

INNOVATION AND RESEARCH IN AGRICULTURE-THE MAIN COMPONENTS FOR A SUSTAINABLE FOOD SECURITY DEVELOPMENT

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Abstract

In present days and for future generations, the responsibility to protect “life” has become crucial. A sustainable development of standards for generating welfare has to cover our needs for food security, which is a top priority for the worldwide population. Therefore, one of the biggest challenges is the discovery of a new way to change and improve food productivity, meaning “to innovate”. Innovation is the main component of a sustainable development that produces food and nutrition security. The concept of innovation is translated in institutional, technological and social improvements for the agriculture system, as well as the interaction between people and institutions, responsible for demanding, supplying and disseminating knowledge, which is a valuable asset for crop yields and to reduce poverty in developing countries. Research and development activities stand at the bottom of a sustainable agriculture system to overcome the lack of competitiveness and the deficiencies in the food market profitability. Innovation in rural farming and its core products, such as grains, the principle resources of food security, will remain a primary engagement to exceed insecurity.

Keywords

innovation, knowledge transfer, sustainable development, food security.

1. Introduction

Starting with Copenhagen paradigm, national security has evolved on several dimensions, including food safety and covers both the state and the individual, as main subjects (OECD, 2005). Food security dimension has changed over the past decades, because another factor put pressure over the human kind welfare. Nowadays, people have to confront “extreme poverty”, the main characteristic of food and nutrition insecurity. As the economist Paul Collier defines the poorest fifty countries in the Middle East and Asia as “the billion bottom”, we all should be aware that from a number of three billion people that live in economic and social inequalities, about one billion are still suffering of starvation.

Therefore, there is a worldwide need to reduce the poverty and to develop new ideas for a sustainable agriculture sector. Feeding the population is a top priority, but the process is difficult as the world has to face challenges as poor food production and crop land, inadequate infrastructure, climatic changes and low incomes that all generate unsustainable development of agriculture.

Countries from Europe and Romania as well try to implement better policies to reach the standards of competitiveness, efficient technical equipment and specialized staff, which are included in the process of innovation. Because the principal goal is to eradicate hunger, the innovation will focus on rural development and knowledge transfer among young farmers. Good education and training create professionals that will improve the rural agriculture.

Thereby, the small and medium enterprises and family farms projects are among the first priorities in rural development.

But those targets can be transformed in policies only by the governments and authorized institutions in coordination with private and public stakeholders, that allocate financial and human resources to innovate the research and development agenda. In addition, if science is understood as a practical tool, the economic, environment and social benefits will change the status of a vulnerable population.

Innovation does not mean to erase a system from the bottom, but to make it better by changing and improving its mechanisms, coming up with new practical ideas. "Oslo manual" which comprises more targets of innovation as a guideline, based on a OECD survey of member and non-member countries, defines four types of innovation:

- **Product innovation:** improvements in goods and services, regarding to their components, functions and technical characteristics;
- **Process innovation:** includes new methods of goods and services production and delivery;
- **Marketing innovation:** changes in products labels, packaging, advertising and pricing;
- **Organizational innovation:** refers to changes that occur in an organization's structure and in the relationship with other partners.

All these types of innovation should support five different goals:

- Creation of new products for a sustainable food chain;
- Diversification of food production methods;
- Demand new food markets;
- Demand offers for raw materials and inputs;
- Investments in new market structures in a particular industry.

2. Future goals in food security for next decades. Challenges for the Romanian food sector

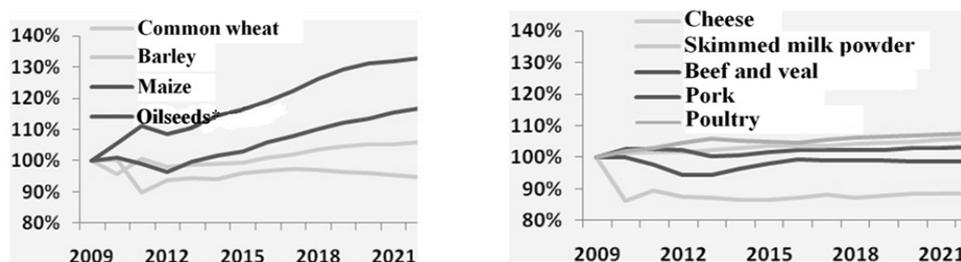
One of the biggest challenges in agriculture and food security is "innovation process", which represents an increase in food production to supply the need of a population, to enhance easier food access and to provide a more competitive and sustainable system. Therefore, the necessary tool for this is the "innovative financing" (Bazga, Manole, 2011), which involves a major cooperation between private and public sector, taking into account a couple of risks such as climatic changes, greenhouse gas emissions and a wide energy consumption that reduce the livestock and crop production.

There are two funding mechanisms: the resources (including taxes, voluntary contribution) and the use (egg. creation of mechanisms). The investments are made so "as fertilizers to increase food production, because the growing population threatens the food security worldwide, to enhance crop land extension and conservation of biodiversity, that ensure a sustainable environment" (CBD, 2015).

Countries from Europe, including Western Balkans, which have begun the negotiations to integrate in the EU and where most of the people are employed in agriculture field, because of lower land price and quality resources, gather their forces to rich the EU "Common Agriculture Policy" standards. Its reforms "should increase countries competitiveness, both in agriculture and forestry, develop the rural environment and better living standards, and improve the management of the economic activity" (EC, 2014).

European countries should increase the production of basic food to respond to increasing people consumption by 2020, shown in the fig.1.

Romania, which is nearby and an EU member state, has to face the same problems and the agriculture system does not make this country an independent one, in terms of competitiveness. The food production is still low, the infrastructure is inappropriate and the business sector still struggle to cooperate with farmers in rural areas. Although Romania is a rich country, being on the 6th place in Europe in terms of arable area with high cereals production, its agricultural potential need to be improved to launch it on the global food market and to create a modern food system, to overcome self-insurance levels of domestic consumption.



Source: European Commission. Note: *Seeds of rapeseed, soy, sunflower, cottonseed and peanut.

Fig. 1 Plant and animal consumption in the EU - projections to 2022 (2009 =100%)

According to the “Romanian Strategy for Research-Development-Innovation in Agriculture on medium-long term, 2014-2020/2020-2030” (MADR, 2014), and the innovation is based on seven specific purposes:

1. Ensuring appropriate production of food and agricultural commodities;
2. Maximizing flow stability of supply of agricultural products;
3. Ensuring access to available agricultural resources, to basic foods needed for human health;
4. The transition from net importer of food products to exporter by actual production;
5. Use all of its agricultural potential;
6. Finding forms of "special" support for reintegration on circuit of about 4 million hectares of agricultural land fallow per year;
7. Development of research and innovation system and implementation of the results on the latest technologies (free available technologies through projects with full support, coordinated and prepared by the Department of Coordination of Nuclear Activities for Agriculture, Division FAO - IAEA, based in Vienna).

An increase of the economic potential by innovating should lead not only to development of the production factors (labor force, capital and resources) and to lower costs, but to a better quality of products and price flexibility.

Romania has the potential to feed more than 40 million inhabitants, but its agriculture potential is not fully exploited, because the country suffers from a trade deficit, being unable to balance the trade balance for its benefit. Its territory enjoys favorable pedo-climatic conditions that allow Romania to be a major agriculture producer of commodities, as the table below shows:

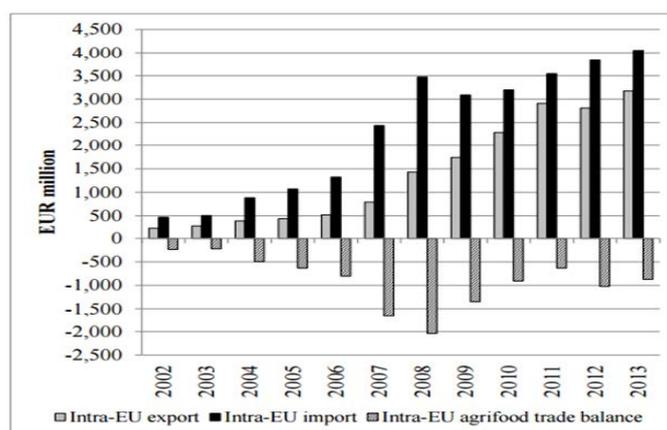
Table 1 Vegetables production in Romania, 2010-2013

Source: National Institute of Statistics, Yearbook 2014.

Major crops	2010	2011	2012	2013
Grains	16713	20842	12824	20940
Wheat	5812	7132	5298	7296
Rye	34	31	18	24
Barley	1311	1330	986	1542
Potatoes	3284	4077	2465	3290
Sugar Beet	838	661	720	1029
Oilseeds, from which:	2378	2687	1668	3057
Sunflower	1263	1789	1398	2196
Vegetables ¹	3864	4176	3535	3961
Fruits ²	1420	1480	1129	1280
Grappes ²	740	880	746	992

1,2 including family farms.

The major trade partners for Romania are Italy, Hungary, Bulgaria, Netherlands and Germany which imports large quantities of agri-food products, such as wheat and corns, oilseeds, sunflower oil, rapeseeds and live animals such as sheep's and bovines. Yet, the imports from countries as Brazil, Poland, Spain, France and Germany in Romania exceed the exports, because fertilizers use is less than 70 kg/ha compared to an average of 200-500 kg/ha in Europe and Romania has a negative food products balance.



Source: ITC/ UNCTAD/WTO Trademap, National Institute of Statistics of Romania and Romania Trade and Invest

Fig. 2 Romanian agri-food trade balance, 2002-2013

Romanian “*Strategy on Research, Development and Innovation*” provides specific tools to access European funds through EAFRD projects, World Bank support, “The Seventh Framework Programme for Research and Technological Development” and structural funds (MECRMA, 2012), for research in livestock, fruit and cereals production, forestry and fishery. If environmental issues are a global threat emerged within the European Union, risks related to aging and migration from rural to urban areas are growing. Both risks involve a fall

in agriculture employment and limiting the expansion of food markets, these challenges being also valid for Romania. Thus, by 2050, according to the Strategy for the development of the agri-food sector in the medium and long term, "Romania will have a share of about 40% of the population 65 years of age." (MADR, 2014) Very interesting is the study of Traian Rotariu, namely "Demography and Sociology of the population – demographic phenomena" (Rotariu, 2003), which indicates that only 10% of people from rural areas have higher education, so that investment can help to increase the quality and quantity of human resources. In this context, measures are needed to prepare young people in the agricultural sector and rural areas that can save Romania's agricultural potential.

Beyond the human factor, fundamental characteristics that transform Romania into a typical agrarian country, whose main component is arable farming are extensive arable lands, high employment and the majority of the rural regions, covering 87.1% of the total area of the country (INS, 2012). Romania must invest at least 1.5% from GDP in innovation, because it brings sustainable investments with high added value and an increase in economic competitiveness in agriculture, forestry and rural areas in general, on medium and long term. However, it is far from reaching the EU standards of 2% from GDP (consist of public and private investments), that is why Romania had made very limited progress.

For each country worldwide the progress is met only when people are involved in. FAO, the largest organization of agriculture, "is promoting good practices to stimulate the agri-food production, soil and biodiversity conservation by making a call that sustainable investments lead to food security" (OECD, 2009).

Innovation should be encouraged at the national and international level, by encouragement of entrepreneurship and development of intellectual property. Therefore, for next decades, the steps will be the constant evaluation of research performance for all public actors, universities and experts in agriculture and investments in human resources and technical support.

Conclusions

Labour force, the environment and the capital are the main factors of production, but the worst enemies as well, because in the absence of their cooperation, the system itself collapses. Innovation takes shape after policy-making process become functional in a certain area, according with a careful monitoring of the agriculture system to avoid the shocks of inefficient mechanisms to develop the domestic and international food market, to ensure not only the nutrition need of the population, but their health and welfare stability.

Many poor countries from Asia and Middle East have land resources, but are still not rich. They have chances to turn into exporters only when domestic trade is valuable. It does not matter the degree of internal wealth, as long as those countries do not have markets nearby to compete with their products, leading to a decrease in state budget and economic insecurity. Food insecurity associated with lack of innovation should be the biggest concern for the Governments, that stands at the bottom of development of agriculture and risk management system for 2020-2050 period.

Romania as other countries from Europe needs to develop the agriculture sector, providing socio-economic and human research, to adapt the education system, the labour force and the transfer centres of research results, creating European technological platforms and implement models at national level. Increasing the recovery of agricultural potential for Romania to maintain high levels of export, but at the same time becoming a provider of security for its own citizens by increasing domestic consumption requires a systemic approach, thus focused on those areas showing a high degree of vulnerability, such as rural areas. Hence, firstly, Romania should increase its degree of effectiveness building a modern and efficient

agricultural system that is necessary, and secondly to become effective in finding the proper way to support and maintain the so created system for ensuring food security.

More specific, every area should cooperate in creating national and local strategies, according with their particular characteristics to ensure enough food and water resources to satisfy producers and consumers needs and finally, to become an attractive and independent food market.

Innovation is more than a process, because its purpose is to apply the best solutions to meet new requirements, develop new products and markets, without harming the environment with a careful attention for soil conservation, which is a non-renewable resource, transforming the agriculture sector and enhancing food security worldwide for a sustainable development.

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