

INTEGRATING LOCAL KNOWLEDGE AND LOCAL INNOVATION WITH DEVELOPMENT
POLICIES FOR A SUSTAINABLE AGRICULTURE
INTEGRAREA CONOȘTERII LOCALE ȘI A INOVĂRII LOCALE ÎN POLITICILE DE
DEZVOLTARE PENTRU O AGRICULTURĂ DURABILĂ

Grigoraș Mircea Adrian

University of Agriculture Sciences and Veterinary Medicine Cluj-Napoca, Cluj-Napoca, Calea Mănăștur 3-5,
magrigoras@yahoo.com

Manuscript received: August 1, 2008; Reviewed: October 1, 2008; Accepted for publication: October 8, 2008

ABSTRACT

This article aims to underline the necessity to integrate local knowledge into the development policies in the field of sustainable agriculture. The basic idea is that we need to apply our local knowledge to the fundamental redesign of our technologies and systems in order to be able to bridge the current gap between research and local economy.

Key words: development policies, local knowledge, local innovation

REZUMAT

Acest articol își propune să sublinieze necesitatea integrării cunoașterii și inovării locale în politicile de dezvoltare pentru o agricultură durabilă. Ideea de bază este aceea că este nevoie de integrarea cunoașterii locale pentru re proiectarea fundamentală a tehnologiilor sau sistemelor, pentru a putea reduce decalajul existent între cercetare și economia locală.

Cuvinte cheie: politici de dezvoltare, cunoaștere locală, inovare locală

DETAILED ABSTRACT

Introdus ca și concept în anii 80, dezvoltarea sustenabilă (sau durabilă) este considerată în prezent strategia de dezvoltare spre care tind statele UE. În centrul acestei strategii este pusă reconcilierea a două aspecte, considerate până nu demult antagonice: dezvoltarea economică care să asigure un standard înalt de viață vis a vis de protecția mediului înconjurător, atât pentru generațiile prezente, cât și pentru generațiile viitoare, care trebuie să aibă aceleași șanse de dezvoltare și împlinire a propriilor aspirații. Există multe modalități în care o dezvoltare economică optimă poate duce la protejarea resurselor de mediu: folosirea unor măsuri de eficiență energetică, tehnici îmbunătățite de management sau integrarea cunoașterii locale și a inovării locale în tehnologiile mai performante, de exemplu.

Lucrarea pornește de la ideea că agricultura reprezintă probabil cea mai mare colecție de practici locale din întreaga lume. Dar în același timp este domeniul în care există cel mai mare timp de latență în adoptarea unor noi tehnologii. În opinia autorului acest lucru se datorează în parte și decalajului inovativ datorat unor fluxuri deficitare de transfer de cunoaștere dinspre cercetare spre economie. Susținem ipoteza că acest decalaj poate fi redus prin înțelegerea mecanismelor structurale și de comportament care stau în spatele său.

Ca și metodă de lucru care să permită înțelegerea mecanismelor care stau la baza decalajului inovațional, am folosit teoria elaborată de Nonaka, Dynamic Theory of Organizational Knowledge Creation, referitoare la fluxurile de cunoaștere și implicațiile acestora asupra inovării. În conformitate cu această teorie, cunoașterea la nivel organizațional este creată printr-un dialog continu între cunoașterea explicită și cea tacită. Articolul conține definiția celor patru tipuri de transfer de cunoaștere (socializare, internalizare, externalizare și combinare).

Cunoașterea mecanismelor de transfer de cunoaștere poate permite integrarea de o manieră eficientă a cunoașterii locale și a inovării locale în politicile de dezvoltare pentru o agricultură durabilă

INTRODUCTION

The concept of sustainability was introduced in the early 80's by Lester Brown, founder of the Worldwatch Institute. He defined a sustainable society as one that is "able to satisfy its needs without diminishing the chances of future generations." [1]. The report of the World Commission of Environment and Development, the so called "Brundtland Report", used after a few years

the same definition to present the notion of sustainable development: "Humankind has the ability to achieve sustainable development - to meet the needs of the present without compromising the ability of future generations to meet their own needs" [2]. The definitions of sustainability are important because they are a reminder of the responsibility to pass on to the future generations a world with as many opportunities as the one we inherited, but also to pass over generation the local knowledge we inherited from our ancestors.

Coming at the end of a turbulent century, and at the dawn of a millennium, the rise of nature into culture is the sign of a new paradigm into the research and development. The quality of the minds the new biology attracts, the rapid growth and excitement it generates, its broad influence as a unifying concept, and its potential for reshaping culture all suggest we are witnessing now a historic transformation [3]

Most societies aspire to achieve economic development to secure rising standards of living, both for themselves and for future generations. They also seek to protect and enhance their environment, now and for their children. Reconciling these two aspirations is at the heart of sustainable development. The debate is often presented in terms of a conflict between economic activity and the environment, as if it is only possible to pursue one at the expense of the other. But this is mistaken: economic activity and the state of the environment both affect the quality of life. Often economic investment and environmental protection go hand in hand. What matters is that decisions throughout society are taken with proper regard to their environmental impact and also to their social and cultural impact [4].

There are also many ways in which the right kind of economic activity can protect or enhance the environment. These include energy efficiency measures, better product design and marketing, waste minimisation, environmentally friendly farming practices, better use of land [5], improved technology and techniques of management, along with the implementation of up to date technologies [6], and, last but not least, integrating local knowledge and local innovation into the development policies.

LOCAL KNOWLEDGE AND LOCAL INNOVATION: POTENTIALS FOR SUSTAINABLE AGRICULTURAL DEVELOPMENT

The largest collection of local practices worldwide is probably in agriculture. A major factor constraining agricultural producers from capitalizing on the modernization of agriculture has been weaknesses of modes of technology transfer. Prior work [7] considered that the innovation gap is a result of structural and

behavioral mechanisms. We support the hypothesis that the innovation gap is in part a function of structure. Only by understanding the structural and behavioral mechanisms behind it the economy will be able to integrate the results of any research program.

As a method of understanding the innovation gap and also of the structural and behavioral mechanisms related to new technology adoption, we will consider the Nonaka Dynamic Theory of Organizational Knowledge Creation related to knowledge flows and its structural implications for innovation, which states that “the ability to manage knowledge and information effectively and efficiently has been central to performance improvement in many industries”. According to [8] organizational level knowledge is created through a continuous dialog between tacit and explicit knowledge. In this framework, it is assumed that new knowledge is created through conversion between tacit and explicit knowledge. Explicit knowledge is defined as knowledge that can be transmitted in formal, systematic language, whereas tacit knowledge refers to knowledge that has a personal quality and therefore difficult to formalize and communicate. Consequently, there are four modes of knowledge conversion between tacit and explicit: socialization (tacit to tacit), internalization (explicit to tacit), externalization (tacit to explicit), and combination (explicit to explicit).

Socialization of knowledge takes place through shared experience. Mentees learn from mentors through a process of observation and repetition. In the new technology adoption process, a team will develop routines and procedures for using the new technology.

Combination of knowledge is a process by which explicit knowledge held by individuals is shared. In the process of sorting, adding, re-categorizing and re-contextualizing, explicit knowledge can lead to new knowledge. In interacting with a new technology tool, the same team would combine knowledge about how best to use the tool during formal or informal meetings. The combined knowledge would lead to new knowledge of better ways to use the new tool.

Internalization of knowledge is analogous to the traditional concept of learning. However, because in this case explicit knowledge is converted to tacit, it is the process or action that enables conversion. In the case of a new technology tool, the act of using the tool enables the internalization of knowledge. In the opposite case, externalization of knowledge refers to the conversion of tacit knowledge to explicit knowledge. Because tacit knowledge is not definable directly in language, metaphors are often used to explain the knowledge concept. With our new technology tool example, the externalization refers to an individual describing to the

team how he or she uses the tool.

In the current research project and transfer to industry based paradigm, knowledge does not flow well between organizations and sometimes within organizations, too. In the case when the knowledge is socialized, externalized, combined and internalized only within an initial group of users, the tacit knowledge required to drive the process of adoption of the new technology or innovation doesn't flow effectively within or between organizations or social groups. In the knowledge conversion process, realizing the benefits of created knowledge rests on externalization and “amplification through dynamic interactions” [8] between all four modes of knowledge conversion.

Another lesson about innovation is that farmers innovate in technologies within the scope of their resources and within a short- to medium-term perspective. Their primary interest is to address their typical biophysical constraints: pests, diseases and weeds, which is why half of their “innovations” are pest-, disease- or weed-control practices. An environment conducive to the evaluation and promotion of local knowledge signals to communities that their contributions are valuable and may induce more innovative creativity.

Agricultural policy should no longer reflect top-down, generalized debates and models. Development needs to start with what people know and build on their knowledge and experiences. With this perspective, the authors of this paper intend to underline the importance local knowledge has to its users, different ways in which they use this knowledge, and the potential that local knowledge has in some areas of agricultural development.

Local innovations are broadly perceived as constituting a major under-utilized potential for development and rural poverty reduction, and rural development policies should sustain this potential more effectively. Local innovators continue to experiment and generated knowledge within a broad spectrum of areas, including:

- improved mechanical tools for agriculture,
- natural resource management,
- medicinal and agricultural practices and
- innovative ways of organizing and doing business.

The significance of local innovators as a source of knowledge and well-adapted solutions is high among the poorer sections of rural society, many of whom cannot afford, nor have access to, relevant advisory services.

There is a growing recognition that a wide range of different actors and organizations is required to stimulate widespread local technological development. New products and processes are brought into local economic and social use through networks of organizations, often referred to as the innovation system. The key challenge

is perceived not in terms of devising new technologies, i.e. doing different things, but of bringing about changes in how the innovation system works, i.e. doing things differently [9]. Once one accepts that rural people have potential answers to rural problems, then it becomes logical to seek out and stimulate the local innovative processes that are inherent in local communities.

In this, one important role for innovators is to import technologies from outside system boundaries, often with a new role for outsiders as catalysts and facilitators [10]. It is commonly agreed that a well-functioning national innovation system is a system in which not only the actors (fig.1), but also the links between them, perform well. An innovation system can be defined as “a network of organizations within an economic system that are directly involved in the creation, diffusion and use of scientific and technological knowledge, as well as the organizations responsible for the coordination and support of these processes” [11].

The novel aspect of the concept of innovation systems is that it emphasizes the importance of linkages and their complexity, leading to a focus on multiple feedback loops instead of linear flows of information [12]. Innovation becomes an interactive process between many actors, and individual organizations rarely possess all the knowledge necessary for the whole process of innovation.

As a result, local innovation systems draw on a combination of scientific, operational and local practical knowledge from different sources.

In the context of industrialized countries, innovation is sometimes defined with the implicit understanding that it takes place mainly in the private sector or public research, where companies and universities “innovate”, i.e. use a new process or introduce a new product or service in the market. More often, though, and fortunately, innovation is perceived as taking place within a system of actors, public and private organizations. Within a company or organization, innovations may be of different types – incremental or dramatic – and they may result from a conscious effort or not, that is, be explicit or implicit. Thus, innovation activities may be strategically or tactically guided and formalized, or else they just happen informally, as result of day-to-day operations.

THE NEED FOR SUPPORTING LOCAL INNOVATIONS

At the turn of the new millennium, donor programs, research institutions and NGOs worldwide started to support local knowledge and local innovation. From a donor point of view, the “business case” for using local knowledge rested on the premise that understanding local contexts would permit better adaptations of global knowledge, and using local knowledge sources

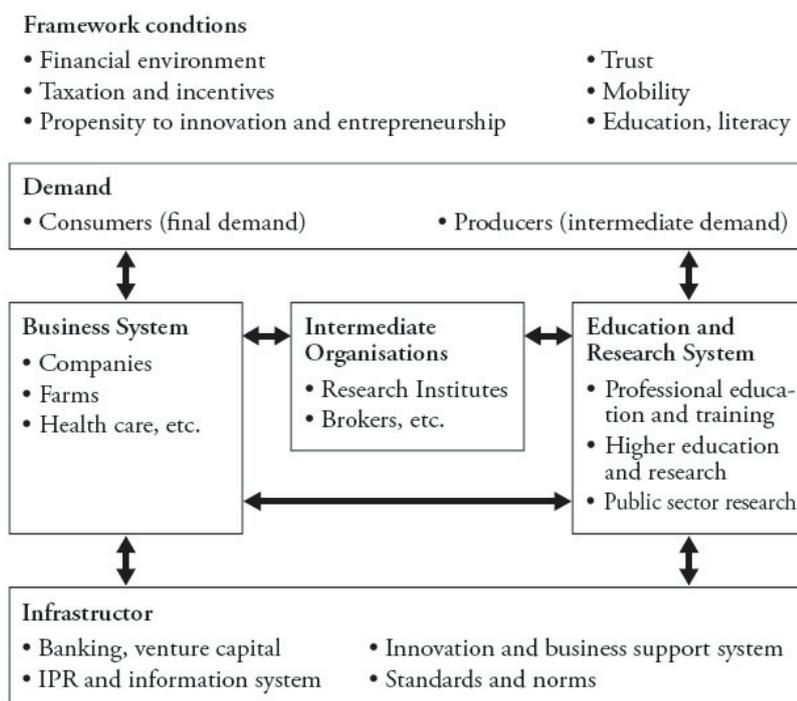


Fig.1 An Innovation system model [11]

Fig.1 Modelul unui sistem inovativ

would increase ownership, and improve results and sustainability. Building on locally embedded knowledge systems will help the empowerment of communities and foster a sense of equity vis-à-vis external agencies.

2004 the World Bank formulated a six-point agenda (The Indigenous Knowledge for Development Program), including targeted interventions to enhance the capacities of local communities to develop, share and apply their indigenous (local) knowledge; to develop innovative protocols for the validation and protection of local knowledge; to establish an “innovation fund to promote successful local knowledge practices”; and to organize a global local knowledge conference to promote this agenda [13].

Rural people are observing, adapting, experimenting and innovating as part of their daily work and in response to changing economic and social situations. Throughout history, local communities and individuals have developed technological and institutional solutions that satisfy their socio-economic needs and conditions of production. Local innovators have played a crucial role in the evolution of knowledge and practice. Dynamic local communities are characterized by an interaction between innovators and users or adaptors of technologies through a series of learning cycles.

Industrialization and the spread of science-based agriculture significantly reduced the importance of local innovators for social welfare and economic growth in rural areas. Over the past three to four decades, many traditional crafts and skills have been replaced by industrially produced machines, tools and means of production (e.g. fertilizers and pesticides replacing local landraces and biological pest management). State institutions may have contributed sometimes to diminishing the respect for local innovators (and local knowledge) through the promotion of ‘modern’ farming practices.

However, in spite of their reduced importance and status in the eyes of the state, local innovators have continued to experiment and generate knowledge within a broad spectrum of innovations, ranging from the mechanical to the institutional.

The relevance of local innovators as a source of knowledge and well-adapted solutions is high, particularly among the poorer sections of rural society, many of whom cannot afford to use external inputs.

One approach to providing a wider understanding of the institutional environment for innovation could be to create Learning Alliances, seen as:

- Groups of individuals or organizations with a mutual interest in solving an underlying problem and scaling-up solutions.

- Groups that bring together a wide range of partners with capabilities in implementation, regulation, policy & legislation, research & learning, documentation & dissemination etc.

- Represent part of the bigger whole, and thus capture some of the organizational complexity - warts and all - that constitutes the day-to-day realities of the innovation system.

- Comprise partners who are typically clustered at different ‘administrative’ (e.g. national, regional, district) levels – stakeholder platforms – within the innovation system.

- Aim to identify and breakdown the barriers that constrain learning, both across platforms (i.e. horizontally) and between platforms (i.e. vertically).

- Promote flexible and adaptive working practices, and share responsibilities, costs and benefits.

Innovation can be seen as an important component in development strategies for rural communities in a globalizing world. We need to apply our knowledge to the fundamental redesign of our technologies in order to be able to bridge the current gap between research and economy, as well as between human design and the sustainable systems of nature.

CONCLUSIONS

The paper had as a starting point many observed examples of agricultural practices in which resource-poor agrarian householders have used their local knowledge, as well as innovations, to overcome many of the socioeconomic, political and environmental constraints they experience. This is done by highlighting the importance of local knowledge for sustainable agricultural development.

Today, competition for resources is increasing, and local adaptation is not able to keep pace with the resulting challenges. New knowledge is urgently needed to enable small-scale farmers to participate successfully and sustainably in the economy. However, scientific research results produced by on-station research do not always meet small-scale farmers’ requirements for the complex environments in which they live and produce.

These challenges also pose new questions related to processes of agricultural innovation. How can the gap between research methodologies and farmers’ realities be narrowed? Is it possible to orient researchers or organizations towards the realities farmers are faced with? Can new modes of interaction between different knowledge systems such as local knowledge and scientific knowledge lead to more relevant research? What contribution can this interaction make to generating new understandings of sustainable agriculture? Can farmers’

own networks or social groups play a role in validating innovations for a specific location?

Finding that local innovation is inseparably associated with local knowledge, challenges for agricultural research and policy must take care of the following aspects:

- The micro-level relevancy of local knowledge means that policy development can no longer be based on generalized debates and models. Good policies which recognize farmer and agro-ecological diversity and support local knowledge will go a long way to bridging gaps in conventional scientific research.
- The notion of ‘universal truths’ needs to change. Science may have a lot to offer if it starts focusing at the local or micro level.
- Not all local knowledge and innovation practices are necessarily good. Knowledge may have eroded, or circumstances may have changed meaning that these practices now have a negative impact rather than a beneficial one.
- The implementation of a Local Knowledge Systems Policy must take note of the dynamics of local knowledge, its ability to contribute positively to development, and the ability of users to continually improve and innovate upon this knowledge.

Local innovations constitute a major but still under-utilized potential for sustainable rural and agricultural development. Policies should support the use of this potential more effectively. This global momentum can be seen as part of a wider search for more cost-effective ways of supporting sustainable growth. Support for the generation and use of local innovations can play an important role in rural sustainable development, through encouraging and promoting local innovators, establishing local innovative cultures and promoting the spread of local innovations.

BIBLIOGRAPHY

- [1] Brown, L.T., Building a Sustainable Society, W.W. Norton & Co, Ltd. Publishing House, US, 1982.
- [2] United Nations. [Report of the World Commission on Environment and Development](#) Our Common Future, General Assembly Resolution 42/187, 11 December 1987.
- [3] Frenay, R., Pulse: How Nature Is Inspiring the Technology of the 21st Century, Little-Brown, New York ISBN-13: 978-0316640510, 2006.
- [4] Cernea, M. M., [A. H. Kassam](#), Researching the Culture in Agri-Culture: Social Research for International Agricultural Development, CABI Publishing, Oxford Press, 2006.
- [5] Raman, S., Agricultural Sustainability: Principles, Processes, and Prospects, Haworth Press Inc., U.S., 2006.
- [6] Mircea Adrian GRIGORAS, Agatha POPESCU, Emilian MERCE, et al., Scada System - Tool And Partner For Sustainable Agriculture Development, The 6th International Symposium Prospects for 3rd Millennium Agriculture, 04-06.10.2007, USAMV Cluj-Napoca,
- [7] Mircea Adrian GRIGORAS, Agatha POPESCU, Cosmin HOLEAB, Veronica CHEDEA et al., Bridging the innovation gap and the management of interdisciplinary project for sustainable development”, XXXVII Annual Meeting of European Society for New Methods in Agricultural Research, ESNA, 10-14.09.2007, Dubna, Russia
- [8] Nonaka, I, A Dynamic Theory of Organizational Knowledge Creation, Organization Science, 1:5, pp.14-57, 1994
- [9] Phila 2005. Post-Harvest Innovation Learning Alliance. (<http://www.nri.org/PHILA>)
- [10] Critchley, Will (ed.), Promoting Farmer Innovation: Harnessing Local Environmental Knowledge, RELMA Workshop, 1999.
- [11] Dantas, E., The system of innovation approach, and its relevance to developing countries, Science and Development Network, April 2005.
- [12] Adolph, B., What are innovation systems? Natural Resource Institute, Vol. 15, No. 2, pp. 175-185, 2005.
- [13] Gorjestani, N, in WB 2004; pp.45-53.