occupation, economic activity, labour market, rural inhabitants.

1 INTRODUCTION

Education has been widely considered in microeconomics as a factor determining people's level of economic activity on the labour market. The first economic theory which especially stressed this role was the human capital theory. According to Becker, one of main authors in this field, the human capital theory explains an empirically observed connection between the unemployment rate and the skills of potential workers. He posited that the unemployment rate is inversely connected with the potential workers' skill level (BECKER, 1975). The logical consequence of this relation is the fact that long-term unemployment causes a decrease in the

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skills and the qualification level of the unemployed, thus a decline of their human capital takes place (WOJTYNA, 1994).

Becker also distinguished between two kinds of training – the general and specific. General training increases workers' productivity, not only in the present workplace but in all potential workplaces, whereas skills gained during specific training can be used in one workplace only, and are useless in others (BECKER, 1962).

The theoretical relationships between opportunities on the labour market and the level of education, as well as general skills, were verified by many researchers using different statistical instruments. For example, regression methods were used to verify relationships between the level of education and the number of periods of unemployment (WINKELMANN, 1994).

Education is also a very important factor in the macroeconomic approach to growth and development. Human resources are currently considered to be the most important factor determining the development of a country and its competitiveness in the international arena. Education plays an essential role in shaping human resources. More and more young residents of Poland's rural areas understand the importance of education for their future life and career. However, the general level of the rural population's education is still lower than that of urban dwellers (DĄBROWSKA, 2003).

The education level of rural inhabitants has also been connected with a change in kinds of economic activities run in rural areas. As far as branches of economic activeies are concerned, agriculture and agribusiness were traditionally perceived as the main element of rural areas. These patterns have been changing recently and there are some functions which are becoming more and more important. These processes are conditioned by changes in occupations, level of education and additional skills acquired by rural societies. Moreover, nowadays quite a significant proportion of rural inhabitants does not come from the country; they work in towns and have moved to the country because they want a respite from the pressure of an urbanised lifestyle.

In most rural areas of the European Union (EU), the primary sector accounts for less than 10 % of total employment; in a third of rural areas, its share is less than 5 % (around the EU-25 average). However, in some rural areas – particularly in the east and south of the EU – its share is above 25 % (COMMISSION OF THE EUROPEAN COMMUNITIES, 2006). The education level, as well as the occupation of rural inhabitants, and consequently to some extent agricultural workers, also affect development opportunities of the primary sector. Unfortunately, many farmers do not have the skills necessary to take advantage of the potential of the new environment for innovation, provision of environmental services, diversification, and development of local services and bioenergy production.

From an economic point of view, the level of education, occupation, and additional skills all play an important role for job-seekers' possibilities of finding a job in non-agricultural sectors, which are the basis for sustainable rural development. The service sector is the largest employer in Europe's rural areas, but it is

smaller compared to urban areas and tends to be dominated by the public sector. This results from the underdevelopment of private services, which remain largely urban. This is reflected in the slower shift to activities centred in the knowledge-based economy (COMMISSION OF THE EUROPEAN COMMUNITIES, 2006).

2 MATERIAL STUDIED AND METHODS

Empirical data analyzed in the paper comes from a research project entitled "Analysis and assessment of rural women situation on labour market", which was co-financed by the European Social Fund within the Sectoral Operational Programme Human Resources Development, realized in the Department of Marketing and Agrarian Policy in Warsaw University of Life Sciences, Poland. Though women's situation on the labour market cannot be considered without their families, especially considering how traditional they are in the countryside, 1000 rural households from 24 poviats (NUTS 4 according to the Nomenclature of Territorial Units for Statistics) were surveyed from August to November, 2006. Four poviats were selected in each of 6 macroregions in Poland – 2 with the lowest unemployment rate and the highest level of Gross Domestic Product (GDP) *per capita* and, respectively, 2 with the highest unemployment rate and the lowest level of GDP *per capita*. Trained interviewers carried out a questionnaire survey which consisted of open and closed questions. The total investigated population numbered 3034 people over the age of 18. This was the basis for the statistical analysis and verification of some general assumptions concerning the economic activity of rural inhabitants on the labour market.

The majority of the obtained data was of a qualitative character, so they were coded as categorical data, that is, numbers were specified to represent categories, for example, for the level of education, 0 – primary education, 1 – vocational education, 2 – secondary education, and 3 – higher education. A group coded as 0 was always a reference group when interpreting the results of the logistic model. All data from the questionnaires were gathered in a database in the SPSS software, and all statistical analyses were carried out in this software.

The occupations of investigated rural inhabitants were classified according to the Polish Classification of Occupations and Specialities based on the International Standard Classification of Occupations by the International Labour Organisation, adjusted to the requirements of the EU (THE PUBLIC EMPLOYMENT SERVICES, 2007). The analysis of occupations of the surveyed population was carried out taking into account major groups of this classification. It should be also indicated that occupations declared by the researched population mostly involved professions that require formal education.

Statistical analyses were carried out with use of the Cramer's V statistic to examine the correlation between the level of education, occupation, additional skills and economic activity on the labour market. Subsequently, the logistic regression model was used to verify the probability of economic inactivity depending

on the group of socio-economic factors, including the level of education, occupation and additional skills (for example, computer literacy) in the researched population. The choice of the statistic and the regression method was conditioned by the character of data – the selected methods allow the comparison and analysis of categorical variables such as the level of education or occupation.

The estimated model also included different factors which can potentially influence the probability of economic activity on the labour market, but the interpretation of those relationships is much wider than the topic of the current study and will be presented in other studies.

3 RESULTS AND DISCUSSION

There was a set of factors (variables), which may influence the probability of economic activity of researched rural inhabitants on the labour market. Three of them were: the level of education, their occupation, and additional skills – the probability accompanying the χ^2 was lower than 0.05 for these three variables, which allows us to conclude that the relationship between economic activity on the labour market and the level of education, occupation, and additional skills is relevant from the statistical point of view. The Cramer's V statistic was used in order to measure the intensity of these relationships. This statistic can have values from 0 to 1 and the higher it is, the stronger relationship between the variables is (RÓSZKIEWICZ, 2002). The value of the Cramer's V statistic for the relationship between economic activity on the labour market and the occupation was 0.395, whereas the relationship between economic activity on the labour market and the level of education was characterised by a 0.249 value of the Cramer's V statistic. The relationship between economic activity on the labour market and additional skills was characterised by the 0.101 value of the Cramer's V statistic. These results formed a basis for including these three variables into the group of factors which can be used for building the logistic regression model for economic inactivity on the labour market.

The logistic regression is the one with an outcome (dependent) variable that is a categorical dichotomy, which means that it can be predicted to which of two categories a person is likely to belong, given certain other information (FIELD, 2005a). Information from the questionnaire concerning economic activity on the labour market of each surveyed person was treated as the outcome variable and was coded as 0 – a person economically active on the labour market (a farmer, employee, a person running their own firm, or unemployed but looking for a job and ready to start it) and 1 – a person economically inactive on the labour market. In that way it can be predicted whether a person is economically active or inactive on the labour market taking into analyses some different factors (independent variables), for example age or level of education. In effect, it is possible to compare the probability of being inactive between representatives of people of different educational levels, various occupations, and with or without additional qualifications.

A similar model was estimated for the Polish population at working age (KWIATKOWSKI, 1995) based on the Labour Force Survey, but thus far there has been no research of this kind on rural inhabitants. Table 1 presents results of the whole model estimation for the researched population. The influence of each particular predictor on the outcome was estimated holding other independent variables constant. For the purposes of this paper, only the influence of the level of education, occupation and additional skills were precisely examined.

Significance values of the Wald statistics ($p < 0.05$) for each predictor indicate that higher education, occupations (defined as: professionals, technicians and associate professionals, service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers), as well as additional skills can signify-cantly predict economic inactivity on the labour market.

Table 1: Variables in the equation in the model of economic inactivity on the labour market

No.	Independent variable	B	Standard error	Wald	df	Signifi-cance	Exp(B)	95.0 % confidence interval for Exp(B)	
								Lower	Upper
1	Macroregion			26.451	5	0.000			
2	M_south_western	0.143	0.279	0.262	1	0.609	1.153	0.668	1.993
3	M_southern	0.221	0.270	0.667	1	0.414	1.247	0.734	2.117
4	M_north_western	0.843	0.249	11.432	1	0.001	2.323	1.425	3.786
5	M_northern	0.133	0.278	0.229	1	0.633	1.142	0.663	1.967
6	M_eastern	0.904	0.263	11.810	1	0.001	2.470	1.475	4.138
7	Sex	0.846	0.159	28.187	1	0.000	2.329	1.705	3.183
8	Position_in_family			16.932	4	0.002			
9	P_spouse	-0.225	0.221	1.035	1	0.309	0.799	0.518	1.232
10	P_adult_child	0.919	0.296	9.664	1	0.002	2.508	1.405	4.477
11	P_parent	0.144	0.545	0.070	1	0.792	1.155	0.397	3.362
12	P_other	0.597	0.394	2.303	1	0.129	1.817	0.840	3.932
13	Age_group			89.255	4	0.000			
14	A_25-34	-2.028	0.249	66.326	1	0.000	0.132	0.081	0.214
15	A_35-44	-1.502	0.307	23.870	1	0.000	0.223	0.122	0.407
16	A_45-54	-0.873	0.309	7.974	1	0.005	0.418	0.228	0.766
17	A_>=55	-0.073	0.365	0.040	1	0.841	0.929	0.455	1.899
18	Education			5.618	3	0.132			
19	E_vocational	-0.190	0.314	0.364	1	0.546	0.827	0.447	1.532
20	E_secondary	-0.012	0.389	0.001	1	0.975	0.988	0.461	2.118
21	E_higher	-1.291	0.649	3.966	1	0.046	0.275	0.077	0.980
22	Household_type	1.393	0.156	79.357	1	0.000	4.027	2.964	5.472
23	Occupation			87.393	7	0.000			
24	O_professionals	-1.753	0.587	8.905	1	0.003	0.173	0.055	0.548
25	O_technicians	-1.142	0.393	8.431	1	0.004	0.319	0.148	0.690
26	O_service_workers	-1.951	0.408	22.825	1	0.000	0.142	0.064	0.316
27	O_farmers	-0.859	0.355	19.546	1	0.015	0.424	0.211	0.848
28	O_craft_workers	-1.279	0.329	15.102	1	0.000	0.278	0.146	0.531
29	O_operators	-0.997	0.566	3.104	1	0.078	0.369	0.122	1.119
30	O_general_education	0.361	0.387	0.870	1	0.351	1.435	0.672	3.066
31	Additional_skills	-0.822	0.273	9.068	1	0.003	0.440	0.258	0.751
32	Constant	-1.849	0.418	19.546	1	0.000	0.157		

Source: Author.

As far as the levels of education, occupation and additional skills are concerned, detailed results of the model can be interpreted as follows:

- The values of exp β for higher education (exp β = 0.275, confidence interval = 0.077, 0.980) indicate that persons with higher education are about 3.6 times less likely to be economically inactive on the labour market than persons with primary education (the reference group).
- The values of exp β for professionals (exp β = 0.173, confidence interval = 0.055, 0.548) indicate that persons whose occupation is assigned to this group are approximately 5.8 times less likely to be economically inactive on the labour market than persons without any occupation (the reference group).
- the values of exp β for technicians and associate professionals (exp β = 0.319, confidence interval = 0.148, 0.690) indicate that persons whose occupation is assigned to this group are approximately 3 times less likely to be economically inactive on the labour market than persons without any occupation (the reference group).
- The values of exp β for service and sales workers (exp β = 0.142, confidence interval = 0.064, 0.316) indicate that persons whose occupation is assigned to this group are approximately 7 times less likely to be economically inactive on the labour market than persons without any occupation (the reference group).
- The values of exp β for skilled agricultural, forestry and fishery workers (exp β = 0.424, confidence interval = 0.211, 0.848) indicate that persons whose occupation is assigned to this group are approximately 2.4 times less likely to be economically inactive on the labour market than persons without any occupation (the reference group).
- The values of exp β for craft and related trades workers (exp β = 0.278, confidence interval = 0.146, 0.531) indicate that persons whose occupation is assigned to this group are approximately 3.6 times less likely to be economically inactive on the labour market than persons without any occupation (the reference group).
- The values of exp β for additional skills (exp β = 0.440, confidence interval = 0.258, 0.751) indicate that persons with additional skills are approximately 2.3 times less likely to be economically inactive on the labour market than persons without any additional skills (the reference group).

A sought-after occupation can certainly be a stimulus to economic activity on the labour market. Nearly all occupation groups indicated in the model are undoubtedly such stimuli. A moot point can be skilled agricultural, forestry and fishery workers. There is still hidden unemployment in Polish agriculture, so quite a considerable number of interviewees declared the occupation assigned to this group and working

on a farm, whereas they work part-time only or not at all. Moreover, the report of the Central Statistical Office indicates agriculture, hunting and forestry as having the smallest number of vacancies (CENTRAL STATISTICAL OFFICE, 2007).

A Hosmer and Lemeshow's goodness-of-fit test statistic tests the hypothesis that the observed data are significantly different from the predicted values from the model (FIELD, 2005b). This is why a non-significant value for this test is expected (because this would indicate that the model does not differ significantly from the observed data). In the case of ($\chi^2(8)=10.890$, $p=0.208$), it is non-significant, which is indicative of the model that predicts the real-world data fairly well. Overall, the final model accounts for 24.2-42.7 % of the variance in economic inactivity – depending on which measure R^2 Cox and Snell's or Nagelkerke's is used.

4 CONCLUSION

The estimated logistic regression model of economic inactivity on the labour market in the researched rural population proved relationships considering some factors affecting their economic activity. A higher level of education, some acquired professions (professionals, technicians and associate professionals, service and sales workers, craft and related trades workers), as well as additional skills were found to be important factors resulting in a higher probability of economic activity. These results confirm assumptions of the human capital theory, stressing the improved chances of people with a higher level of human capital on the labour market. As a consequence, persons with a lower level of human capital (lower levels of education, without sought-after occupations or additional skills) have smaller chances on the labour market, they give up when they cannot find a job, and as a result they become economically inactive on the labour market.

One of the most important conclusions from this study is the importance of both education and additional skills in the development of Polish rural areas. Results of the estimated model clearly indicate that these factors stimulate economic activity of rural inhabitants on the labour market so they contribute to growth and development in rural areas. That is why these aspects should be taken into account in the process of programming and implementing different polices towards rural areas.

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MARKETS AND PRICES

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ENVIRONMENTAL EFFECTS AND IMPLICATIONS OF BIOFUELS IN THE EU AND US – THEORETICAL FRAMEWORK AND EMPIRICAL ANALYSIS

JADWIGA ZIOLKOWSKA[*], *LEO SIMON*[*]

ABSTRACT

Biofuels are acknowledged as one of the sustainable energy sources and the development of this sector takes an important place in the Renewable Energy Program of the European Union. The first generation biofuels, analyzed in this paper, is already widely explored and implemented in different countries in the world. Also, several scientific studies have already proved multiple effects of biofuels in terms of food supply, farming risks and uncertainties, price stability on agricultural markets, growth and poverty, and others.

In this paper, we present a theoretical framework on positive and negative environmental implications of biofuels. Furthermore, based on this framework and by means of time series analysis, we estimate CO_2 reduction as a positive result of biofuels consumption and the fertilization increase as a negative effect of biofuels production in the European Union 27 and the United States of America in 2006-2018. Finally, we point out a number of questions to be addressed with regard to environmental issues in the biofuels policy in future.

Keywords: Biofuels, ethanol, biodiesel, theoretical framework, environmental protection.

1 INTRODUCTION

For the past three decades, biofuels policy has been an important issue in national policies both in the European Union (EU) and the United States of America (US). The biofuels policy is regulated with several governmental acts and directives such as: Biofuels Directive (2003/30) (EC, 2007) and Renewable Energy Roadmap (EC, 2007) (in the EU) and the Energy Independence and Security Act of 2007 (in the US) (US CONGRESS, 2007). The main targets of biofuels policies on the national and international level relate to economic, environmental, and energy aspects.

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In recent years, many investigations have been conducted on biofuels policies (both biodiesel and ethanol production) and their implications on different sectors. Most of these studies address such questions as: price stability on national and international markets (TYNER and TAHERIPOUR, 2008; MEYER et al., 2009; BANSE et al., 2008), support policies (DE GORTER et al., 2009; WIESENTHAL et al., 2009), welfare economics, growth and poverty, and food security (HARRISON, 2009; CORDONNIER, 2009). While most research looked at market and price implications, little research has been done on environmental effects of biofuels. DICKS et al. (2009) set forth implications of growing ethanol demand for land use changes while LANKOSKI and OLLIKAINEN (2009) examined the multiple environmental effects of policies promoting biofuel production from agricultural crops. CUEVAS-CUBRIA (2009) investigated changes of environmental externalities when substituting biofuels for petroleum fuels in Australia while THAERIPOUR et al. (2008) analyzed economic and environmental implications of biofuels and their by-products.

Referring to this existing gap, we seek to extend the discussion on environmental effects of biofuels and introduce a theoretical framework as well as an empirical analysis on positive and negative implications of biofuels consumption and production. The analysis focuses on first generation biofuels in the EU and US as leading producers and consumers of biodiesel and ethanol, respectively (compare: FAO, 2008: 6).

The paper is structured as follows. The second chapter describes methodology and data used. In chapter three, the theoretical framework is presented and positive and negative effects of biofuels are discussed. In chapter four, the results of the empirical analysis are interpreted. Finally, conclusions and outlook for further research are formulated.

2 METHODOLOGY AND DATA

In this paper, we develop a theoretical framework addressing the question of the growing biofuels (ethanol and biodiesel) production and their implications on the environment. We focus our investigation on biofuels from cereals and corn (for ethanol) and rapeseed and soybean (for biodiesel) and will not consider other feedstock.

For the empirical analysis, we use statistical data from FAPRI (Food and Agricultural Policy Research Institute) (FAPRI, 2009) on the production of ethanol and biodiesel as well as data from International Energy Agency (IEA, 2007) on CO_2 emissions from one litre gasoline and the percentage of CO_2 reduction when using biofuels. Additionally, data on pesticide use and fertilization (phosphorus and nitrogen cumulatively) for ethanol and biodiesel production in the US are used (TILMAN et al., 2006). Based on this time series data, we calculate the CO_2 reduction resulting from the total ethanol and biodiesel consumption in the EU and US in 2006-2018 as compared to the gasoline consumption. For the analysis,

we consider the lowest and the highest possible level of CO2 emissions (40-60 % possible reduction for biodiesel and 15-25 % for ethanol) as compared to the traditional gasoline of 2.8 kg CO_2/litre. We calculate the total amount of CO_2 emissions released by the gasoline usage and the usage of biodiesel and ethanol, respectively. By subtraction, we estimate a net amount of CO2 reduced due to the application of the analyzed biofuels. The absolute net effects have been expressed in percentage with the year 2006 as a reference. The year 2006 has been chosen as base year, first, with the aim to facilitate an analytical comparative discussion on the biofuels development trend and environmental issues related to this development both before and after the current year 2010, and second, due to the limited historical data availability on ethanol and biodiesel production.

Furthermore, we do not differentiate between GHG (greenhouse gasses) emitted by biorefineries or cumulated in the soil in the production process (compare: KIM et al., 2009; TILMAN et al., 2006).

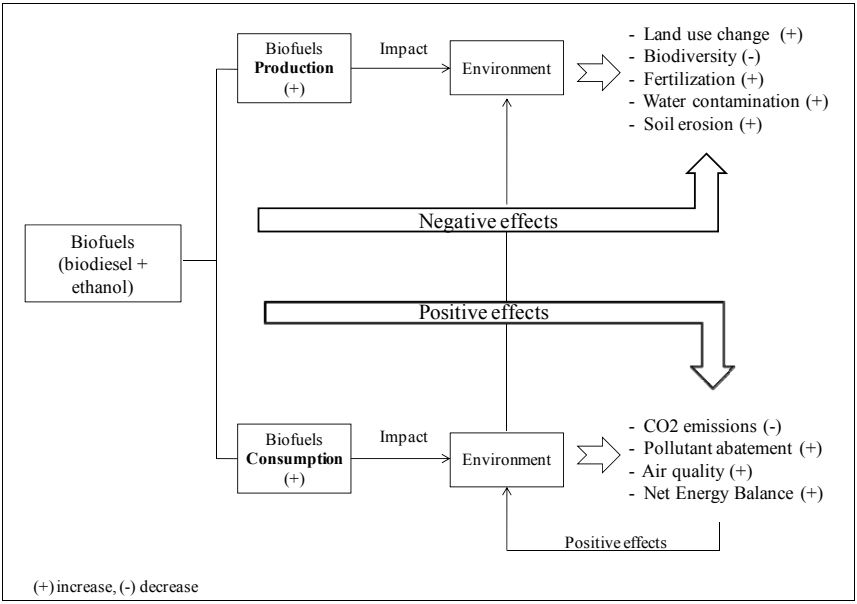
In a next step, we calculate the total amount of fertilizers used for biofuels feedstock production. Due to missing statistical data on the fertilizers and pesticides use for biofuels production in the EU, we consider only the ethanol and biodiesel production in the US. In the analysis, we consider the average amount of fertilizers used for the corn production to amount to 200 kg/ha and 25 kg/ha for the soybean production (see: TILMAN et al., 2006). Moreover, we assume *ceteris paribus* condition with regard to the technology, presuming that the amounts of the applied fertilizers per hectare for the respective biofuels feedstock production are the same in the time period 2006-2018. This assumption is necessary due to the fact that the future amounts of the applied fertilizers are neither predictable nor statistically estimated until now.

3 THEORETICAL FRAMEWORK – ENVIRONMENTAL EFFECTS OF BIOFUELS

The main targets of biofuels policies in terms of environmental protection, such as, sustainable resource use, protection of air, soil and water sources and conservation of cultural landscape in rural areas, clearly support the goals of rural development plans and agro-environmental programs. In the broader sense, the biofuels technology is widely introduced to be environmentally friendly (IEA, 2009; FAO, 2008). The environmental benefits of biofuels policies are often underpinned by economic arguments such as a) the feedstock for bioenergy production can be easily stored, thus, bioenergy can be produced constantly and classified as a reliable source of energy; b) the biofuels by-products can be also used as a second generation biofuels feedstock; c) biofuels allow a country to secure higher independence from international markets and trade conditions. However, both scientific and political discussions on environmental and economic effects of biofuels often deliver heterogenic information (BORDERS and STERLING BURNETT, 2007; EEA, 2009).

By focusing solely on environmental aspects, we develop a theoretical framework (Figure 1) and conceptualize a general explorative investigation of environmental effects of biofuels production and consumption.

Figure 1: Impact of biofuels production and consumption on the environment



Source: Authors.

In this framework, we introduce two sides of biofuels: production and consumption sides. We claim that negative implications for the environment occur on the production side while positive effects on the consumption side. Therefore, in order to benefit from the positive implications in future, negative effects at the present time need to be accepted; even though the positive long-term effects can be predicted.

On the one hand, several negative effects can result from biofuels production, e.g. land use change, growing fertilization, soil erosion, and accumulation of CO2 gases in the soil, ground water contamination, or decrease of biodiversity. The scope and range of these changes clearly depend on the soil type, climate conditions, implemented technology and production systems and production feedstock. Therefore, the indicated directions and changes defined in our model are to be denominated in a relative way. Negative implications can also occur, if natural protection areas or uncultivated habitats would be used as arable land for biofuels feedstock production. Accordingly, considering these negative effects, new challenges appear to policy makers, as the potential changes of agricultural

landscape can be in opposition to agro-environmental measures supported within rural development plans.

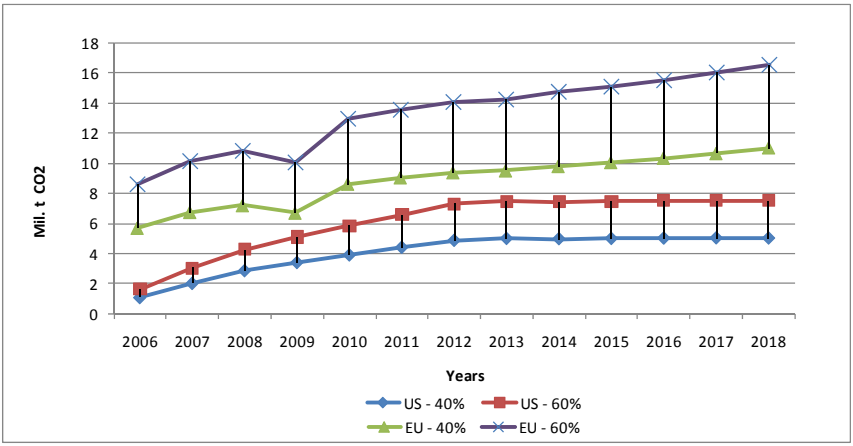
On the other hand, several positive environmental effects of biofuels consumption have been already proved, e.g.: reduction of greenhouse gas emissions and the subsequent improvement of the air quality (especially in cities with high smog contamination), as well as positive energy balance. The positive impact of extended biofuels consumption nowadays (versus pure gasoline consumption) can contribute to positive long-term changes in the environment. Due to a lower air pollution, the soil and ground water contamination from the regular rainfall can be diminished, which clearly proves positive implications, e.g. for food production. Thus, in a long-term perspective, the positive effects of the biofuels consumption could indirectly help reduce negative effects of the current biofuels production. Unclear however is, which effects would dominate and how the mentioned changes can influence other sectors, especially agricultural production, that can be directly affected by potential negative effects of the biofuels production or other sectors. Currently, sophisticated investigations on the potential effects of biofuels are still limited, especially with regard to biodiversity and land use changes. Accordingly, the following empirical analysis should help visualize positive and negative effects of biofuels, presented at the example of CO2 reduction and fertilization in the EU and US.

4 EMPIRICAL ANALYSIS – CO2 REDUCTION VS. FERTILIZATION IN THE CONSUMPTION AND PRODUCTION OF BIOFUELS

Referring to the presented framework, we investigate the range and scope of CO_2 reduction resulting from the biofuels consumption (as compared to the traditional gasoline/diesel) and fertilization resulting from the feedstock production process. As energy input and total emissions from biofuels depend on feedstock and production processes, we analyze CO_2 reduction from cereals and corn (maize), mostly used for ethanol production in the EU and US and from vegetable oils (soybean in the US, rapeseed in Europe) for biodiesel.

According to the results, the consumption of biofuels can considerably contribute to the reduction of CO_2 emissions, where the changes in the emissions definitely depend on the analyzed country. Figure 2 displays the amount of CO_2 that can be reduced when substituting gasoline with biodiesel (or else blending gasoline with biodiesel) in the EU and US in 2006-2018.

Figure 2: CO_2 reduction from biodiesel consumption in the EU and the US in 2006-2018 for 40-60 % reduction rate scenario

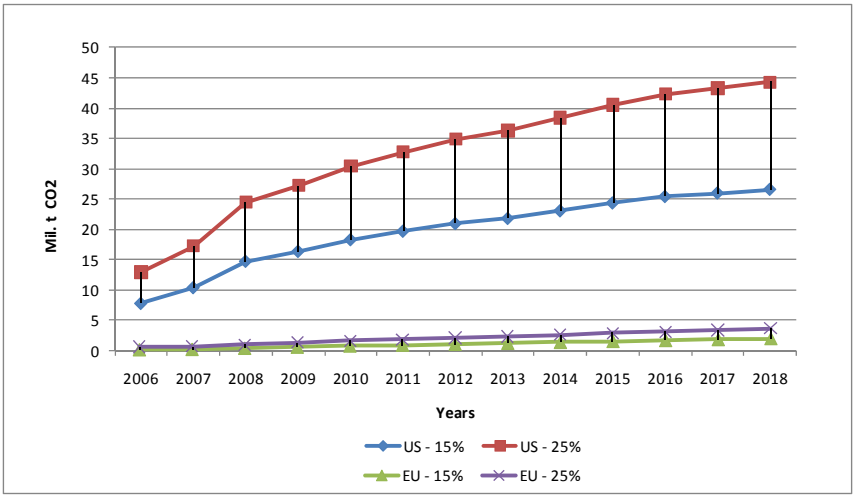


Source: Authors.

The results show that only in 2009, the CO_2 reduction resulting from biodiesel consumption amounts to 3.4-5.1 mil. t in the US and 6.7-10.1 mil. t in the EU. Cumulatively, over the analyzed years, the estimated CO_2 reduction amounts to 52.6-78.8 mil. t in the US and to 115.4-173.1 mil. t in the EU as compared to traditional diesel. These effects are clearly correlated with the amount of the production and consumption of biodiesel in the EU and US. What can be seen is that the gap between the minimal and maximal possible CO_2 reductions is growing in each following year, which means that compared to 2006 the expected reductions of CO_2 in 2018 are 4.5 times higher for the US and almost two times higher for the EU.

Also with regard to the ethanol production, a considerable reduction of CO_2 emissions was found (Figure 3). In 2009, almost 7.6-13 mil. t CO_2 were reduced by blending gasoline with ethanol in the US, while 0.6-1.1 mil. t CO_2 in the EU. The total CO_2 reduction in 2006-2018 was estimated to 255.1-425.1 mil. t in the US and 20.2-33.7 mil. t in the EU. The difference between the minimal and maximal reduction rate is growing in each following year. The estimated CO_2 reduction from ethanol consumption in 2018 is 3.4 times higher in the US and 3.7 times higher in the EU as compared to 2006.

Figure 3: CO_2 reduction from ethanol consumption in the EU and the US in 2006-2018 for 15-25 % reduction rate scenario



Source: Authors.

The analysis shows positive effects of biofuels used as a blend in the transportation sector. The relatively higher positive effect of biodiesel consumption in the EU and of ethanol consumption in the US is directly correlated with the respective production amounts.

With regard to possible negative effects of fertilization in the biofuels feedstock production, the analysis shows that 1641 Mio. kg of fertilizers were applied in 2006 in the US, almost 3460 Mio. kg in 2009, while 5623 Mio. kg are expected to be used in 2018 (Table 1). Thus, the estimated fertilization for the ethanol feedstock production in 2018 is 3.4 times higher than in 2006 while the increase of fertilizers for the biodiesel feedstock production increases by 4.6 times between the years 2006-2018. The total fertilization for the maize production in the US in 2006-2018 is predicted to 53083.2 Mio. kg and 1173.2 Mio. kg for the soybean production.

Table 1: Fertilizers application for ethanol and biodiesel feedstock production in the US in 2006-2018 (in Mio. kg)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Ethanol feedstocks	1641.14	2191.07	3112.13	3458.98	3865.21	4160.91	4430.19	4608.16	4874.74	5147.58	5372.69	5497.13	5623.29
Biodiesel feedstocks	24.47	45.34	63.99	75.97	87.05	98.28	108.54	111.32	110.91	111.33	111.86	112.18	111.91

Source: Authors.

This analysis shows that the biofuels production brings about growing fertilization, assuming that in a situation without the biofuels feedstock production, no other

production would be processed and the agricultural land would be set aside for environmental protection purposes. However, due to the fact that only 15 % of the agricultural land in the EU is required to be set aside and 85 % is used for food/feed production, we acknowledge that the interpretation of the presented negative environmental effects, without considering the food production, shows only one side of the investigation in terms of biofuels effects and implications. The estimation of trade-offs between the food/feed production and the biofuels production would require a multilevel Life Cycle Analysis that is not the purpose of this paper. Therefore, we present the estimated environmental effects in a relative way and encourage interpreting the results in absolute terms.

5 CONCLUSIONS AND OUTLOOK

In this paper, a theoretical framework on positive and negative environmental implications of biofuels consumption and production was presented. This investigation created a basis for empirical analysis on CO_2 reduction from the biofuels consumption and on fertilization from biofuels feedstock production in the EU and US.

The theoretical investigation displays relations between positive and negative effects for the environment and rural development. It shows that most positive environmental implications can be found on the biofuels consumption side while the negative implications on the biofuels feedstock production side. Based on the listed literature review and the research set forth there, as well as the presented analytical discussion, biofuels can have both positive and negative environmental effects, depending on a number of other factors such as implemented technologies, soil types, climate conditions, intensity of soil cultivation, and others. The positive effects of biofuels consumption expected in the future, such as air quality improvement, can contribute to the improvement of environmental conditions in rural areas generally, since lower air pollution brings about lower soil and ground water pollution from rainfall and snowfall.

The empirical analysis presented in this paper shows the scope and range of potential environmental effects. Regarding positive environmental effects and assuming the biofuels production as estimated (FAPRI, 2009), the total CO_2 emissions reduction from the biodiesel consumption in 2006-2018 amounts to 52.6-78.8 mil. t in the US and to 115.4-173.1 mil. t in the EU as compared to traditional diesel. Similarly, the amount of CO_2 reduction resulting from the ethanol consumption amounts to 255.1-425.1 mil. t in the US and 20.2-33.7 mil. t in the EU. Regarding negative environmental effects, the cumulated amount of fertilizers used for the maize production in the US in 2006-2018 was estimated for 53083.2 Mio. kg and for 1173.2 Mio. kg for the soybean production.

Referring to the presented analyses and due to missing empirical studies on environmental effects of biofuels, many questions are still open. Further research is

necessary, especially in terms of such questions as: energy inputs and outputs, costs of biofuels production, biomass production for energy purposes, second and third generation biofuels, implications of biofuels feedstock production on other sectors, especially on agriculture and rural development, as well as decision-making and policy design in the context of multiple objective policy issues.

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FORTUNE FAVOURS FOOLS – ARE COMPLEX ALGORITHMS FOR PRICE EXPECTATION WORTHWHILE?

FRANZISKA APPEL[*], *ARLETTE OSTERMEYER*[*]

ABSTRACT

Farmers have sometimes a reputation for being rather stupid. The question occurs if farmers would benefit from using complex algorithms for price expectation rather than acting in a "naive" way. In an attempt to answer this question the agent-based model IPES (Influence of Price Expectations on Success) has been developed. In the model, three groups of farmers are assumed to grow wheat in different price scenarios. These three groups are differentiated according to their expectation forming of future prices. One group uses a price expectation function, the second group acts on the basis of the former price level, and the third group selects their expected prices completely randomly. The wheat price is given by a demand function. Additionally, price scenarios are added. In the first scenario the wheat price has a negative trend, in the second an unpredictable event occurs, and in the third scenario the wheat price is set randomly. In these various scenarios the farmers' behaviour and success is analysed regarding the price expectation, profit, and total number of surviving farmers. It is shown that the success is highly dependent on the underlying wheat price scenario. The hypothesis that more complex algorithms for price expectations are more successful is refuted.

Keywords: Agent-based modelling, price expectation, farmers' behaviour.

1 INTRODUCTION

Farmers have sometimes a reputation for being rather stupid. A German saying goes that the most stupid farmers yield the biggest potatoes – that fortune favours fools. Furthermore, the pig cycle described by HANAU (1928) is attributed to farmers' deficient knowledge about economic relations between demand and supply and to lacking foresight.

Nowadays in a globalised world with substantially less protection as in the 1970s to 90s, the demands on agricultural managers have grown. Price fluctuations of agricultural products have increased. A crucial success determinant is therefore the received price for crops and animal products. Nobody can predict the future

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prices, but one can learn from the past real prices and related price expectations. This leads to the question whether a better education with regard to expectation forming is able to improve the outcome of agricultural production. Is it better to use more complex algorithms for price expectation in contrary to the alleged naïve expectation, i.e. that the prices of the previous year will also be valid for the next year? Or is it even better for farmers to form the price expectation completely randomly? Does in the end fortune favour fools?

To answer these questions, we developed the agent-based model IPES (Influence of Price Expectations on Success). In the following sections, the model is explained and accomplished experiments are analysed, finally conclusions are drawn and a brief outlook is given.

2 METHOD

The model IPES is programmed in NetLogo 4.0.4 (WILENSKY, 1999, cf. Appendix 1). To understand the behaviour of two kinds of farmers concerning different price expectations we implemented agents who are smart or simpleminded regarding the expectancy of future prices for their outputs. Additionally, random farmers were added who select their expected price randomly.

2.1 Model

In the model, all farmers (agents) own an equal amount of land (patch) on which they can grow wheat in an extensive or intensive way. The decision of a farmer to do extensive or intensive farming depends – aside from his capital – on his own assumption of future product prices. An expected high price leads to intensive production, and vice versa. The actual price of the output is given by a demand function. The higher the actual price and the more intensive the cultivation of a farmer is, the higher is the revenue from his production. The amount of a farmer's profit depends, however, not only on the wheat price and his harvest but also on the input costs. When a farmer cultivates intensively he spends 100 monetary units (MU) for the inputs, when doing extensive farming only 50 MU. The reason for this assumption is that intensive production needs more fertilizer, crop protection and machinery.

As already mentioned every farmer owns one patch of land. The allocation of the farms is random. Every farm has initially 120 MU seed capital. The starting price expectations differ among the farmers; they vary randomly by ±10 % around 100 MU.

We model 50 smart farmers, 50 naive farmers and 50 random farmers. The percentage of smart and naive farmers can, however, easily be changed by using the slider "intelligence" in the program (cf. A-Figure 1).

In the end of a simulation one can see in the sum of profits which group of farmers was the most successful. Furthermore, it can be shown how many farmers of a farm type stay in business.

To gain an overview of the model the state variables and their possible values are listed in Table 1.

Table 1: Overview of variables and their values

Entities	Variables	Value
Farmers	Spatial location	Initially random and then fix
	Price expectancy	Smart, naive, random
	Money	Actual liquidity of a farmer: • pay inputs (50 for extensive farming and 100 for intensive farming, • get "wheat price * amount of wheat"
	Wheat production	Intensive, extensive
Land patch	Intensity of cultivation	Intensive (colour green), extensive (colour lime), no cultivation (colour brown)

Source: Authors.

2.2 Process overview

The model uses annual time steps up to 25 years according to one generation. In each year the following sequence of calculations is performed:

1. *Price expectation (exp_price)*: In the beginning of each year every farmer decides, based on his price expectation, whether he shall cultivate his land intensively or extensively. Every smart farmer has his own "xpectancy of price"-function following:

   $price_{\exp}^{t+1} = \left(price_{\exp}^{t}\right)^{alpha} * \left(price_{act}^{t}\right)^{(1-alpha)}$ (see HAPPE, 2004, p. 51),

   exp: expected; t: time period; alpha: weight of the actual price and the expected price in period t; here alpha = 0.5; act: actual.

   Every naive farmer forms his price expectation according to the former price: $price_{\exp}^{t+1} = price_{act}^{t}$. The random farmers have a random expectancy which fluctuates by 50 % around the price from period t:

   $price_{\exp}^{t+1} = price_{act}^{t} + (\tau - 0.5) * price_{act}^{t}$,

   τ *: random number between 0 and 1.*

2. *Farming (plant):* For intensive production a farmer needs more than 100 MU and a price expectation higher than 100 MU. If he assumes that the price is lower than 100 MU and he has at least more than 50 MU, he will use his land in an extensive way. The land patch then is lime coloured. At this point inputs have to be paid.

   Farmers get outputs w1 from intensive and w2 from extensive farming. The yield is assumed to fluctuate by 20 %.

For every farmer:

$$\left.\begin{aligned} money^{t+1} &= money^{t} - 100 \\ wheat^{t} &= 1 + ((\upsilon - 0.2) * 1) \\ w1^{t+1} &= w1^{t} + wheat^{t} \end{aligned}\right\} \begin{aligned} &\text{if } price_{\exp}^{t+1} >= 100, \\ &\text{if } money^{t} >= 100, \end{aligned}$$

$$\left.\begin{aligned} money^{t+1} &= money^{t} - 50 \\ wheat &= 0.5 + ((\upsilon - 0.2) * 0.5) \\ w2^{t+1} &= w2^{t} + wheat^{t} \end{aligned}\right\} \begin{aligned} &\text{if } price_{\exp}^{t+1} < 100, \\ &\text{if } money^{t} >= 50, \end{aligned}$$

υ: random number between 0 and 0.4; wheat: amount of wheat produced by specific farmer; w1: total amount of intensive produced wheat by all farmers; w2: total amount of extensive produced wheat by all farmers.

3. *Price setting (get-price):* The price is calculated by a demand function. The higher the wheat supply, the lower the price. Different modifications of the price setting are made, e.g. a random price, a normal distributed price with a negative trend, and a one-time event in the seventh year which causes higher prices. These variations are discussed in our experiments (section 3).

   The demand function is in this case:

   $$price = 150 - \left(\frac{5}{9} * w_3\right),$$

   w3: total amount of produced wheat (w3=w1+w2).

   We assume that the maximum price will be 150 MU in case that all farmers cultivate intensively and if the outputs of all farmers increase by 20 % at the same time (maximum total yield = 180 units). The gradient results from the price range between 50 (assumed minimum) and 150 MU and the maximum total yield.

4. *Selling of wheat (sell):* At the end of each period farmers obtain revenue of their production. If a farmer does not grow wheat because of lacking capital he exits farming and his patch will lay idle in the future. If he produces he will receive the price times the produced wheat: $money^{t+1} = money^{t} + (wheat^{t} * price_{act}^{t})$.

3 EXPERIMENTS

The following experiments show whose price expectation meets the actual price development best: do the naive farmers perform even better than the smart?

Besides the above mentioned price setting method in terms of a demand function, IPES gives the opportunity to choose alternative price setting methods as introduced

in section 2.2. One of these price setting alternatives is an exogenously given price as a random number in the range of 50 to 150 MU per unit wheat (in the following mentioned as "random price"):

$$price_{act}^{t+1} = 100 + ((\tau - 0.5) * 100),$$

τ *: random number between 0 and 1.*

Another alternative is a price with a negative trend. When using this setting, the price in the beginning starts at 120 instead of 100 MU. The trend of -3 % (±2.5 %) per year is otherwise too strong and a lot of farmers exit very quickly (in the following mentioned as "negative trend").

$$price_{act}^{1} = 120,$$

$$price_{act}^{t+1} = 100 + \xi * price_{act}^{t},$$

ξ *: random number between 0.945 and 0.995.*

Additionally there is also a version in which an event occurs in the seventh time step. The event causes a price increase by 50 MU. For the next periods the price will stay at this level (in the following mentioned as "event").

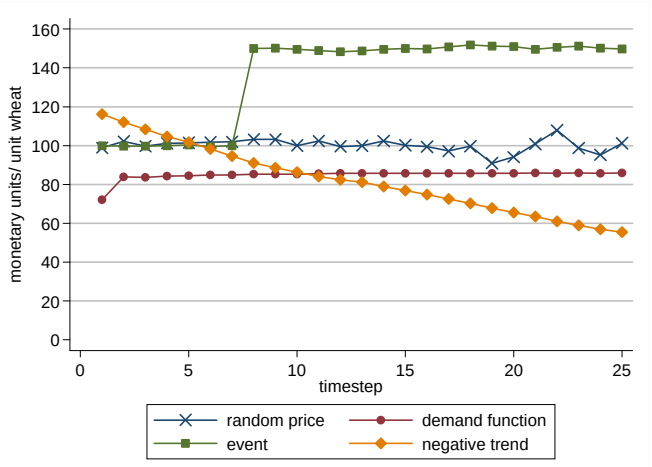
$$price_{act}^{7} = price_{act}^{6} + 50,$$

$$price_{act}^{t+1} = \kappa * price_{act}^{t},$$

κ *: random number between 0.975 and 1.025.*

All different types of price setting are shown in Figure 1. For each price setting scenario we analyse 25 time steps and repeat the run 100 times. Regarding to the random price setting one has to consider that the graph represents the mean price of 100 simulation runs. Therefore the line is almost even.

Figure 1: Price development



Source: Authors.

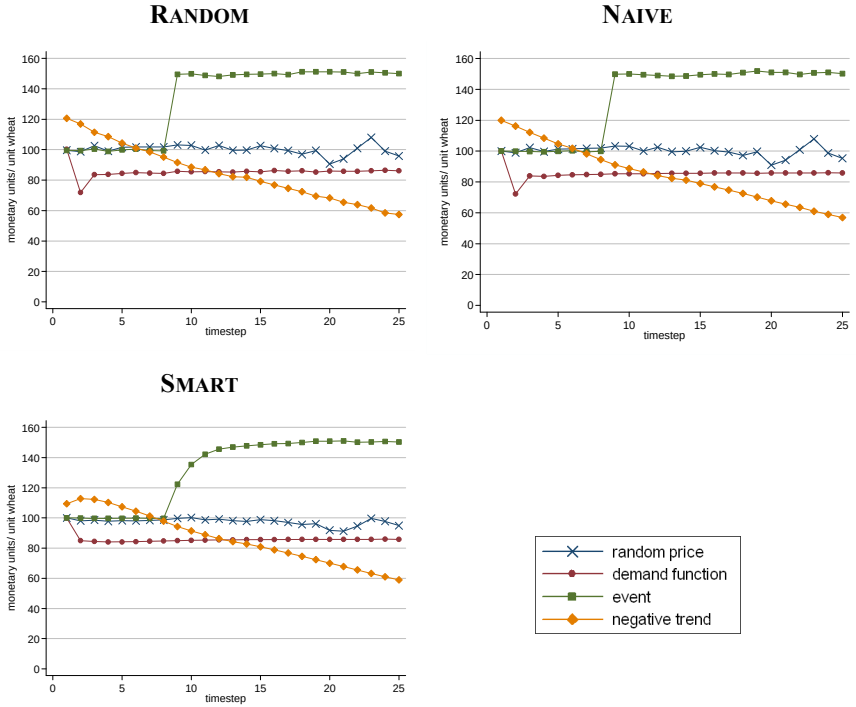
4 RESULTS AND DISCUSSION

Following parameters are observed for each scenario in order to analyse the experiments: farmers' price expectation, average profit per farm and number of producing farmers.

The expected prices depend on the different types of expectation forming (Figure 2). Random and naive farmers assume nearly the same prices because the random farmers' expectation alternates randomly around the previous price level which naive farmers expect. Because of the 100 iterations the mean of the random farmers' price expectation is nearly the price of the previous time step.

The inclusion of prices and expected prices of former time steps causes the curves of the smart farmers to be more even than the ones of both other groups of farmers.

Figure 2: Expected price of smart, random and naive farmers

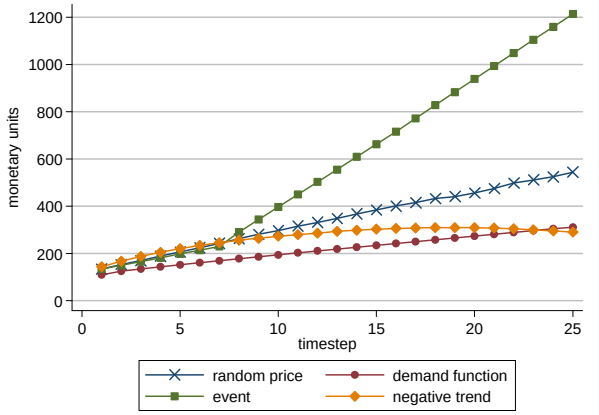


Source: Authors.

The expected price alone is not an indicator for a farmer's success. The success, i.e. the profit, rather depends on input costs, the harvested amount of wheat (both determined by intensity) and the actual price. In Figures 3 to 5 are simulation results for the farmers' profit shown. The farmers with a random price expectation (Figure 3)

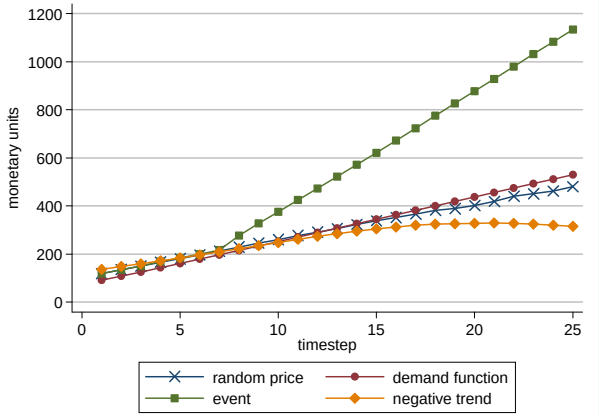
have the lowest profit in the scenario with the demand function. An explanation is that the price in the demand function scenario evolves into a stable level (i.e. an equilibrium price) as one can see in Figure 1. The naive (Figure 4) and smart (Figure 5) farmers' price expectations can also lead to an equilibrium. The opposite applies for random farmers: they do not learn from the previous price development but set their expected prices by pure chance. The range of fluctuation does not decline. Therefore farmers with a random price expectation do worst if an equilibrium price exists.

Figure 3: Profit of random farmers



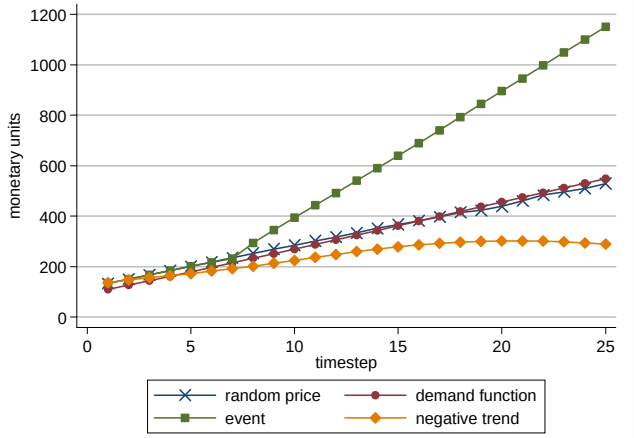
Source: Authors.

Figure 4: Profit of naive farmers



Source: Authors.

Figure 5: Profit of smart farmers



Source: Authors.

The graphs, furthermore, show that random farmers perform slightly better in the event scenario than the naive and smart farmers. Random farmers thus adjust faster to the new situation. On the contrary the naive farmers drag one time step behind. Due to the random expectation setting half of the farmers expect for the eighth time step prices above the price level of the seventh time step. These 50 % of the farmers are able to gain a higher monetary outcome because their crop growing is already adjusted to a higher price level. From the eighth time step on the higher price level is the mean of the randomly fluctuating expected prices. Now the random farmers are just as well adjusted as in the previous price level.

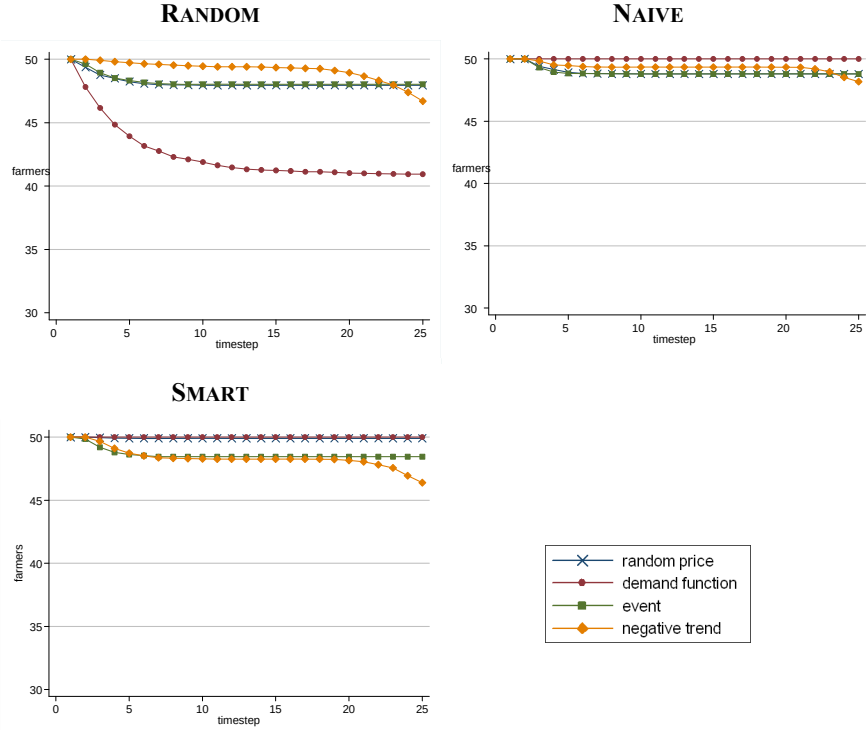
The smart farmers need more time to adjust their price expectation to the new level because previous price expectations and prices are taken into account. That leads to the conclusion that farmers with a randomly set expectation deal with an unforeseen situation better. The random price setting scenario is more manageable for the random farmers in comparison to the smart and naive farmers. Therein they have the best adjusted price expectation because there is no correlation between actual and previous price. Summing up it can be said that a random price expectation fits best a random price.

Comparing the monetary outcome (profit) of the naive and smart farmers, one can see a noteworthy difference between the random price setting scenario and the demand function scenario. In the latter an equilibrium price is reached. Once there is an equilibrium price it is good to expect the previous price because it will not change very much anymore. Whereas in the random price setting it can occur that a time step with a very high price is followed by a time step with a very low price. Naive farmers expect again a high price and grow intensively which has negative effects on their monetary outcome. In the smart farmers' expectation it

cannot come to such a serious error because they take the mean of the previous price and the associated price expectation. This kind of price expectation cannot be as far from the real price as it could be in the case of a naive farmer's expectation.

For the negative trend scenario no remarkable differences in monetary outcome can be found between the three types of price expectation.

Figure 6: Number of surviving random, naive and smart farmers



Source: Authors.

In Figure 6 the number of surviving random, naive and smart farmers is illustrated. Notable is again the poor result of the random farmers in the demand function scenario. And once again, smart farmers perform slightly better in a random price setting than the naive farmers because of the above mentioned reasons.

In the case of a negative price trend, smart farmers leave agricultural production earlier than the others. Because of including previous prices and the associated more optimistic price expectations they deviate more and more from the real price (cf. Table 2). Therefore they expect a higher price than occurs for the next period and farm intensively. The result of their expectation forming is a belated changing to extensive farming. Due to that misdirected investment in intensive production

they loose their money faster and quit farming earlier than the random and naive farmers.

Table 2: Expected prices of smart and naive farmers at a negative trend

Price	Expectation of smart farmers	Expectation of naive farmers
100	100	100
95	100	100
90	97	95
85	94	90
80	89	85
75	84	80
70	80	75
65	75	70
60	70	65
55	65	60
50	60	55

Source: Authors.

If the point is to stay in agricultural production although prices go down, it seems to be the best way to act naively. At the end of 25 periods more naive farmers stay in production than smart or random ones. This kind of expectation seems to be better adjusted to a negative price trend. Random farmers exit farming in the negative trend scenario because the variation of the expected prices is so high that again and again some of them make wrong decisions and therefore reach the liquidity border. In the smart farmers' case the price expectation becomes increasingly unrealistic as it is described above, and leads to wrong decisions. The best price expectation for a negative price trend would perhaps be a case where a trend could be detected and included, but we did not test it yet.

5 CONCLUSIONS AND OUTLOOK

Based on the results of our experiments, it is suggested that:

- Smart farmers act better when a demand function is given or when the number of farmers in a random price scenario is considered.
- Random farmers operate better when a random price, an event or a negative trend is applied and the profit is taken into account.
- Naive farmers act better when the total number of farmers is considered and an event occurs or prices follow a negative trend.

It is shown that a more complex algorithm for price expectation such as in the case of the smart farmers is not always better than a naive expectation (although it has to be mentioned that we did not use highly complex price expectation methods). The success depends to a high degree on how the real prices are set. For example, if

one assumes a market with a constant demand function, there is hardly any differrence between an adaptive and naive price expectation.

Remarkable is that we could not observe a pig cycle using the demand function scenario. One could expect that high prices of the previous period would lead to overproduction and therefore to rapid falling prices and vice versa. That would end up in high fluctuating prices over time. During the first few time steps a higher fluctuation of the prices occurs but it is steadily decreasing over the elapsed time. The reason for that could be the mix of smart, naive and random farmers. Different reactions due to different expectations avoid higher fluctuation (as it would appear if there was only a naive price expectation) and therefore also the pig cycle.

Let us come back to our starting point: What do the results of the experiments tell us about the prejudice that farmers are stupid? We cannot answer the question if a majority of farmers acts naively but we can say that a higher degree of diversity with regard to price expectation is the best answer to the increasing uncertainty of price development in agriculture. There is not a general solution and an always superior way. Flexibility in price expectation and adaptability to emerging events or trends contribute to success.

For real agricultural production you can imagine much more variants of price setting and expectation forming which are perhaps more successful. Herein the further perspective for the use of IPES is given. Until now, the model is relatively simple but there is the possibility to adapt it to new situations and needs. Further price scenarios and expectation forming methods are imaginable as well.

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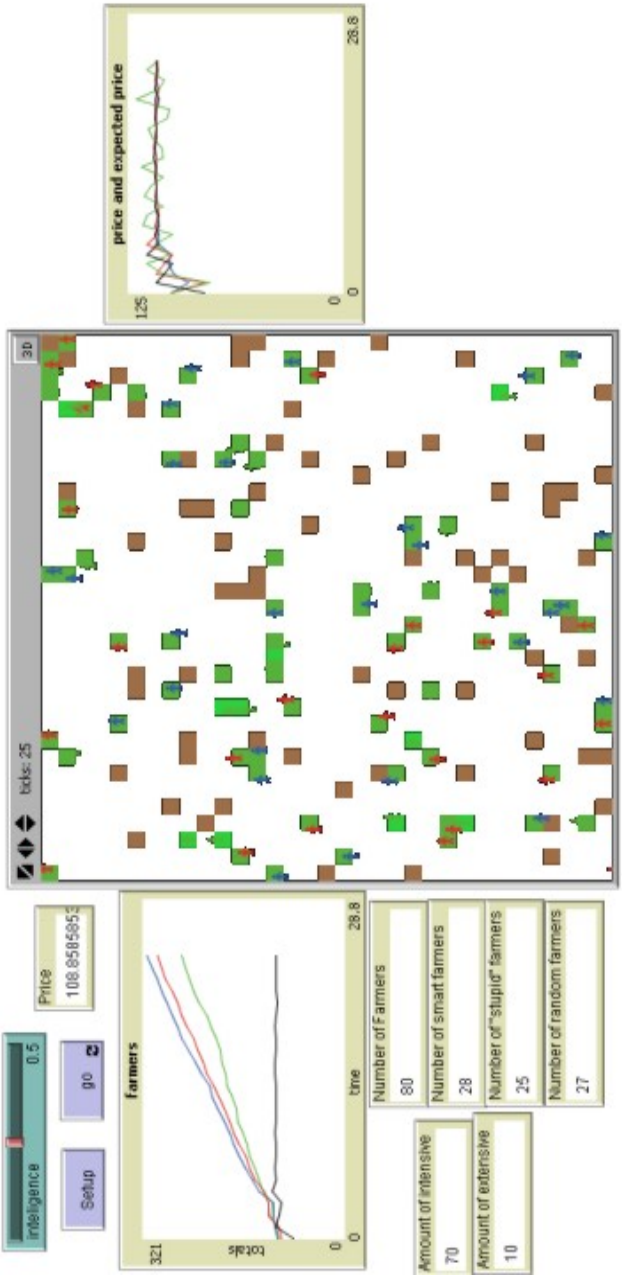
APPENDIX 1

A-Figure 1: User interface of IPES



RURAL DEVELOPMENT

Challenges of education and innovation for agricultural development
KELLY LABAR, MARTIN PETRICK, GERTRUD BUCHENRIEDER (eds., 2010)
Studies on the Agricultural and Food Sector in Central and Eastern Europe, Vol. 56, Halle (Saale), IAMO, pp. 103-112.

DESIGNING THE "RURAL-SENSITIVE EVALUATION MODEL" BASED UPON LEADER PRINCIPLES AND ITS TESTING IN FOUR SERBIAN MUNICIPALITIES

*BRANISLAV MILIC**

ABSTRACT

Rural areas have often been marginalised by local decision-makers in mainstream development planning and implementation. Local governments therefore might be concerned with monitoring "progress", and addressing particular attention to the specificities of rural areas, their vulnerability and special needs. However, monitoring and evaluation of local administrations' rural-sensitive activities, followed by recommendations for their improvement, reveals the gap between their commitment and actual implementation and impact. This paper focuses on defining and testing the Rural-Sensitive Evaluation Model (RSEM). The RSEM is a newly-developed and specific method for monitoring dynamic changes and measuring progress towards rural development, as well as the role of local governance. The RSEM is designed to assist in establishing a framework for institutional and guided development of rural communities advancing towards set standards. The RSEM has its roots in the LEADER (Liaison Entre Actions de Développement Rural) philosophy and related key features, and is structured with three-levels of "rural-sensitive" indicators. After introducing the RSEM's needs assessment, its structure and methods of use, the paper provides validation of the RSEM by testing the model in four East Serbian municipalities. The RSEM's adjustments were made until a satisfactory level of accuracy and logical reliability was achieved.

Keywords: Rural Governance, Methodology, Evaluation, LEADER, Serbia.

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1 INTRODUCTION

A number of studies have suggested that the development of rural areas requires a more innovative approach than does the development of urban areas.

The increasing importance of sub-national actors in rural development, expressed through decentralisation and the transfer of power from higher to lower levels of government, is noticeable (OECD, 2006) and even perceived as efficient, effective and economical. BRYDEN (2005) provides a rationale for such behaviour, depicted by five key words: Transparency, Subsidiarity, Competitiveness, Heterogeneity and Cost savings. Furthermore, as BARQUERO (2002) emphasised, institutional development is a major step towards economic growth and structural transformation.

Local government should be judged according to the difference it makes in people's lives (GALVIN, 1997). However, local society can have a greater role in governing by increasing their participation in politics (WUNSCH et al., 1990:6).

Drawing on the work of several authors and practitioners (PALFREY et al., 1992; WINKLER, 1987; National Consumer Council, 1986; DHSS, 1979), VIGODA (2003) highlighted suggestions to elaborate which performance indicators could be considered good indicators of public policy outcomes. The results of monitoring these indicators can help to: (1) understand and establish public needs; (2) develop, communicate and distribute public services; and (3) assess the public's degree of satisfaction with the services.

Identifying the problems faced by rural communities and the actions taken by local decision-makers to resolve these problems can improve rural welfare. However, due to their lack of experience in these processes, facilitating local administrations' directions and their outcomes toward rural areas is an important need. Approximately 60% of Serbian municipal authorities have no clear view of their own role in solving the rural population's existing problems (BOGDANOV, 2007).

This paper elaborates upon the Rural-Sensitive Evaluation Model (RSEM), (MILIC, 2009), a tool for assessing how local administration works to promote wider rural development objectives. The RSEM is not designed just to assess issues, but also to offer guidelines and recommendations for overcoming or improving existing situations.

Encouraging the involvement of local people in the development process, a main pillar of the RSEM, matches the main principles of LEADER (Liaison Entre Actions de Développement Rural) philosophy. The European Commission (EC) wanted local actors participating in its LEADER programme to work together in a community-based approach to find innovative solutions to rural problems which could reflect what is best suited to their areas, and which could also serve as models for developing rural areas elsewhere (WOODS, 2008). Thus, LEADER is a method for mobilising and delivering rural development in local rural communities, rather than a fixed set of measures to be implemented (EC, 2006).

Rural-sensitive, evidence-based planning has been applied in some countries. The objectives of the rural-proofing concept (United Kingdom example), defined by the Rural White Paper (DEFRA, 2004) are very similar to the objectives of the RSEM. The main conclusion provided by SPENCER et al., (2005) was that rural-proofing processes should be integrated within existing decision-making structures, rather than operating within stand-alone mechanisms. The RSEM is also intended to become part of decision-making structures, primarily as a tool for guiding local administrations through a unique approach toward rural development maintenance.

Despite a great need for them, similar models have not been tested in Serbia until now.

2 STRUCTURE OF THE RSEM

The RSEM is structured in three levels (Table 1, Scheme 1):

a) Type of indicators (ToI)

b) Indicators' Area (IA)

c) Indicators

Three main ToI's are contained in the RSEM (Table 1).

ToI/I pertains to monitoring the extent and manner to which local government changes over time. Additionally, ToI/I measures the level of participation and coordination of activities amongst relevant stakeholders.

ToI/II pertains to measuring the influence and participation of sensitive groups within the rural population regarding overall management of the community.

ToI/III pertains to measuring of impact of local administrations' futures on the overall rural development objectives and their willingness to foster changes endogenously.

ToI's are composed of seven IA's, which each contain a set of minimal conditions required for each municipality to be treated as sufficiently rural sensitive. IA's are based upon key features of the LEADER approach (area-based approach, bottom-up approach, public-private partnership, integrated approach, innovation, cooperation and networking).

Forty-one indicators are classified into seven IA's, and reflect the minimum conditions necessary for quantifying the extent to which a particular indicator is met. Thirty-five indicators are considered obligatory, while 6 are not (Table 1). Additionally, each particular IA brings one "Primary" indicator or sub-indicator. For greater accuracy, the RSEM introduces sub-indicators (SI), allowing deeper municipality insights and precise quantification of differences among municipalities.

Moreover, the RSEM requires that data gathered and indicators achieved should be proven by a list of available documents.

Table 1: Structure and content of the Rural Sensitive Evaluation Model

Type of Indi-cators	Number/Indicator Area		Indicators Mandatory/ Total number of Indicators
I	1	Area-based approach within the local administration	4/5
	2	Bottom-up approach within the local administration – Influence of local administration on cooperation and partnership	5/5
	3	Creation and implementation of strategic documents related to rural development	3/4
	4	Application of innovative approaches in rural development planning and implementation	7/10
	5	Multi-level cooperation and networking	3/4
II	6	Position of women and youth in rural areas	3/3
III	7	Personnel's approach toward rural development	10/10
Total			
3		7	35/41

Source: Author.

The RSEM is quantified by a scoring system, with indicators and sub-indicators carrying a certain number of points. Compared to correlated indicators, sub-indicators carry a different number of points defined by adding, or in three cases, by reducing extra values.

The scoring system is structured for each IA in three stages (Table 2):

Stage 1 correlates to the achievement of a priority indicator or sub-indicator. This minimum value is intended to show that a municipal administration has achieved the basic minimum, but still considers rural development issues as specific issues and has a basic, previously-established orientation towards rural development in accordance with the RSEM.

Stage 2 represents the threshold at which a municipality can be described as sufficiently rural-sensitive and denotes that conditions set by obligatory indicators are achieved. Achieving non-obligatory indicators shows a higher degree of sensitivity to rural issues. Each of the IA's bears the same value (5.00) necessary to declare a municipality as sufficiently rural-sensitive.

Stage 3 represents the maximum score reached by a municipality and denotes that all requirements are fulfilled.

The maximum number of points, 100 (sum of the maximum points' number within each IA), represents the Municipal Rural-Sensitivity Index.

Municipal capacity in Serbia and the willingness to tackle rural issues are currently at a very low level, and are usually combined with a lack of ideas, creativity and innovative approaches. Accordingly, the RSEM illustrates that IA's VII and IV carry the greatest number of points.

Table 2: The scoring system in the Rural Sensitive Evaluation Model

Stage	Number of points	Indicator Area						
		1	2	3	4	5	6	7
1	Minimum required to be evaluated	1.00	1.00	0.75	0.5	2.00	1.50	1.00
2	Minimum required to be rural-sensitive	5.00	5.00	5.00	5.00	5.00	5.00	5.00
3	Maximum	8.00	7.50	11.00	18.00	12.50	7.00	36.00

Source: Author.

The model also incorporates questionnaires that were specifically designed for this purpose. Questionnaires distinguish four levels of questions (Scheme 1):

1. Overall questions accompanied by a particular IA trying to provide broad, first impressions related to the certain IA.

2. Specific questions help to determine the specific activities launched by a municipal administration that guide us towards the conclusion of whether the municipality is rural sensitive or not. This group of questions also enables us to define the deficiencies that the municipal administration has to overcome in the upcoming period to be determined as having paid enough attention to rural issues.

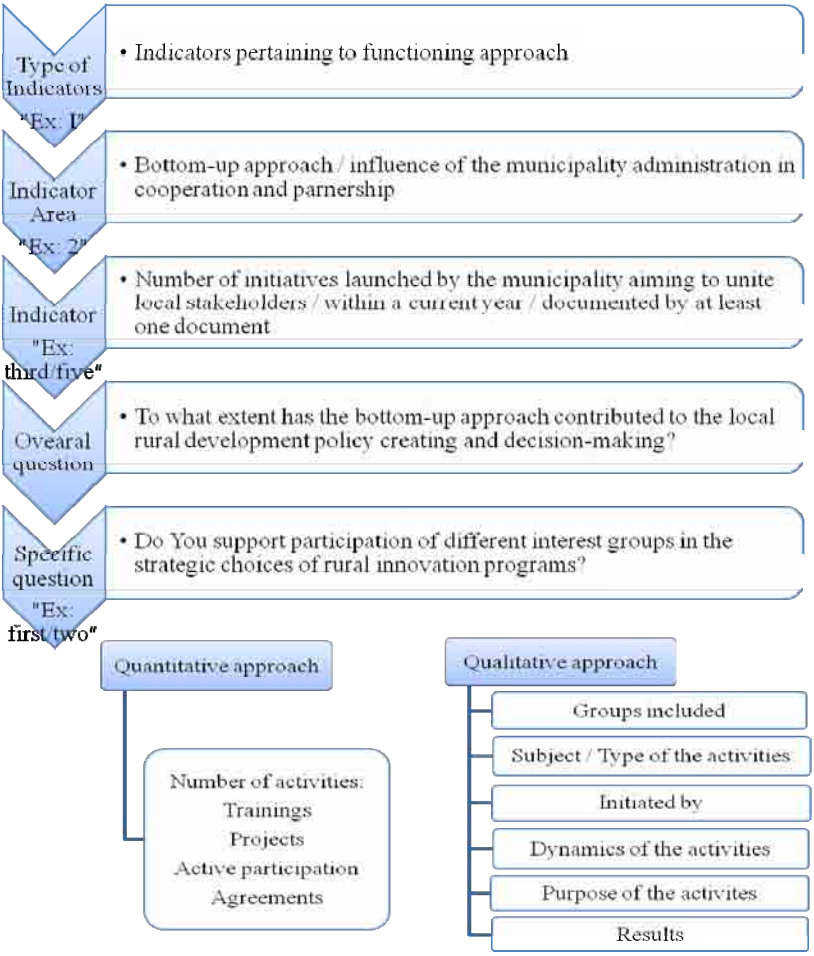
3. Quantitative and Qualitative approaches review the answers gathered by setting the specific questions.

4. The fourth group aims to qualitatively evaluate the quantitatively expressed activities and enables us to obtain a thorough picture of the activities undertaken by the municipal administration.

Lower overall resource capacities, including lower population density and lower business outcomes, result in the services' provision being less dense in Less Favoured Areas (LFA)[10] than in non-LFA areas. Accordingly, the RSEM introduces two different approaches for two types of rural areas by setting the requirements for LFA municipalities to be considered as rural sensitive to a lower level.

[10] Ministry of Agriculture, Forestry and Water Management Republic of Serbia has defined Serbian LFA in 2005. The criteria for defining these areas are not completely compliant with the EU requirements.

Scheme 1: The method for measuring the extent of participatory approaches in local rural development decision-making and its correlation to the structure of the Rural Sensitive Evaluation Model



Source: Author.

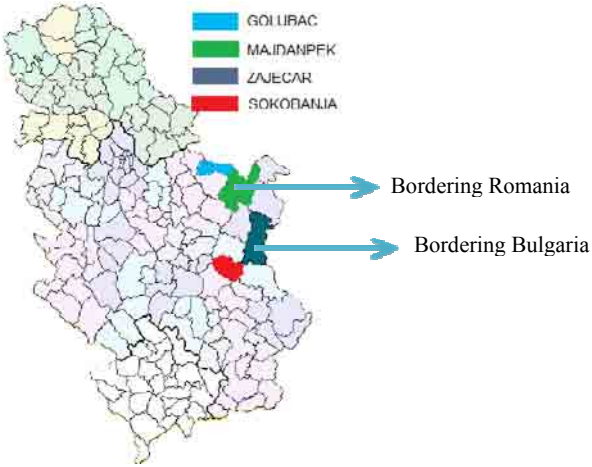
3 CASE STUDY – TESTING THE RSEM

3.1 Testing area

The paper studied a small sample of municipalities (Golubac, Majdanpek, Zajecar and Sokobanja) located in Eastern Serbia (Map 1).

Eastern Serbia consists of two districts and 8 municipalities. It is predominantly rural, and is the second most undeveloped region in Serbia (BOGDANOV, 2006). Although it covers 7.1 % of the country's territory, Eastern Serbia contains only 2.9 % of the total population. The unemployment rate is 27 % (more than double the Serbian average), and its contribution to total GDP is only 1.1 %, compared to the capital Belgrade, which is 45.2 %[11]. The region also borders the European Union (EU).

Map 1: Map of Serbia – Geographical position of the four municipalities where the Rural Sensitive Evaluation Model was tested



Source: Author.

3.2 Defining the sample

The RSEM was tested and adapted until a satisfactory level of accuracy and logical reliability was achieved. Applying the RSEM anticipates utilising semi-structured interviews, including the so-called on-the-spot analysis. Results must be constantly reviewed and analysed in order to move forward.

[11] Statistical Office of the Republic of Serbia 2002, 2006.

Sixteen employees from municipal administrations (Golubac-3, Majdanpek-6, Sokobanja-3, Zaječar-4), ranging from Deputy Mayors to Directors of Local Economic Development (LED) offices, to rural development experts, took part in testing the RSEM.

Within the four assessed municipalities, only Zaječar does not belong to LFA.

3.3 Results

In determining the rural-sensitivity level, none of the observed municipalities has made sufficient progress towards the requirements set in RSEM.

Three out of four municipalities consider themselves to share certain homogeneities with neighbouring municipalities characterised by internal social cohesion, common history and tradition, and experiencing a common feeling of identity (IA1). However, a lack of realising concrete joint actions represents institutional shortcomings.

All of the municipalities declared that they recognise the importance of the bottom-up approach (IA2) when creating local policies, and they all indicated that initiatives related to joint meetings, trainings and promotions help unite local stakeholders from all three sectors. Nevertheless, concrete activities are almost completely absent.

The majority of evaluated municipalities have neither started preparing strategic documents that are directly related to rural areas, nor have they discussed them (IA3). However, all four view rural issues as an important link in the LED chain for designing LED strategies. The term "rural development" was used in strategic documents of all four municipalities, and was classified into special sections – agriculture, rural infrastructure and rural tourism. Both non-governmental and business sectors were consulted.

Innovation is recognised as one of the key links in the development process, although innovative actions are still missing (IA4).

Municipalities are sufficiently experienced in cooperation and networking on multi-levels (IA5) and are willing to increase these activities, although usually without the presence of initiatives. Accordingly, due to the lack of a tradition of decentralised decision-making and weak partner relationships, the necessity of external intervention is noticeable.

However, initiatives that have been launched or implemented by externals and in which local administrations have taken an active role, are not usually recognised and have not been stated as important influential factors.

The women and youth status (IA6) is almost identical among all four municipalities. Evaluation shows a certain degree of involvement for these two vulnerable groups in the planning activities of municipalities, but rarely are they present in decision-making processes.

Among the sensitivity factors analysed, the greatest progress has been achieved in the employees' approach towards rural development (IA7). Here, all parameters show a high awareness of the needs and weaknesses of rural communities. A commitment to rural issues and personnels' motivation to achieve a greater impact on rural communities were also expressed.

The list of documents supporting the respondents' views is not provided in the majority of evaluated topics, meaning that even where rural-sensitive actions are being undertaken, the process is rarely recognised and documented.

4 DISCUSSION AND CONCLUSIONS

Findings derived from the application of the RSEM show, above all, that what appears appropriate and works well in one context may not work well in another. Thus, the transfer of an activity and/or policy initiative from one context to another is no guarantee of success since there is a need to adapt activities and policies to local backgrounds.

Based on the respondents' views, however, the RSEM meets the expected criteria.

The RSEM structure offers the possibility of monitoring dynamic changes, measures progress over time, and determines differences in progress achieved in the rural-sensitivity level among different administrations. Moreover, RSEM provides the possibility of simulating results according to various defined priorities. Accordingly, the use of RSEM is universal enough in interventions at all policy levels, from state government through development agencies, to the local level. As part of a self-monitoring process, the model should serve as a tool to evaluate, monitor and measure the level of effects achieved, and overall local policy goals reached. Monitoring and evaluating the rural-sensitive activities of local administrations through the RSEM reveals gaps between their commitment and actual implementation and impact.

The RSEM provides a basis for focusing policy debates, and potential future policy developments, allowing rural-sensitive findings to be used as a tool to lobby the government and other agencies to obtain a more rural-responsive perspective. The RSEM can thus be used to hold decision-makers accountable for their actions or their lack of actions. Finally, it can also be used to measure the outcomes and impacts of non-rural-specific goals and activities on rural development and urban/rural inequality.

According to the respondents' views, the RSEM contributes to encouraging local self-governments in their new role of rural governance. The RSEM is thus seen as a tool which helps to reinforce the internal cohesion of an area and, by boosting the local identity and image, consequently making better use of local resources. Also, respondents stated that the RSEM contributes to enhancing complementarities to other rural development actions and/or programmes, and encourages exchanges with the outside world and an opening-up to the global community.

Finally, the big advantage of RSEM is the fact that it is relatively simple to handle and possesses key features, flexibility and adaptability.

However, the long-term impact of using the RSEM is beyond the period of its established application, and specialised partnerships should continue to enable the sustainability of rural development support activities.

Threats

The lack of political will in considering the RSEM's results could be a great threat to the effectiveness of RSEM. Moreover, data collection and analysis may be labour-intensive and time-consuming for both evaluators and those undergoing evaluation. Another threat is the way in which the RSEM is applied. The challenge often lies with convincing non-rural specialists to use this tool. This research exposed certain shortcomings of a purely questionnaire-based methodological approach. The RSEM should ideally be used by evaluators who are trained in using it, who are selected from various professional backgrounds and are personally rural-sensitive.

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TEA-INTERCROPPING – A SOCIO-ENVIRONMENTAL STUDY IN XISHUANGBANNA, SOUTHWEST-CHINA[12]

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ABSTRACT

In the mountainous areas of Xishuangbanna, Southwest-China, farmers of high and low altitudes drift apart by rapid development of the rubber industry. Farmers in the high altitudes, where rubber cannot be grown, are looking for alternative livelyhoods. These include agricultural innovations such as tea-intercropping. This study uses qualitative methods to examine how high-altitude villages' adopt innovations, and how society and environment mutually influence each other.

Keywords: Tea-intercropping, agriculture innovation, co-evolution, Xishuangbanna, China.

1 Introduction

In recent years, villages in the mountainous area of Xishuangbanna prefecture of Yunnan province, China drifted apart by rapid development of the rubber industry. Farmers in the lowlands are able to enjoy economic benefits deriving from the constant demand for rubber. This is mainly due to China's growing auto industry and – as a result – an increase in the prices of rubber, backed up by the federal government giving incentives in order to produce more rubber (TANG et al., 2009). This pushed the clearing of forests for growth of rubber to as high altitude as possible which is known to be limited to about 1,000 m above sea level (a.s.l.). In Xishuangbanna Prefecture in the southern part of Yunnan Province, as a consequence minority nationality groups such as Akha (Hani) and Lahu who live both in the low and high altitudes, are now separated by the imaginary rubber line. For some farmers this means that relatives who live under 1,000 m a.s.l. earn a great deal more than those who live above that line. Their economic uncertainty for the short term is reduced and income for the next decades is promised. Those who live above that line, in contrast experience relatively slow economic growth, and are therefore looking for alternative livelihoods, namely trying recently introduced agricultural innovations.

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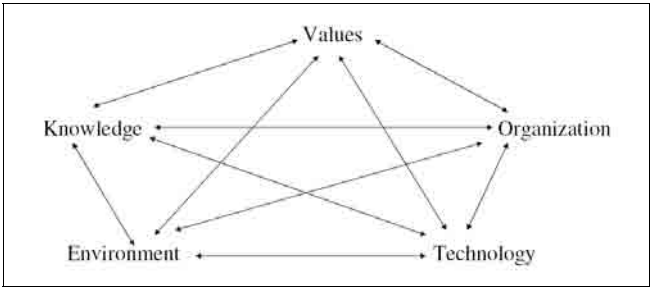
Apart from altitude several other parameters are involved in the need to introduce agricultural innovation, and in the process of adopting such innovations. Indeed, the process of introducing and adopting agriculture innovations is dependent on various environmental parameters (biological and physical) and those of the social, cultural and economic spheres (ROGERS, 2003).

The aim of this paper is to analyse the development of social and ecological systems in relation to farmers' adoption of innovations. The main research question was: how do societies evolve in relation to their environment and their adoption of agricultural innovations?

Figure 1: Coevolution Scheme of Rural Development



Source: NORGAARD, 1994.

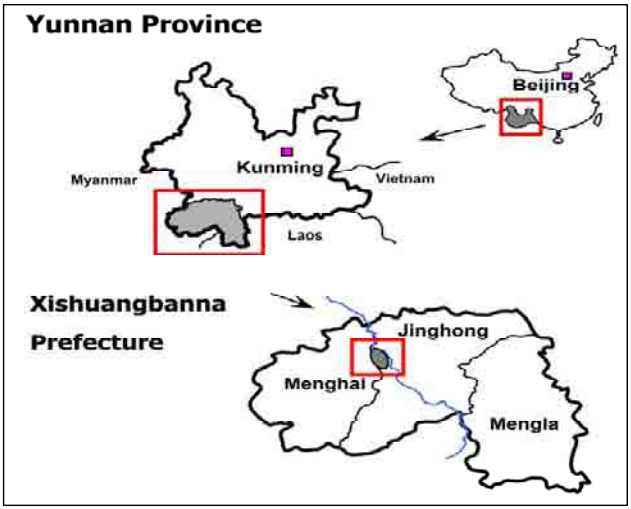
Richard NORGAARD'S (1994) theory of socio-environmental coevolution has been used as an analytical framework (Figure 1) in this paper. Norgaard states that social and environmental systems coevolve in such a way that the environmental system reflects the characteristics of the social system, and the social system reflects the characteristics of the environmental system. The acceptance and adoption of technological innovations, here the case of tea-intercropping, is related not only to economic development, but to social structure, cultural aspects, and environmental features; all corresponding and influencing each other. A way to look at co-evolution is circular: environment determines adoption and socio-cultural evolvement, which influences environmental change, which again influences the evolution of society and culture.

2 METHODOLOGY

2.1 Location of the study

The study was carried out in the framework of the Living Landscape China (Lilac) project, a consortium of German and Chinese universities researching sustainable land options and biodiversity conservation in the Nabanhe National Nature Reserve (NNNR). The location chosen for the project was the Naban River watershed in the Dai Autonomous Prefecture of Xishuangbanna, Yunnan, Southwest-China (Figure 2).

Figure 2: Research location



Source: LILAC, 2008.

2.2 Research methods

As the aim of this study was to examine social as well as environmental processes under different geographical and social conditions, a triangulation of qualitative research methods was chosen.

Two villages have been selected for this study; both with tea-intercropping, but with considerable differences in environmental and socio-economic conditions (Table 1).

Table 1: Overview of the villages

	XiaoNouYouShangZhai	**BengLong**
Ethnicity	Lahu minority and Mountain Han	Hani (Akha) minority
Altitude	1550 m a.s.l.	900 m a.s.l.
Households	33	10
Proximity to main road	30-60 minutes of winding gravel road	10 minutes of easy drive
Main crops	Paddy rice, corn, tea, and hemp	Rubber + paddy rice (tea, corn, litchi, pomelo)
Farming conditions	85 % of the farmers' arable land is sloping land for tea	Slops not very steep; farmers have access to arable land for rubber and paddy rice
Animal husbandry	Pigs, chicken, buffalos and wild bees	Pigs, chicken and few buffalos

Source: Authors.

25 semi-structured in-depth interviews have been carried out with farmers either individually or as group interviews with the whole family, usually two to three people. In order to create an open atmosphere and achieve cooperation of the farmers, the interviews took place in various unbiased social and work situations such as working in the fields with the farmers, dining with them etc. In addition to that, systematic observations, often during walks in and around the villages helped to crosscheck the information gained from the interviews. To complement farmers' views and knowledge, 15 experts have been interviewed in the prefecture's capital Jinghong, and also in Beijing. "Experts" are considered in this paper as people who are familiar with the area's socio-cultural or economic situation and/or have knowledge of the area's agricultural systems and forest ecosystems.

3 CO-EVOLUTION OF CULTURE, TEA CULTIVATION AND ENVIRONMENT PROTECTION

3.1 Cultural changes

Altitude is unmistakably influential on the choice of crops. In Xishuangbanna this is quite fundamental because altitude is a precondition for the possibility – or the lack – to grow rubber. In fact, being able to grow rubber or not has direct and indirect impact on societies, agriculture (selection of alternative crops), and the environment. Inhabitants of neighbouring villages, often not more than 10-15 km away from each other, behave differently. One evident indicator for development is the housing that changed in the low altitude into big concrete houses.

The different cultivations seem to be the beginning of a rapid cultural separation. This might lead for example in XiaoNouYouShangZhai to "Tea-Lahu", who show social, cultural and economic variations to their relatives who live in the low altitudes and grow rubber, and in BengLong to "Rubber-Akha" who differ from those who live in the high altitudes and grow tea.

A difficulty to clearly define character changes of "Rubber-Akha" and "Tea-Akha" comes about from a generation gap. However, it is important to note that this study did not look at inter-generational differences. As the relation of society to its environment is one which evolves over time, behaviour changes are different between parents and children.

3.2 From tea to tea-intercropping

Although prices of tea underwent severe drop in the last 5-6 years, farmers in both, XiaoNouYouShangZhai and BengLong continue to grow tea. They stated that they *"do not want to cut the tea bushes yet"*.

Partly they do so because there is not enough "cash crops motivation" to eradicate tea, i.e. possibility to grow crops which are economic alternatives to rubber. Tea has been part of the culture in the area for several centuries, knowledge

that has been transferred from one generation to the next. Furthermore, Pu'Er tea is renowned for its high quality all over China.

Tea-intercropping seems to be an innovation that serves the purposes of maintaining a healthy agro-ecosystem, keeping an age old cultural aspect, and providing some protection from economic uncertainty. Lack of sufficient arable land was another reason to adopt the intercropping innovation.

The system works in such way that rows of tea bushes are grown and other crops, rubber or walnut are placed between them. The young walnut trees are placed in a distance of 10 m between each tree. Young rubber is placed in a similar way, and if old rubber is intercropped with tea, then rubber and tea are placed in separated interchanged rows. All this is a change to the old system of growing tea separately from any other crop.

In the case of tea-walnut intercropping, it was found that farmers divided into only two groups of adopters according to two stakeholders who introduced the innovation to them. Either the farmer bought the trees from the forest department, or he got it for free from an investor, who will later share a sum of the profits. The decision on "from whom do I learn about the innovation" in so far was made according to whether the farmer had initial investment cash or needed to get the walnut in a lease-like agreement.

It could be observed that tea-intercropping coexists adjacent to other crop systems and to forest ecosystems. Some experts pointed out that tea although being a mono-culture, is not as bad a mono-culture as rubber, known to many in the area as the "Green Desert": rubber plantations which look green from above, but dry the land to a point that it is as dry as a desert.

3.3 Environment protection

Whereas in the low altitudes of BengLong soils are degraded and forests are cleared, in the high altitudes of XiaoNouYouShangZhai the quality of soil is still high and the forests have even grown over the last three decades. Obviously, young people in high altitude villages posses a lot of traditional knowledge of flora and fauna, more than young people in the low altitudes.

In several expert interviews it was argued that, if possible, farmers in higher altitudes would as soon as possible clear the forest in order to grow cash crops if they only had alternatives to rubber. This seems only partly true. Communities in the higher altitudes showed a strong connection to their surrounding forest ecosystems. Older members of one of the studied villages reported how dire the situation was when in the 1960s the forest around the village was close to complete deforestation. This collective memory led to a social decision to protect the environment, allowing the forest to regenerate. This, in addition to new deforestation laws, also means that the farmers were forced to more intensively use smaller parts of arable land e.g. by intercropping.

4 CONCLUSION

While NORGAARD (1994) and MANNION (1995) argue that in relative terms ecosystems become simpler with the development of agro-ecosystems this study has shown that in the higher altitudes of Xishuangbanna agro-ecosystems and forest ecosystems "live" alongside each other and even benefit one another.

Village communities have social and technical capacity to try agricultural innovations and possibly adopt new land use strategies. This, however, is often held back by limited accessibility to external knowledge.

Collective memory is a strong social tool, which influences the relation of a village to its surrounding environment. In the case of XiaoNouYouShangZhai this turned out to be crucial in the implementation of environmental protection and sustainable land-use strategies.

The subdivision of ethnical groups ("Rubber-Akha"; "Tea-Lahu") arguably creates a risk of deepening economic gaps between farmers, sometimes of the same minorities in neighbouring villages of a small area. If the altitude is too high to grow rubber, farmers stick to tea and other crops, a choice that influences socio-economic evolution. This is an example where environmental conditions interact and influence directly the socio-economic situation. This does not only have a huge impact in terms of socio-economic aspects, but also one that might bring along significant cultural deviation. In this example too, tea-intercropping, an innovation which is brought about by environmental features such as arable land, accessibility and altitude, affects the evolution of culture, pulling it to a different direction than this of the farmers in the lower altitude. As for biodiversity in the area, it is clear that in high altitudes where rubber cannot be grown, ecosystems benefit. Furthermore, long run social system might also be the beneficiaries of this environmental development. In other words, the environmental development of the higher altitude, which is considered to be more sustainable, could bring slow but sustainable growth in living conditions, exposure to education, financial and capacity development.

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INNOVATION HISTORIES AND THEIR INTERDEPENDENCY – A SITUATION ANALYSIS OF SELECTED VILLAGES IN XISHUANGBANNA, SOUTHWEST-CHINA[13]

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ABSTRACT

Village life in Southwest-China has changed tremendously, mainly as a result of the introduction of new crops such as hybrid paddy rice, tea, hemp and rubber. The latter is most important for economic development, but only grows up to an altitude of about 1000 m. Thus, the region now faces great disparities in the level of development: farmers below the rubber boundary line operate almost exclusively rubber monocultures and experience fast economic growth while, in contrast, farmers at higher altitudes must continue to search for alternative livelihoods.

A precondition for the introduction of rubber was the improvement of the infrastructure in the region. Most notable was the construction of roads, as the rubber latex has to be transported from the villages to the processing factories. These roads in turn have been pivotal for the introduction of further innovations. An analysis of how these selected innovations are adopted over time has clearly indicated that they are not disconnected scenarios, but rather highly interconnected and mutually influential processes.

Keywords: Adoption, biodiversity, China, innovation, rubber, Xishuangbanna.

1 Introduction

Xishuangbanna, an Autonomous Prefecture in the Yunnan Province of Southwest-China, is one of the world's hotspots of biodiversity. Also rich in ethnic diversity, the region is home to a great variety of different languages, cultural traditions and land use systems. Recently, the region has undergone a rapid change, experiencing economical growth and infrastructural development on the one hand and a dramatic loss of tropical rain forest and decline in biodiversity (LANGENBERGER et al., 2008; LI et al., 2007) on the other.

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Due to the fast economic development of China, the domestic demand for rubber has been steadily increasing. The Chinese Government is aiming for a high level of self-supply. Thus, from the late 1980s, Government incentives have led to an increase of private smallholder rubber production. Young people in particular – desiring to purchase modern consumer goods and live a modern lifestyle – started with rubber plantations, which provided more cash income and were less labour-intensive (XU, 2006; ZHU, 2008). Since rubber trees can only be cultivated under tropical and subtropical conditions, Xishuangbanna is one of the few regions where this commodity can be produced. Currently it is the second largest rubber production area in China (XISHUANGBANNA SINOCHEM, 2008). The introduction of this non-native plant has undoubtedly been a major contributor to the development of the region. Farming systems, land tenure systems, household economy, social life and cultural traditions are in transition. Consequentially, the ecological balance and biodiversity of the region are meeting tremendous challenges.

A closer look reveals a large disparity within the region and a wide field of conflict: rubber trees can only be cultivated at altitudes below roughly 1000 m above sea level (a.s.l.). For this reason, farming households at lower altitudes have a comparatively safer and higher income through the disposal of natural latex, even if prices are fluctuating. Their counterparts at higher altitudes, above the "rubber demarcation line", on the other hand are experiencing much slower economic development. In this way, development is strongly linked to rubber; with strong economic forces encouraging the growth of rubber plantations. Access to these resources is unevenly distributed. The land tenure system is complicated and often intransparent (TANG et al., 2009).

This paper is showing the basic findings of a potential-problem analysis of impacts of selected innovations on rural lives, on local economy, ecology and society, mainly from a land user's perspective. Two villages, one at lower and another one at higher altitude, have been selected to serve as case studies for "innovation histories". To understand the adoption and dissemination processes of innovations, framework conditions within the Nabanhe National Nature Reserve (NNNR) are being elaborated, particularly the changes in land tenure. The study has clearly demonstrated that the histories of the investigated innovations are highly interconnected and mutually influential.

The main challenge lays in the development of land use innovations in both the low and high altitudes, in order to provide economic growth and conserve, or even rehabilitate the rich cultural and biological landscape of Xishuangbanna. Such social, economical and environmental interactions are highly complex. Systemic interventions of this kind require profound insights into the historical as well as the present land use situation. Based on a typification and analysis of more recent innovations, the factors and framework conditions for the adoption and dissemination within the local and the formal knowledge system are being assessed in order to make predictions on future scenarios.

2 OBJECTIVES AND METHODOLOGY

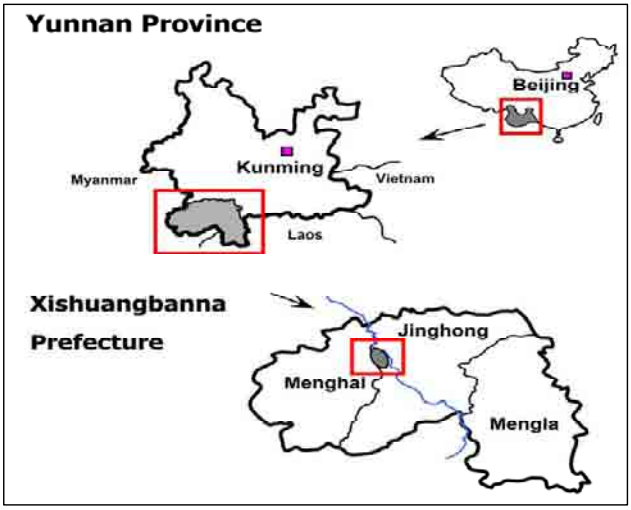
2.1 The project

The Sino-German research cooperation "LILAC- Living Landscapes China" investigates the effects of recent land use changes on biodiversity for the case of the Nabanhe National Nature Reserve (NNNR). The consortium aims to provide a strategic tool enabling decision-makers to better forecast and analyze potential impacts of land-use related decisions on society, economy and environment at landscape level.

Land use has a history. The present and future of land use, as well as its influence on the users and on biodiversity, are based on this history. Through an understanding of the history of land use in the NNNR and in Yunnan Province, important orientations emerge concerning the likelihood of the introduction, adoption and diffusion of innovations. In the frame of the subproject on "Land-use related innovations and knowledge flows," the authors particularly elaborate the main forces either driving or inhibiting these processes from a user's perspective.

The NNNR is located in Jinghong County, close to the borders of Laos and Myanmar (see Figure 1). It is part of the Mekong river watershed. The area covers about 267 km^2 of land, containing 32 villages with approximately 5500 inhabitants. The reserve was founded in 1991 and has just recently been upgraded to a "National" Nature Reserve. It is multi-ethnic, mainly populated by six different minority groups (Dai, Lahu, Mountain Han, Hani, Yi and Bulang). The main source of income is agricultural production.

Figure 1: Location of the research area



Source: LILAC (2008).

2.2 Methodology

The analysis of the adoption and diffusion processes has been carried out by the authors through a combination of narrative interviews, participant observation, expert interviews, and stratified, semi-standardized household surveys. This paper is presenting the basic findings of an in-depth analysis of the adoption processes of a set of more recent innovations. Three market-oriented innovations have been chosen to serve as case studies: rubber, hybrid paddy rice, and "tractor" as an indicator for mechanization. Innovation histories in two villages of the NNNR have been worked out as a source to identify the main factors for adoption and to understand their interdependence. Both are seen as a prerequisite for the development of future land use scenarios.

2.3 Xishuangbanna region

In 1978, China Central Government decided to implement the so-called Rural Economy System Reform. The key step was a land reform towards a Household Contracted Land System: the ownership right of land still belonged to the community and usufruct rights were contracted with the households. The core philosophy of the Household Contracted Land System is to ensure that each resident of a village has an equal opportunity to procure land use rights. To this end, different types of land, of an average size, was rented to each resident without consideration of gender and age. The reform was implemented in Xishuangbanna in 1982/1983. Land distribution was adjusted in 1999 to accommodate for the changes in population structure and contracts were prolonged for 30 years.

This ongoing "Chinese Land Tenure Reform" and the formal Governmental Agricultural Extension are the main driving forces behind the intensification of agricultural production in the villages, reduction of varieties, and introduction of new crops and varieties such as "rubber", "hybrid paddy rice" and most recently "hemp".

Rubber cultivation has become the main contributor to economic development. Soon after the introduction of rubber to smallholder farmers in the 1980s, its production rapidly increased all over Xishuangbanna. Driven by high economic profitability, the size of rubber plantations grew rapidly. By 2004, the total planting area covered nearly one quarter of the landscape. In the low-altitude villages, almost all available areas have been cleared and planted with rubber trees (ZHU, 2006). Many households have given up their traditional farming systems and rely completely on rubber. Although dependency on a single crop bears a high risk, it is unlikely that any other cash crop will be able to compete with the economic performance of rubber in the near future. Despite the fact that farmers have experienced recent crises (such as the drop in market prices and pest outbreaks) and are aware of the negative impacts on the water balance, soil degradation and environmental changes (TANG et al., 2009), enlargement of the rubber production continues to be financially rationalized.

In contrast, the agricultural production in high-altitude villages is much more diverse. Farmers cannot rely on one single cash crop. Farming households at these altitudes, therefore, show a greater variety in their production of vegetables, fruits and livestock. Corn, tea, hybrid paddy rice and, more recently, hemp are the main sources of income. Villagers also collect so-called Non-Timber Forest Products (NTFP) on a regular basis. Livestock such as pigs, buffaloes, chickens and dogs are prevalent within the villages. In addition, farmers try to intercrop tea with other trees or plants such as walnut, wild apple, corn or bamboo in order to diversify their production systems. In this way, most farmers have kept a great store of knowledge on edible wild plants, as they are always searching for additional sources of income and food supplementation.

2.4 Sample

The two villages are briefly described below:

Mandian village consists of 56 households with 287 inhabitants and a working population of roughly 170. It is located near the gate of NNNR at an altitude of 670 m a.s.l., but the farmers' fields are at an elevation that ranges between approximately 634 m to 1103 m a.s.l. The state-owned Rubber Plantation Farm is located nearby, having strong linkages with Mandian. The majority of people in the region belong to the Dai ethnic group, but some Han Chinese, Bulang and people from other minority groups are also present. Attracted by the economic upward trend, new settlers (e.g. from Hunan province) have immigrated to the village to open shops and small businesses. Due to the fast economic growth, restaurants, shops and even a clinic can now be found, indicating a comparatively high standard of living. New concrete houses, typically white-tiled and blue-roofed, are omni-present in the village. The most important source of income, by and far, is rubber.

Xiaonuoyoushangzhai village is less developed; an "old-fashioned" Mountain Han/Lahu mixed village, located at an altitude of approximately 1550 m a.s.l. with an elevation range between about 908 m to 1635 m a.s.l. Currently, there are about 33 households with a population of roughly 150 persons, making the village less densely populated than Mandian. Xiaonuoyoushangzhai is located in a very remote area and was not connected by way of road construction until 1993. The altitude of the village is much too high for rubber cultivation, so the main cash crops are tea, corn, paddy rice and, recently, hemp. Farmers are always searching for alternatives. The village has a wide range of livestock such as chickens, pigs, buffaloes, beehives, etc. Although most households now have their own tractor, the majority of the farmers still keep at least one buffalo.

3 RESULTS: INNOVATION HISTORIES, ADOPTION FACTORS AND THEIR INTERLINKAGES

This section presents the innovation histories in a nutshell. Adoption factors will be elaborated, and their interlinkages briefly described.

3.1 Road

Road construction is interlinked with the production of market crops. Infrastructure and in particular the construction of roads is a main driving factor towards market oriented production and vice versa.

In 1966, a road was constructed that connected Mandian village with the state-owned rubber farm. This made the village the first to obtain a linkage to outside world. It was mainly initiated by the Government, as a means of connecting latex producing villages with the processing factories. Over time, more and more villages within the NNNR have been linked to the main road. Furthermore, the Government encouraged those farmers living too far from the main road to resettle. In 1993, Xiaonuoyoushangzhai village received its connection to the main road. Farmers from the NNNR were in this way able to reach places outside the area in a relatively short time and, conversely, people from outside the region obtained better access to it. In general, this is seen to be very positive. To put it in the words of one female farmer: *"If you want to enhance your life, you have to improve the road"* Some implications have been noted with regards to autonomy: some elder farmers have mentioned a close connection between the construction of the road and a higher "influence of Han Chinese culture".

The poor condition of the road, especially during the rainy season, continued to be a problem in Xiaonuoyoushangzhai. However, this situation may change with the introduction of a new crop: nearly all farmers of the village began to cultivate hemp. This has been strongly supported by the Government, who built a huge hemp factory and, being aware of the bad conditions, may also improve the road in the nearer future.

3.2 Rubber

In the years 1981 and 1982, the first rubber trees were introduced to Mandian, which was the first village to begin planting such trees in the NNNR. The area used for rubber cultivation increased year by year until 2003/2004, when no additional land was available for the expansion of rubber crops. The price of rubber also steadily increased until 2003 with some exceptional years in the early 1990s. From 2004, it rose even faster. However, in the end of 2008 a tremendous drop in the rubber price occurred due to the global economic crisis and the resulting drop of the latex price on the world market. Next to the financial benefits of the commodity, farmers are also aware of its harmful environmental impacts such as erosion, soil degradation and negative changes in water household, since rubber trees are widely known as "water pumps" (QIU, 2009). As a result of this, rubber

plantations have a strong influence on the water household of the region: there is far more water run-off during the rainy season and small rivers are likely to dry out. For this reason, most farmers must now depend on rainfalls to feed their paddy rice fields.

Rubber planting is not possible in Xiaonuoyoushangzhai village since its altitude is above the "rubber limitation line" of approximately 1000 m a.s.l. However, farmers have begun renting rubber plots from farmers at lower altitudes, trying to get their share of the business in this way.

3.3 Hybrid paddy rice

Hybrid paddy rice was introduced to Mandian village in 1985. Similar to the case of rubber, it was promoted by the Government. The innovation has been adopted rapidly.

The big advantage of hybrid rice is that its yield is much higher when compared with local varieties. Rice is cultivated for personal consumption. With the hybrid varieties, only one rice harvest per year is necessary. Therefore, farmers are able to either; plant additional cash and subsistence crops, such as melons, sweet corn, etc., or lease their rice field to other farmers in order to create income. Moreover, some villagers – more or less illegally – have turned parts of their former rice fields into rubber plantations.

Disadvantages of this system are the higher demands on pesticides, herbicides, fungicides and fertilizer. The main inhibiting factor is dependency: the villagers themselves cannot reproduce hybrid varieties. Therefore, farmers must buy seed from companies outside the region and, in instances of larger problems such as fungal diseases, farmers are forced to depend on external knowledge. The introduction of this innovation thus far is strongly linked to road construction and the accessibility of extension service and agricultural traders.

In the upland village Xiaonuoyoushangzhai, the progression from the introduction of hybrid paddy to its diffusion over the whole village has taken about six years. One reason for the lower adoption rate might be the poor road conditions. Adoption increased when different hybrid varieties became available on the markets that were also suitable for the harsher conditions of higher altitudes. Currently, there are two households left in the village that cannot plant hybrid rice because their rice fields are located above 1250 m a.s.l. At this altitude the water is too cold, such that only local varieties can be cultivated.

3.4 Mechanisation

Buffaloes have historically been of high value in the land use system of the NNNR. They have now lost their importance, especially in villages of lower altitudes. In Mandian village, the first tractor was introduced by the Government in 1977, which was initially used solely for transportation. From 1985, people started to use tractors for the cultivation of their rice fields. During this period,

30 to 40 buffaloes continued to be kept. In 2006 the last buffalo disappeared. Consequentially, what was previously grazing land and land for fodder production for the animals has been turned into rubber plantations.

Many factors contributed to the decision to give up buffalo keeping in the region: firstly, the work with animals is highly labour intensive. Furthermore, it is risky; as buffaloes often have diseases or cause accidents. In such cases, the farmer is forced to sell the buffalo at a very low price, if it can be sold at all. Finally, perhaps the most important and recent factor is rubber cultivation. Rubber production has become the highest priority. Farmers who suffer a loss in their rubber fields caused by buffaloes will claim for high compensation. Therefore, a buffalo keeper living in a rubber-planting village or in a neighbouring village takes a high risk to lose huge amounts of money.

This picture is very different in regions of higher altitudes. In Xiaonuoyoushangzhai village nearly all farmers have their own tractor and at the same time keep their own buffaloes. After the introduction of tractors, the farmers gave up cattle farming completely. So cattle, not buffaloes, have been replaced by mechanization. According to our informants, cattle were formerly used mainly for transportation. Additionally, the area of grazing land for cattle is very limited. Buffaloes can be kept in the forests. The main reason to keep buffaloes is simply that they are needed for the work in the rice terraces. While tractors can easily be used in the plain paddy rice fields of the lowlands, buffaloes are still required for cultivation on the slopes at higher altitudes. For this reason, buffalo husbandry is a main factor for the cultivation of hybrid rice in the uplands.

4 DISCUSSION AND CONCLUSION

The rapid rural development in the mountainous region of Southwest-China has brought fundamental changes to the area, with both positive and negative effects. The main positive effect to be mentioned is the fast economic growth in the region, mainly caused by the introduction of rubber, a tree that is not native to the region. Rubber planting households are able to improve their standards of living noticeably. In the course of this economic development, the infrastructure has been significantly improved, which in turn was an important precursor for the successful introduction of following innovations. Therefore, it is clear that rubber has not only had influence on rubber-planting villages, but that it has also, either directly or indirectly, had influence on the whole region.

The main negative effect arising out of this fast development is the dramatic loss of rain forests coupled with a drop of biodiversity. Taking China's high domestic demand on natural latex into consideration, it is clear that there is no turning back. Thus, future prospects for the region may not lie in an attempt to return the environmental conditions to those prior to the introduction of rubber. The capability lies rather in potential innovations that may improve the current land-use systems and retain, or even upgrade, the existing status of biodiversity. For this purpose,

the case study on rubber monocultures in the NNNR may also serve as an example for other areas in Xishuangbanna. Furthermore, the results of the research can give an important hint as to how other monoculture systems in the area, such as sugar cane, banana or tea, may be improved.

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LAND USE AND PRODUCTIVITY

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LAND DEGRADATION FROM AGRICULTURAL ACTIVITIES IN UZBEKISTAN: A REVIEW OF EVIDENCE

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ABSTRACT

Agriculture accounts for most of the land use in Uzbekistan, and is consequently the main determinant of environmental quality. Thus, due to the excessive use of production inputs and irrigation, land is widely degraded in Uzbekistan. This paper explores characteristics and changes in land use, agricultural production, soil ecosystems and water availability, and their effects on both soil degradation and limits on sustainable development in different agro-ecological zones of Uzbekistan. Secondary data from various sources was collected and processed, and descriptive statistical methods were used to analyze trends, causes and effects of land degradation. Zones with lower land quality have higher water use indicators. There is a positive correlation between the land grade and fertilizer application coefficients. Agriculture from the East zone showed sustainable water consumption, the highest average land quality grade, and has the highest fertilizer use coefficient. The downstream West zone has the highest water use and the lowest fertilizer use indicators. The analysis revealed a great potential for water saving in the West and South-East agricultural zones of Uzbekistan.

Keywords: Land degradation, soil quality, land use efficiency, sustainable development, Uzbekistan.

1 INTRODUCTION

Soil quality is crucial for agriculture's sustainable development. Indeed, it determines the productivity of agricultural production, which is the basis for food safety and the livelihood of rural people. The continuous decline of soil quality is observed in the irrigated lands of Uzbekistan, where the excessive exploitation of natural ecosystems under agricultural production to follow state orders caused severe environmental degradation.

The policy issues of agricultural and rural development in Uzbekistan, as well as the environmental and soil problems in Central Asia, have been both studied and documented. The most current study on the effects of policy on agricultural development is provided by Lerman (LERMAN, 2008). MIKHALEV et al. (2008) highlight

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land degradation problems among Central Asian countries without a thorough explanation of its causes and effects: soil degradation (loss of fertility, salinization, water-logging), degradation of pastures, degradation of forests, as well as erosion, landslides, and mudflows. Much research, including LAL et al. (2007) on the consequences of agricultural activities on soil quality and other environmental factors focus mainly on the Aral Sea region. No studies on the specific aspects of agri-environmental issues limiting the development of agriculture in separate countries have been discussed. An explanation of soil degradation problems and their impacts on agricultural development within each country will help to understand specific circumstances of soil degradation processes. Therefore, the objectives of this paper are to explore characteristics and changes in land use, agricultural production, soil ecosystems, water availability, and their effects on soil degradation and the limits on sustainable development in various agro-ecological zones of Uzbekistan.

2 DATA SOURCE AND METHODOLOGY

Data on population, land use practices, agricultural production, and soil degradation was collected from the following websites: http://www.isric.org; http://www.fao.org; http://faostat.fao.org; and http://enrin.grida.no/aral/aralsea; http://www.statistics.uz. Data was also collected from official statistics (SCLR, MWAR) and previous studies (SAMOLOYOV et al., 2006; UL HASSAN et al., 2005; GLEICK, 2000; KLOTZLI, 1994; Spoor, 2004; GUADAGNi et al., 2005; LERMAN et al., 2004; WEHRHEIM et al., 2008; CAI et al., 2003).

Five agro-ecological zones with different natural and economic characteristics were determined (UZGI, 2001):

East (Andijan, Ferghana, Namangan): plains and mountain zones with well-drained, good soils, irrigated and some rain-fed.

Central: poorly drained, saline soils, irrigated, low yields.

Central-East (Syrdarya, Tashkent, Djizzak, Samarkand, Bukhara and Navoi): plains and mountain zones with well-drained, good soils, irrigated and some rain-fed; plain zones with poorly drained, saline soils, irrigated.

South-East (Kashkadarya, Surkhandarya): plains and mountain zones with well drained, good soils, rain-fed and irrigated; plain zones with poorly drained, saline soils, irrigated.

West (Khorezm, Karakalpakstan): poorly drained, irrigated, saline soils, low yields.

3 RESULTS AND DISCUSSION

In 1992, 65.2 % of the land in Uzbekistan was used for agriculture and 10.5 % of agricultural land was irrigated. The figure hardly changed from 1992 till 2007 (FAOSTAT, 2009). The sector significantly contributes to the economy of the country. Uzbekistan is the world's fifth largest cotton producer and has become

self-sufficient in grain production in the post-Soviet period. Uzbekistan is pursuing a gradual strategy of partial changes in the area of agrarian reform (SPOOR, 2007). The reforms in agriculture of Uzbekistan are guided by the principle that "private farming" uses natural resources more efficiently, and thus contributes less to environmental degradation. The state fixes the area that farmers may cultivate to produce two strategic crops: cotton and wheat. Cotton is the main export crop, contributing approximately 25 % of foreign exchange revenues, and a significant source of tax revenue. Wheat is considered essential to achieve food security, and it also offers an easy rotation with cotton, although cotton/wheat is not necessarily the best rotation for maintaining soil fertility. The analysis of land use changes showed that despite an announced withdrawal from cotton monoculture policy, that crop nevertheless makes up the largest portion of cropland (Table 1). The share of cropland under cotton slightly decreased in the East and Central-East zones, while the area under wheat cultivation has shown an increase in all zones. The yield of cotton in the East zone decreased to 0.4 ton per hectare. In other zones, yield per hectare increased for both crops.

Table 1: Arable land use dynamics

Region	Crops	Arable land (%)			Yield (Mg ha-1)		
		2001	2006	Change	2001	2006	Change
East	cotton	35.4	34.9	-0.5	2.9	2.5	-0.4
	wheat	27.3	28.0	0.6	4.3	5.3	1.0
Central-East	cotton	34.3	33.4	-0.9	2.1	2.6	0.5
	wheat	28.0	28.9	0.9	2.9	4.5	1.6
South-East	cotton	34.3	34.6	0.4	2.3	2.7	0.3
	wheat	26.9	28.6	1.7	2.7	4.9	2.2
West	cotton	22.6	25.8	3.2	2.0	2.2	0.2
	wheat	7.5	10.8	3.4	2.2	3.9	1.7

Source: MAWR, 2007.

The country's agriculture is based on artificial irrigation, the systems of which are widely developed in Uzbekistan. Irrigation is of the surface flow type, including about 63.9 % of furrow irrigation, 31.6 % strip and 4.5 % of basin irrigation. Sprinkling is not used. Drip irrigation is on a stage of minor pilot projects. The following table shows water consumption by main cash crops.

Table 2: Irrigation and water consumption

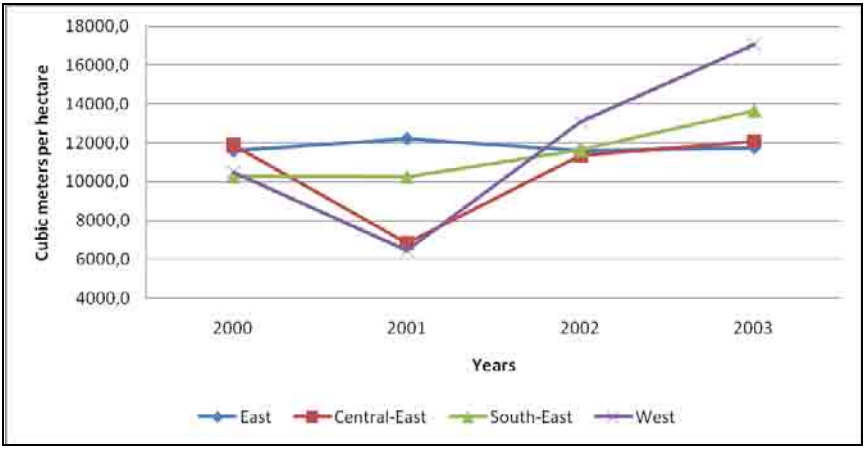
Regions	Water use, m3/mg, cotton	Water use, coefficient*, cotton	Water use, m3/mg, wheat	Water use, coefficient*, wheat
East	4240	0.83	1970	0.65
Central-East	4720	0.92	3040	1.01
South-East	4330	0.84	2970	0.98
West	7970	1.55	4420	1.47

Source: MAWR, 2004.

Note: * 1=country average.

Table 2 shows that water use between two crops and across zones vary considerably. The East zone has the lowest water use coefficient, with 0.83 and 0.65 scales for both crops. The farmers from the West zone used 1.55 times more water to produce 1 ton of cotton than the country average, and 1.47 times more for wheat. This is explained by the availability of water for irrigation purposes. The West zone is located in the downstream of two main rivers, the Amudarya and Syrdarya.

Figure 1: Temporal changes in irrigation water use, m3/ha



Source: MAWR, 2004; MAWR, 2007.

Figure 1 shows that the East and South-East zones have sustainable water availability and consumption patterns: the standard deviation of the mean of per hectare water use from 2000-2003 is equal to 292 m³ in the East zone, 2494 m³ in the Central East zone, 1610 m³ in the South-East zone, and 4457 m³ in the West zone.

Despite the benefits of irrigation, which include increasing agricultural productivity and improving rural welfare, flood irrigation has negative impacts. In addition to high water use and low efficiency, the environmental problems are subject for concern. These include excessive water-logging, soil salinization, water depletion and water quality degradation. Yield reductions of 20-30 % for cotton have been observed at medium salinity levels in the irrigated soils.

The second factor contributing to land degradation is unsustainable fertilizer use practices. Table 3 shows differences in fertilizer application in agricultural regions of Uzbekistan. Analysis showed the variation between regions in fertilizer application is not as disperse as the water consumption coefficient.

Table 3: Fertilizer use across regions of Uzbekistan (1996-2004 mean)

Region	Fertilizers consumption, '000 ton				Fertilizers consumption, t/ha			Fertilizer application coefficient		
	Total	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
East	173.6	136.1	34.3	3.2	0.150	0.038	0.004	1.16	1.46	0.98
Central-East	276.2	223.5	46.2	6.5	0.127	0.026	0.004	0.99	1.02	1.03
South-East	121.3	100.5	18.0	2.8	0.121	0.022	0.003	0.94	0.84	0.94
West	104.6	90.8	12.1	1.7	0.117	0.016	0.002	0.91	0.60	0.61
Uzbekistan	677	551	110.6	15.4	0.129	0.026	0.004	1.00	1.00	1.00

Sources: Authors estimation based on ERGASHEV, 1999. UNDP, 2009.

The East zone agricultural sector heavily uses nitrogen and phosphorus fertilizers compared to other regions. On average, 0.2 tons of mineral fertilizers are used, with a 1.16 coefficient for nitrogen and a 1.46 for phosphorus. The West zone has the lowest fertilizer application. The average fertilizer application ratio between the West and East zones is 2/3.

The soils in agricultural lands are classified by the State Committee on land resources, geodesy, cartography and state cadastre. A land productivity classification system, termed the Bonitet, is used by land resource managers and Government Officials to classify land into classes based on their potential productivity. The average value of the Bonitet for Uzbekistan is 53 (MAWR, 2004; MAWR, 2007). Soils with a Bonitet range of 41-60 are regarded as average. By stratifying Bonitet values into classes, a semi-quantitative evaluation of the soil resources is achieved.

Only 25.3 % of the land is classified as "good" and of a "high" fertility (Table 4). Compared to the beginning of 1960s, the land class of irrigated soils dropped all over Uzbekistan by 10 units (UNDP, 2008) and 5 units compared to 1991. The highest decrease of soil quality was observed in the East and Central East zones. The condition of irrigated lands in Uzbekistan is in most cases classified as "medium" or "low", and in two regions – Khorezm and Karakalpakstan – as the "lowest".

Table 4: Soil quality distribution in Uzbekistan, 2003, %

Soil class	I (0-10)	II (11-20)	III (21-30)	IV (31-40)	V (41-50)	VI (51-60)	VII (61-70)	VIII (71-80)	IX (81-90)	X (91-100)	Unrated	Total, '000 ha	Average land grade,	Average land grade, change
East	0.0	0.3	4.1	18.1	18.9	18.6	19.9	13.8	3.9	0.2	2.1	755.7	64	57	-7
Central-East	0.0	0.3	2.3	14.3	29.8	20.0	18.7	9.2	2.5	0.0	2.9	1520.8	60	54	-6
South-East	0.0	0.3	1.2	16.4	34.1	20.5	13.8	8.3	3.7	0.0	1.7	724.2	59	54	-5
West	0.0	0.3	6.5	38.6	16.7	13.3	10.7	3.6	0.6	0.1	9.6	697.6	47	45	-2
Uzbekistan	0.0	0.3	3.2	20.1	26.0	18.5	16.5	8.9	2.7	0.1	3.8	3698.3	58	53	-5

Source: MAWR, 2004; MAWR, 2007.

The humus in the soil, which is the basis of its fertility, has decreased by 30-40 % in the last 50 years. A continuation of excess irrigation has led to a loss of organic matter and thus to decreasing soil fertility. The soils with humus content of ≤1 % equals 65.4 % of all irrigated lands. Only 28.1 % of irrigated lands have between 1-3 % of humus. Thus, most of the soils in irrigated lands have a humus content lower than the average humus content (3 %) ascertained for the characteristic soil type under agricultural use in Europe.

The Bonitet system was developed for cotton monoculture during the Soviet period (UL HASSAN et al., 2005). Analysis of correlation coefficients shows a strong relationship between average land Bonitet grades and cotton yields, while wheat yield has a weak correlation with no significance. There are significant negative correlation land quality indicators with water use coefficient and a positive correlation with the fertilizer use indicator.

Table 5: Correlation between Bonitet land grade and land use indicators

	Bonitet grade	Cotton yield, t/ha	Wheat yield, t/ha	Water use coefficient of cotton	Water use coefficient of wheat	Fertilizer use average coefficient
East	57	2.63	4.57	0.83	0.65	1.2
Central-East	54	2.43	3.14	0.92	1.01	1.01
South-East	54	2.4	2.17	0.84	0.98	0.91
West	45	2.1	3.94	1.55	1.46	0.71
r	1	.704**	0.242	-.752**	-.772**	.527*
Sig. (2 tailed)	0	0.002	0.349	0.001	0	0.03

Source: Author.

Notes: ** -significant at 0.05 the level.

4 CONCLUSION

The major objectives of agriculture in Uzbekistan are wheat self-sufficiency and sustainable currency flow from cotton exports. Therefore, the current state of agriculture could be called bi-cultural. The area under cotton and wheat cultivation makes up 2/3 of total arable land, and the cotton-wheat rotation does not significantly contribute to soil quality. The obsession with growing cotton impeded the use of crop rotation, which is the basis for soil conservation. Balanced land use would have developed fodder crops and animal husbandry, which produce the organic fertilizers necessary for soil fertility. Instead, large-scale and unbalanced application of mineral fertilizers and pesticides has undermined the natural biological processes and degraded soil quality.

Uzbekistan`s excessive reliance on agriculture results in intensive land use and excessive use of chemicals, which is detrimental to soil quality. This short-term

policy to achieve high productivity levels using chemicals and irrigation contradicts the long-term goal of sustainability. The government procures the bulk of the cotton harvest from producers at the state procurement price, which is calculated every year by subtracting official costs from export revenues. However, due to overstated costs, the price received by farmers typically lies considerably below export parity under market conditions. This represents the main source of tax revenue from agriculture. High taxes in turn imply reduced profitability of cotton production and the need for state orders to ensure that cotton production levels are maintained. Reflecting adverse production incentives, deteriorating land quality consequently results in gradually declining cotton yields.

The infrastructure for irrigation and drainage has been used for more than 30 years without modernization and rehabilitation. Due to operational difficulties, many existing drainage systems are malfunctioning or out of order, and approximately 50 % of the vertical drainage is not used at all. The average efficiency of irrigation practice is 0.66-0.68 over all of Uzbekistan. As a whole, operational efficiency of irrigation systems is 0.58-0.60. The strong correlation between sustainable water availability and water use efficiency is revealed. Zones with low temporal dispersion of available irrigation water show higher efficiency of water consumption. A high variation of water use in downstream regions of the West and Central-East zones is explained by a high sensitivity of agricultural practices to long-term irrigation water availability.

Trends in fertilizer consumption show significant bias to nitrogen fertilizer use. Hence, it increases yields in the short-term at the expense of long-term soil productivity. Cotton monoculture requires the large-scale use of chemical fertilizers and pesticides. Between 20 to 90 kg of pesticides and 300-500 kg of mineral fertilizers per hectare/year were used in the past. Total fertilizer use in Uzbekistan did not change significantly from 1996 to 2004. The share of nitrogen fertilizers used in agriculture increased from 56.2 % to 77.8 %. A decrease in the consumption of phosphorus and potassium was replaced by nitrogen use, which leads to the long-term reduction of overall soil productivity.

Agriculture in the East zone showed sustainable water consumption, and highest average land quality grade. The East zone has the highest fertilizer use coefficient. The downstream West zone has the highest water use and lowest fertilizer use indicators. The analysis revealed the high potential of water saving in the West and South-East zones.

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LAND CONSOLIDATION FOR INCREASING COTTON PRODUCTION IN UZBEKISTAN: ALSO ADEQUAT FOR TRIGGERING RURAL DEVELOPMENT?

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ABSTRACT

After the breakup of the Soviet Union, farm restructuring in Uzbekistan gradually led to the fragmentation of large-scale farms into manifold smaller farms. Yet the existing support infrastructure had been established to serve large-scale producers and did not suit to the smaller farms that comprised multiple scattered plots. As a result, agricultural productivity was disrupted and the stability of national budget revenues from cotton exports was jeopardized. To reverse this trend, the state imposed a land consolidation scheme and re-enlarged the farm sizes. This paper examines the recent state-induced land consolidation process in Uzbekistan, with a focus on the presently experienced constraints for farm innovations and rural development. Khorezm province is used as a case study. Although it was expected that sooner or later farm sizes would be readjusted to fit the design of existing infrastructure, this paper argues that changing the farm sizes in isolation from other reforms will not provide sufficient incentives for creating economically efficient farms. Instead, land consolidation must be supported by a number of additional policies to relax various existing production obstacles, including the extent of the state procurement system, land ownership, water management and auxiliary farm services.

Keywords: Farm restructuring, land consolidation, farm innovations.

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1 INTRODUCTION

During the first years of independence, agricultural production in Uzbekistan, a republic of the former Soviet Union (FSU), was dominated by large-scale collective farms (*kolkhozes*) and state farms (*sovkhozes*). These formed the core of Soviet agricultural production, were largely subsidized and performed at levels and prices determined by state procurement (SP) targets (LERMAN, 2008). The imposed discrepancies between centrally set production targets and actually realizable farm outputs led to continuing losses in agriculture (MÜLLER, 2006). Hence, one of the major changes in reforming the agricultural sector in the aftermath of independence has been, as in many countries of the FSU and Central and Eastern European Countries (CEEC), farm restructuring whereby collective land was distributed to individuals for private farming activities.

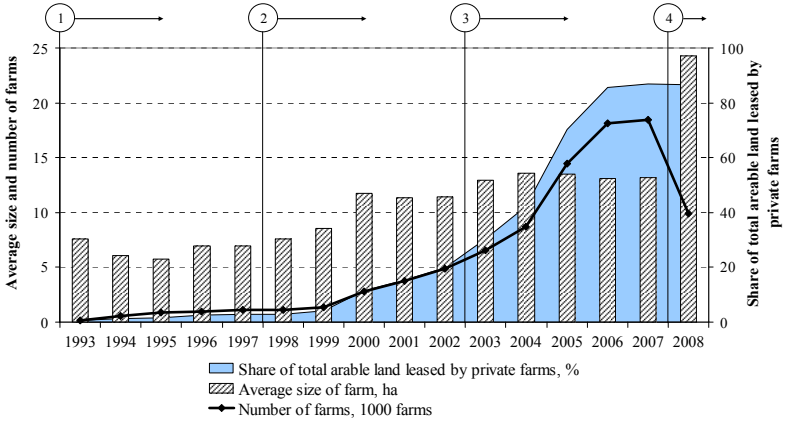
The farm restructuring process in Uzbekistan has been extensively described and compared (see e.g. LERMAN, 2008; VELDWISCH and SPOOR, 2008). However, the conditions have been changing so rapidly and radically that only a continuous analysis can increase the understanding and assess the role of farm restructuring in rural development. This analysis therefore touches upon the most recent process of farm restructuring in Uzbekistan, which started in late 2008. The combined data and information indicate that there are perhaps central obstacles that limit the opportunities for implementing farm innovations and that merely changing the sizes and number of farms will have limited effects for creating economically efficient producers. Therefore, the objective of this paper is to examine the obstacles to implementing farm innovations and development based on detailed evidence of the farm restructuring process in the Khorezm province, in Northwest Uzbekistan. Farm restructuring in Khorezm mirrors the nationwide processes and illustrates on-going processes in many countries of the FSU and CEEC (DIXON et al., 2001).

2 FROM LARGER TO SMALLER FARMS AND VICE VERSA

Following the dissolution of the FSU in 1991, existent farm types and structures in Uzbekistan were modified to increase their market-orientation (LERMAN, 2008). This farm restructuring process can be grouped into four stages, each distinguished by its own speed and the resultant farm sizes (Figure 1). In stage 1, most *sovkhozes* were divided and transformed into self-supported *kolkhozes*, aiming to reduce the government's financial responsibility for on-farm *sovkhoz* operations, and in turn relieving the state budget. Before stage 2, which started

with the adoption of the Law on Private Farms, the number and average size of the private farms were relatively small and hardly contributed to total agricultural output. In stage 2, the *kolkhozes* were converted into agricultural cooperatives (*shirkats*) by issuing and distributing private ownership shares for the *shirkats'* assets among their workers. Concurrently, the state made its first attempt towards an extensive fragmentation of large farms into many smaller farms under individual land lease terms. At the onset of stage 3, the expansion of private farming was intensified and *shirkat* lands were fully transferred to individuals, leading to the creation of manifold smaller farms. From this moment onwards, these farms became the core of agricultural production in Uzbekistan.

Figure 1: Evolution of size and number of private farms in Khorezm

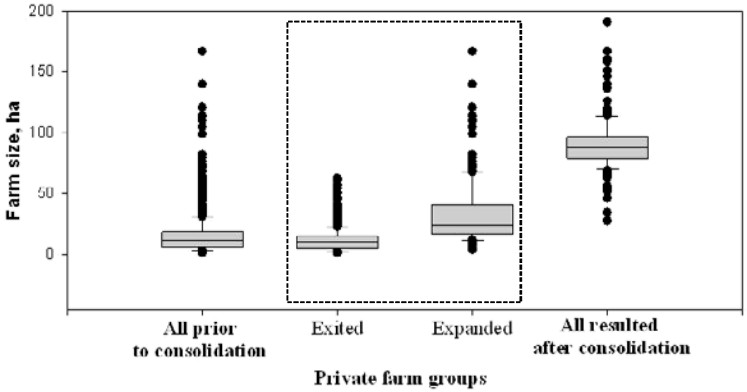


Source: Regional Department of Private Farms in Khorezm, 2009.

In all stages of farm restructuring, the system of SP targets has remained a centrepiece of the national strategy and is strongly linked to budget earnings via implicit taxation of the cotton sector (GUADAGNI et al., 2005). To maintain budget revenues from exporting cotton fibre, the state requires the farms to allocate part of their land to cotton and purchases output at prices below the world market level. Farm restructuring resulted in the creation of manifold farms, each comprised of numerous 2-3 ha plots commonly scattered at a distance from each other. However, the infrastructure, installed during the FSU era to serve *sovkhozes* and *kolkhozes*, was not modified to serve the newly established smaller farms. Consequently, the land "overfragmentation" caused confusion in the functioning of the infrastructure, in particular of

water distribution. The small and scattered plots also generated additional transportation costs e.g. in delivering machinery services. This disrupted the cotton yields and, thus, the stability of the export revenues. Consequently, in 2008, the state triggered a reverse land reform: a land consolidation was imposed to re-adjust farm sizes to suit the existent infrastructure design. In practice, this meant that those cotton producing private farms that were smaller than 30 ha had to return land to the state. The land was then allotted to larger farms, resulting in a greater concentration of production by fewer, but larger farms (Figure 2).

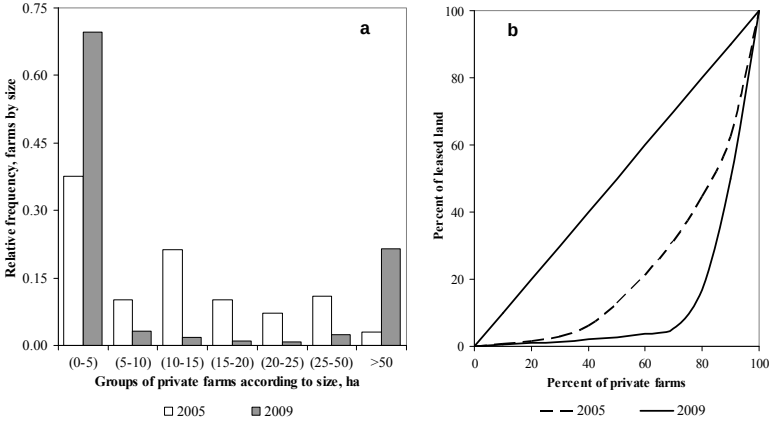
Figure 2: Layout of land consolidation process in Khorezm



Source: Regional Department of Private Farms in Khorezm, 2009.

As a result of the imposed land consolidation, the total number of farms in Khorezm decreased almost twice (Figure 1). Furthermore, farm size distribution became more skewed: the data for 2005 and 2009 show that the consolidation led to a sharp change in farm groups as two groups became dominant: (i) farms with a size of less than five ha (mostly farms specializing in gardening and horticulture), and (ii) farms with an area greater than 50 ha (Figure 3a). Based on developed Lorenz curves (Figure 3b), it can be seen that the land for private farming became distributed unequally. Whilst in 2005, 80 % of the farms leased 45 % of the farmland, after the consolidation in 2008, 20 % of the farms leased 83 % of the farmland.

Figure 3: Distribution of private farms by size in Khorezm



Source: Regional Department of Private Farms in Khorezm, 2009.
Note: Data for 2005 and 2009 cover 81 % and 28 % of farms, respectively.

3 CONSTRAINTS AND OBSTACLES

It is frequently stated that land consolidation was an expected step in the development of farm restructuring in the FSU and CEEC (DIXON et al., 2001) as it can lead to an increased efficiency of agricultural production. However, its success in Uzbekistan are likely to be limited by the organization of agricultural infrastructure in some way inherited from the Soviet regime, and which affects the levels of resilience and vulnerability of the farms as well as their ability to adapt long-term strategies for development.

3.1 Land tenure

A critical obstacle for farm development in Uzbekistan is the absence of ownership of land. Despite the different stages of farm restructuring, the land remained owned by the state, which leases it to the farms for a period up to 50 years. The land lease rights of farmers are limited to non-transferable, usufruct rights, while the sale, mortgage or exchange of land is prohibited (LERMAN, 2008). Furthermore, as the single landowner, the state can withdraw land from a farmer if conditions are assessed as necessary.

The recent land consolidation has increased thus the insecurity of tenancy rights and sent the wrong signals for investment in farm innovations. Thus, farmers

are reluctant to invest in soil quality improvements, e.g. in soil conservation practices, and particularly to commit to long-term investments, e.g. tree windbreaks.

Additionally, the state prohibits land-use change from crop production to gardening or pastures (KAN et al., 2008). Although this is a common practice worldwide, this limits the activities of other farm types in Uzbekistan, including livestock farms, which presently are entitled to insufficient land for fodder production. As cropland cannot be declared as pastures, livestock farms face a notorious lack of feed/pastures and, thus, have to rely on costly feed mixes derived from crop by-products (DJANIBEKOV, 2008). The same applies to the extension of tree plantations and introduction of agroforestry systems in Khorezm despite their manifold benefits for farmers (e.g. LAMERS et al., 2008).

3.2 State procurement targets

After gaining independence, agricultural reforms in Uzbekistan were aimed at maintaining export revenues, especially from cotton fibre (RUDENKO, 2008). These revenues contributed to the accumulation of current accounts and set the ground for achieving energy and food self-sufficiency. Being at the core of the agricultural production system in Uzbekistan, the cotton procurement policy is however another factor limiting the adoption of agricultural innovations by farmers. The present SP policy is a volume/quantity-driven, whereby the state defines and fixes the field size and location where farmers have to cultivate cotton (GUADAGNI et al., 2005). In 2007, cotton occupied 60 % of farms' sown area (VELDWISCH and SPOOR, 2008), and any variance in cotton area can constitute the grounds for losing a land lease (MÜLLER, 2006).

Furthermore, the state-determined price paid to cotton producers lies below export parity (RUDENKO, 2008). In return, the state provides selective benefits for cotton producers in the form of subsidies for main inputs (BOBOJONOV, 2008). To reduce the distortions in farm incentives, the government has narrowed the difference between world market and virtual farm gate prices for cotton fibre by increasing the SP prices. However, concurrently, the input subsidies were reduced, causing significant increases in input prices and, thus, the cotton prices paid to farmers only marginally covered production costs.

To minimize the risks of low cotton yields, the state coordinates farmers' field operations in various ways. Farmers are required to apply fertilizers to their cotton at state-determined levels, which are not necessarily economically optimal (BOBOJONOV, 2008). Additionally, the cotton is prioritized in relation to input supply. For example, irrigation water is diverted to cotton fields before it is delivered for other types of agricultural production. During water scarce seasons,

this compromises the yields of other crops (VELDWISCH and SPOOR, 2008). Farmers have responded to this cotton-prioritizing policy by applying inputs on cotton at lower rates, and diverting the received inputs to crops with higher market values (GUADAGNI et al., 2005), e.g. rice in Khorezm. Being aware of this, the state coordinates the farms' production of commercial crops: e.g. rice production level in Khorezm is regulated via direct measures such as the control of the farms' cropping pattern and indirectly by the timing and amount of access to irrigation water (VELDWISCH and SPOOR, 2008). Additionally, the unauthorized introduction of innovative technologies for cotton production, such as conservation agriculture, may attract state sanctions for violating state-determined production norms. Such coordination of farm management restrains farmers' adoption of new soil improving technologies, such as crop rotation (HORNIDGE et al., 2009).

3.3 Water management

Agricultural production in Uzbekistan largely depends on the irrigation infrastructure, which was originally designed to serve *sovkhozes* and *kolkhozes*. The latter were responsible for covering the operation and maintenance (O&M) costs of their in-farm canals. Following the farm restructuring process, the state policy on O&M has been reconsidered. Water management and O&M of irrigation canals were transferred to water users associations (WUA). However, this was done in a top-down manner without farmers' involvement (VELDWISCH and SPOOR, 2008). The farmers hardly participate in irrigation management by WUA because the irrigation water is controlled by the state, which defines the water distribution strategy of the WUAs. Consequently, the water service fees that WUAs charge are unpopular among farmers and this in turn compromises the capacity of WUAs, which have limited resources, to sustain the conditions of irrigation canals and to supply water adequately to farmers. The modification of the irrigation infrastructure to serve smaller farms requires large investments and thus land consolidation could be an option to improve water management. Nevertheless, following the land consolidation the number of farms remains large, fields are still scattered and the central problem remains to strengthen the capacity of WUAs.

3.4 Extension and advisory support

The lack of efficient agricultural service organizations in rural areas is another factor constraining the economic efficiency of manifold private farms in this region. Uzbekistan has embarked on a transfer of capital-intensive technologies and less on knowledge-based activities. The transfer of knowledge has not yet been introduced at the intensity and scale needed to boost agricultural

production in the private farms. Whereas extension type services are supposed to bridge the gap between the generators and users of agricultural knowledge, this has hardly occurred in Uzbekistan. Because of their top-down origins and mandates to represent the state interests in cotton production, the agricultural support organizations have done little to fill the knowledge gap of farmers (BEKCHANOV et al., 2009). As larger farms will still be mandated to allocate the largest area of their land to cotton, the development of a user-oriented, cost-effective and demand-driven extension delivery system is likely to remain limited. Whereas extension type programs worldwide advocate participatory approaches in order to increase the adoption rate of innovations by farmers, the universal suitability of participatory approaches is questionable in the context of Uzbekistan (CONLIFFE, 2009).

4 SUMMARY AND CONCLUSIONS

It is commonly argued that land concentrated in large farms should be distributed to the rural population to facilitate poverty alleviation (LERMAN, 2008). However, as long as the infrastructure maintains the design established to serve large-scale farms, this setup obstructs gaining economic efficiency of smaller farms. During 2006-2008, it became evident that due to the infrastructure setup, the establishment of a vast number of small farms undermined the stability of cotton export revenues in Uzbekistan. Consequently, the state had to cope with the dilemma of how to promote private farming without expending budget funds to adapt the infrastructure and maintain the state export revenues. In this context, the land consolidation process was applied to increase farm productivity by creating farms with fewer, larger and better-shaped land parcels (DIXON et al., 2001).

Although the economies of scale associated with larger farm sizes in principle have the potential to increase agricultural productivity, changing the farm size alone is not sufficient to provide incentives for adopting farm innovations given the discussed obstacles that offset the gains from land consolidation. Even if relaxing an individual constraining factor results in the improvement of farm production, its effect may be limited by other existing obstacles, which in turn need to be relaxed. For instance, the introduction of land sublease will allow farms to adjust their land size accordingly. More efficient producers will lease additional land from less efficient ones. However, if farms can only quasi-privately select land and input allocation strategies within the production boundaries assigned by the state, lease of extra land will be limited. Similarly, the development of water management will largely depend on the extension of the state coordination of farms' irrigation strategies. Attention needs to be

devoted to modification of the SP approach such that, if the cotton procurement continues, farm profits are sufficient to generate farm investments (e.g. into the improvement of soil quality). However, this paper provides evidence to indicate that the pure abolishment of the SP policy in the Khorezm province very likely will lead to higher demands for water as more farmers will jump towards the most profitable yet water-intensive cropping activity, i.e. rice cultivation, and this may cause serious problems in water-scarce years (DJANIBEKOV, 2008). Therefore, a package of policies needs to be promoted to confront these constraints of farm production and increase the productivity and efficiency of farms.

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