

HUMAN CAPITAL AND SUSTAINABILITY OF RURAL DEVELOPMENT

Milan Milanović¹, Milutin Đorović², Simo Stevanović²

Abstract

The strategies and policies of agricultural and rural development, within the overall long-term area development, traditionally lean on natural-resource capital and certain differential-rent advantages. New dimensions of the agricultural and rural multi-functionality of areas in the zones of large industrial and urban agglomerations and the inevitable processes of degradation of natural capital, stress the role of science in the process of sustaining the level of overall production potential. This presumes a certain degree of substitution of natural capital with human, primarily intellectual capital. This is the basis for considering the creating possibilities and transfer methods for new scientific knowledge, in the function of reaching a strategic developmental goal – long-term sustainability of the agricultural and rural development of a certain agro-ecological or economic-geographical region.

Key words: resources, capital substitution, role of science, sustainability of development

1. Introduction

The valuation of natural and manmade values and conditions in rural areas, in the production and market context, should be based on the significant agricultural and rural potentials and **developmental advantages** of certain areas. These advantages can be identified in three forms: (1) **natural capital advantages** – diversity and abundance of agro-ecological, ecosystem and rural production

¹ Milan R. Milanović, Ph.D., Scientific advisor, Megatrend University, Belgrade, Serbia, E-mail: milanrmilanovic@yahoo.com, Phone: ++381 63 302 951

² Milutin Đorović, Ph.D., Simo Stevanović, Ph.D., Faculty of Agriculture, Belgrade University, e-mail: djormi@agrif.bg.ac.rs, simo.stevanovic@agrif.bg.ac.rs

potentials and overall natural heritage as an economic resource; (2) **market differential-rent advantages** – proximity of large sales centers, or availability of physical and financing capital (growing purchasing power, developed and growing market infrastructure, retailers, wholesalers, public warehouses, banks etc.); and (3) **human capital advantages** – favorable conditions for creating and reproducing human capital in agriculture (human and intellectual), or acquired knowledge and production experience, as well as the scientific, technical and overall cultural potential that a certain area has at its disposal. In this the network of institutions in the field of agro-economical and biotechnological sciences (secondary school, college and university levels of education, research and scientific implementation) is of determining importance.

The identified developmental advantages of rural areas indicate the necessity of defining the determination to, primarily with (a) long-term sustainability of agricultural and rural development, and (b) production and structural, as well as socio-demographic revitalization of rural zones, (v) secure a better balanced agricultural and rural, and especially demographic development, i.e. (g) a more even / balanced and demetropolized development of urban, suburban and rural areas, as a **strategic developmental goal**.

Apart from the customary structure of the market demand for agricultural produce-foodstuffs, the increase of a specific form of business-tourism demand can be expected, continuously throughout the year, and particularly during large international business, political, sports and cultural conventions. Such demand must have its appropriate match in agritourism supply. A specific component of (e) development of the agritourism supply would be not just the diverse, high-quality and secure offer of authentic agricultural produce, but also creating the opportunity for the promotion of traditional values, cultural and historical content and events in authentic rural areas, ecological zones and protected natural values.

2. Science and Profession as the Basis of Human Capital

In the context of the goal of long-term sustainability of agricultural and rural development, and the inevitable degradation processes of natural capital, particularly agricultural land, science, profession and education, as the basis of creating and reproducing human capital, will both absolutely and relatively increase in significance. Agricultural land is rapidly decreasing in favor of the swift regulated or unregulated spreading of urban development land, construction of settlements, for the requirements of industry, utilities, road and other infrastructures.

As is known both in economic theory and in contemporary practice, if the total capital, as production potential, is provisionally divided into:

- *Natural capital* (C_n) and
- *manmade (human)*– physical and intellectual capital (C_h), then one of the criteria of **sustainability of the production potential** of agricultural and rural development would be fulfilled only if it were ensured that
- *the total available capital* (C_n+C_h), did not drop during a foreseeable period of time.

An obvious requirement for the above is to ensure a certain degree of substitution between the various forms of capital, i.e. to compensate the inevitable decrease in natural capital with increase in the available human, primarily intellectual capital. This can, then, be achieved only by increased implementation of already acquired and new knowledge and the best contemporary production practice, i.e. by using the resources of the overall scientific and technical as well as the cultural potential.

The core contribution and main role in the fulfillment of this important requirement is bestowed upon science, profession and education, i.e. the appropriate network of institutions, particularly in the field of agro-economic and biotechnological sciences (secondary school, college and university levels of education, research and scientific implementation). Their programs must be modernized and adaptable to the long-term developmental goal, creating new knowledge, new agricultural technologies and new products, especially new sorts and species adapted to the more efficient use of (probably) altered agro-ecological conditions and resource potentials of a specific economic-geographical area.

If we take a closer look at the network of institutions in the field of agro-economic and biotechnological sciences in Serbia, we will see that the area of Belgrade, as metropolis and capital city, has the highest concentration of higher school and scientific-research institutions³, the programs and activities of which are of double significance for the fulfillment of strategic goals: (1) as teachers educating new professionals, and (2) as researchers occupied with science and research.

³ The most significant institutions are as follows: **faculties of the University**, in the field of biotechnological sciences – Agriculture, Veterinary Science, Biology, Forestry and Technical-Metallurgical Sciences; in the field of economy and management – Faculties of Economics, Business Studies, several faculties and colleges in the field of management, etc.; **institutes** – Institute for Agricultural Economics, Corn Institute, Livestock-Breeding Institute, Institute for Medicinal Herbs, Institute for Implementation of Science in Agriculture, Veterinary Institute, Institute for Protection of Plants and the Environment, Meat Technology Institute, the “Agroekonomik” Institute and others.

The most prominent position in the creating of human capital in agriculture is certainly held by the Faculty of Agriculture of the Belgrade University and the Faculty of Agriculture of the Novi Sad University. Studies at the faculty in Belgrade at all levels are organized in 22 (twenty two) programs-educational profiles⁴, and at the faculty in Novi Sad in as many as 32 (thirty two) programs⁵. Both faculties have an impressive number of teachers and teaching associates, as

⁴ **The Belgrade Faculty of Agriculture** has academic studies organized in four levels (according to the 4+1+(2)+3 system): **Undergraduate academic studies**-bachelor (4 years), 6 programs (Plant Production, Zoo-technical Sciences, Soil Management, Agricultural Technology, Agricultural Economics, Food Sciences and Technologies,); **Graduate academic studies**-master (4+1 year), 9 programs (Crop Sciences and Vegetable Farming, Fruit Growing and Viticulture, Horticulture, Phytomedicine, Zoo-technical Sciences, Soil Management, Agricultural Technology, Agricultural Economics, Food Sciences and Technologies); **Specialist studies**-specialist (4+2), 4 programs (Zoo-technical Sciences, Phytomedicine, Food Sciences and Technologies, Agricultural Economics,); **Doctoral studies**-PhD (4+1+3), 3 programs (Agricultural Sciences, Food Sciences and Technologies, Agricultural Economics,).

⁵ **The Novi Sad Faculty of Agriculture** organizes academic and professional studies. Academic studies are organized in three levels (according to the 4+1+(2)+3 system): **Undergraduate academic studies**-bachelor (4 years), in 13 (thirteen) programs: Crop Sciences and Vegetable Farming, Livestock Breeding, Fruit Growing and Viticulture, Phytomedicine, Agricultural Technology, Water Management, Usage and Preservation, *Agricultural Economics*, *Horticulture*, General, Landscape Architecture, Biotechnical Sciences and Management, Agro-ecology and Environmental Protection, Agritourism and Rural Development; **Graduate academic studies**-master (4+1 year), in 14 programs: Cultivation of Field Plants (5 modules: crop cultivation; vegetable cultivation; cultivation of fodder crops; crop irrigation; agro-meteorology); Land and Plant Nourishment; Genetics, crop improvement and cultivars; Organic Agriculture; Livestock Breeding; Fruit Growing and Viticulture (2 modules: fruit growing; viticulture); Phytomedicine (5 modules: phytopharmacology; entomology; phytopathology; herbology; agricultural, veterinarian and medical zoology); Water Management, Usage and Preservation, Agricultural Technology, Agricultural Economics, Horticulture, Biotechnical Sciences and Management; Rural Development Management, Water Management in Agriculture; Integrated academic studies of the 1st and 2nd level: Veterinary Medicine (10 semesters - 5 years); **Doctoral academic studies** (6 semesters - 3 years) in three programs: Agronomy, Animal Production, Agricultural Economics, Veterinary Medicine. **Professional studies**-bachelor appl., organized only on the first study level (undergraduate professional studies, 3 years) in three study programs: Agronomy (5 modules: livestock breeding; phytomedicine; crop sciences and vegetable cultivation; fruit growing and viticulture; horticulture); Agricultural Technology and Water Management (two modules: agricultural technology; water management) and Agricultural Economics (two modules: agricultural economics; agritourism and rural development).

well as other professional and technical associates in laboratories and experimental farms.⁶

It has been estimated that the acquiring of biotechnological skills and skills in the field of agricultural economics according to new study programs, primarily at agricultural and other faculties and institutes, would enable students at undergraduate and graduate levels to work independently in institutions in the field of agriculture, but not entirely in professional advisory bodies and their role in contemporary conditions without additional specific education. This particularly refers to the content of programs in secondary vocational (and even elementary) schools, particularly in the field of agriculture and food sciences and technologies, the graduated students of which would find their place in these departments as well.

In developed societies with developed agriculture and agricultural industry, during the past several decades advisory practice has shaped into both a teaching and a research discipline under the heading of *Advisory Sciences*. This is actually a very complex discipline, based on learning in the field of Rural Sociology, Communicology, Social Psychology, Adult Education, Management, Systems Theory, Social Anthropology and other social sciences. Advisory science is an integral and very important part of the education of agricultural professionals in all developed societies, as well as in some societies in transition which, through reforms of education in the field of agriculture, strive to stimulate the developmental processes in agriculture and ensure sustainable rural development. As a teaching subject *agricultural advisory science* is still not profiled as such in Serbian faculties of agriculture⁷, although such a specific discipline could be formed from the plethora of study programs, educational profiles and so-called modules.

3. How to Achieve the Strategic Role of Science in Development Sustainability

Reaching the given strategic goals, which are basically oriented towards **socio-demographically, economically and ecologically sustainable development**, generally presumes three strategic activity levels: (1) functional

⁶ The teaching and scientific staff of the Faculty of Agriculture of the Belgrade University includes: 71 full professors, 52 associate professors, 36 assistant professors, 1 senior lecturer, 1 foreign language teacher, 66 teaching assistants, 32 teaching fellows, 17 teaching associates and 140 professional and technical associates.

⁷ As of recently the Faculty of Economics in Subotica added Agricultural Management to the education of students in the Department of Agricultural Economics.

organization, (2) applicative education; and (3) effective motivation of direct stakeholders.

3.1. Functionally Connecting Science and Profession. The anticipated structural changes on a resource-developmental basis (less natural and of necessity more intellectual capital) demand that the focus of activities must indubitably be, first and foremost (or almost entirely) on stimulating the development and implementation of new applicative agricultural technologies and applied organizational and managerial methods and skills in direct practice. Essentially, without the active role of the state (at all levels), agriculture cannot be successfully organized and advanced. Fundamental scientific research and higher education, as well as the basic instruments and institutions that ensure macroeconomic stability and basic market guarantees to producers (including import protection and stimulation of agricultural exports) should be within the competence of central governmental authorities.

Therefore, the regional, town and municipal authorities and budgetary institutions of the local self-governance should direct the focus of their activities primarily towards practical advisory services, develop mechanisms for stimulation of the practical implementation of contemporary results of biotechnological and agro-economical sciences, throughout the reproduction chain, from inspection of the quality and cultivation of the land, protection and nourishment of the crops, to the final sale and consumption. The thus stimulated direct implementation of new agricultural technologies and introduction of contemporary production methods will, with the anticipated further reduction not only of the basic natural capital (agricultural land) but of the live labor of the primary producers as well, enable a significant increase in the unit resource productivity and further growth of the volume and quality of the overall agricultural output, in keeping with the growth and structural change of the demand for agricultural foodstuffs.

The most important task of the governmental authorities in charge of agriculture, science and education, both the central authorities of the Republic and the town and local self-governances, is to establish a firm functional relationship between the indubitably respectable scientific potential of faculties and institutes (not just in the capital city, of course) as providers of specific knowledge services, on one hand, and the also respectable production and overall agro-ecological conditions and potential of a certain regional economic-geographical area, i.e. the individual farmers, farms and entrepreneurs of various profiles, as the beneficiaries of such services, on the other. The key then lies in transforming advisory science into advisory practice.

3.2. Applicative Education, Advisory Services and Transfer of Knowledge. The development of primary agriculture, but of processing as well, should lean on the results of scientific research and their implementation in practice. The

fundamental implementers of new agricultural technologies in the function of agricultural and rural development should be scientific research institutions and an authoritative professional advisory department. Agricultural advisory services as a practice have a long-standing tradition, particularly in developed countries with developed agriculture. At the same time, the governments of all societies strive to develop and reform agricultural advisory services and agricultural research, considering the well-known and confirmed fact that investing into this sector pays off many times over, through various direct and indirect effects.

Advisory services in agriculture evolved over time, in keeping with the development of advisory practice and the emerging of problems that needed to be defined and theoretically and practically thought out. The evolution of advisory services actually portrays the development of advisory practice of each country. The “advisory services” of less developed countries have not even reached the **early stage**, in which the main task of the advisers is to successfully transfer production and technical knowledge to farmers; the advisory services of other, developed countries are in the early stage or the stage of providing support to farmers to help them reach good decisions, develop an awareness of their problems and the knowledge and skills to overcome them; the most developed countries (such as the Netherlands) have an established practice of advisory services in the form of a network of relationships between social teachings and negotiations of all participants in the change of farming practice, further development of agriculture and the village as a social community, i.e. multi-functional rural development.

In the given context, agricultural advisory services in Serbia are still in the early developmental stage and with merely certain indications of providing support for farmers to reach good decisions. In fact, as in many other sectors in the transition process, this field has also witnessed retrograde processes. Since the early sixties when professional departments were founded, agricultural stations (agricultural offices, agricultural institutes) primarily acted towards the advancement of the socially- and governmentally-owned and cooperative agricultural sector. The transfer and diffuse dissemination of science and profession in practice was achieved through this sector, through the developed forms of production cooperation and association. The fact that the socially-owned sector is systematically disappearing, that many coops, business associations and other entities in the agricultural infrastructure have been discontinued, necessitates a shift in the focus of advisory services towards individual-farming agriculture.

It is very important for the agricultural advisory services of any society to, among other things, establish the optimum balance between the number of experts and the agricultural-resource community in which they operate. Global experiences differ greatly, but unfavorable relations throughout Serbia can easily be recognized.

Agricultural advisory services in Serbia are for the most part provided through the Institute for Implementation of Science in Agriculture, Belgrade, which serves as the Agricultural department for the Republic (with 33 regional departments)⁸. The Institute now comprises a unified agricultural department with 730 employees, 349 of which are with university degrees (40 PhD's, 33 masters, 13 specialists, 263 graduate engineers) and 381 other employees. This department is expected to provide the appropriate services for around 779,000 farms, which cultivate around 1,920,000 ha of arable land. This means that one adviser with a university degree should service as many as 2,225 farms, or production on the area of 5,500 ha⁹.

For example, in Slovenia, which even in SFRY had the most advanced advisory services of all the Republics (while the role of agriculture in its industrial structure is not nearly as significant as in Serbia), in 2000 the agricultural advisory department employed 308 agricultural experts, in the following agricultural context: 86,467 farms and 485.879 ha of agricultural area. In the Netherlands during the 1990s the governmental advisory sector employed 600 on-site advisers, 200 advisers for socio-economical issues and problems and 2,500 consultants and technical advisers.

The intensive process of further fragmenting of agriculture (largely as a consequence of the mechanical inflow of population – internal migrations) points towards the necessity of a stronger presence of the profession and advisory services in all regions, even in the area of Belgrade. From the viewpoint of advancement of production and rural development, such a situation is unsustainable in the long run, a huge number of farms will still not be included in advisory services, particularly “medium” and “small” family farms (which are the most numerous), the commercial and social importance of which will still be great.

⁸ This Institute evolved from the Cattle Selection and Accounting Office, Belgrade (founded by Decree of the government of NR Serbia, 1952) and the Agricultural Production Advancement Center of NR Serbia, Belgrade (founded in 1958) and their merger in 1974.

⁹ Even in the Belgrade area there is an evident disproportion between the agricultural community and the number of experts in advisory departments, particularly the number of direct advisers, and the total number of farms and arable areas. In the territory of Belgrade there are 60,370 farms (7.75 % of the overall number in Serbia), which cultivate around 104,000 ha of arable land (5.4 % of this resource in Serbia), i.e. 1.72 ha per farm. The average size of farms in the territory of Belgrade is significantly smaller than in Serbia overall (2.46 ha), even in the predominantly rural municipalities (Sopot 2.34 ha, Mladenovac 2.22 ha, Obrenovac 2.15 ha).

3.3. Necessity of Reform of Advisory Services. The system of advisory services in Serbia needs to be fundamentally reformed. This will partly depend on the (re)organization of the existing advisory network (the Institute for Implementation of Science in Agriculture and regional agricultural stations) and the willingness of the elements thereof to swiftly approach internal changes. In the other, naturally more significant, part, the reforms will depend on the government and its institutionalizing of advisory policies. Such reforms, through the enactment of new regulations (law, by-laws, rules), should cover several different aspects, especially:

(1) resolving the concept and ownership status of agricultural advisory services – which, in our opinion, should be mostly public (governmental), i.e. what and under which conditions would make up private advisory services;

(2) forming the appropriate territorial organization which would enable the advisory department to cover as great a number of producers-farmers as possible (the most important goal of the advisory service), which presumes the development of local advisory services within the overall advisory system;

(3) stable sources and significantly greater funds for advisory services¹⁰ (secure financing, mostly from the budget, and in a lesser part from the commercialization of certain services);

(4) improvement of human resources and establishing the necessary structure of various profiles (agronomists, veterinarians, agricultural economists, etc.);

(5) a program for the planned and systematic education of advisers;

(6) development of advisory programs and the directing thereof towards the needs of the farmers;

(7) separation of advisory work from activities with a monitoring function;

(8) strengthening management and planning of advisory work;

(9) establishing a unified information system (with typology of advise and services, charts of farms with all relevant information and farm characteristics, linking of all information and the statistical processing thereof) as a necessary analytical evaluation and monitoring tool, the further development of advisory services and establishing rational and optimal advisory policies, in the service of public (national) interests and the interests of farming agriculture in Serbia.

The authority of the advisory department should lean on two firm foundations: (1) a well-organized network for transferring professional and expert

knowledge; and (2) secured financing for the department (mostly from the budget, and in a lesser part from the commercialization of certain services). In accordance with the above, the professional advisory department should:

(a) lean on science – faculties and institutes, in such a manner that each teacher/researcher manages, in the capacity of mentor, a more specific branch, directly contacts the local advisors and a certain number of producers/farms;

(b) apart from the necessary advice relating to the implementation of agro-bio-eco-technological knowledge in production, offer other content as well, and specific agricultural-economical advice, relating to business management, commercial activities; securing information pertaining to the market; the possibility of obtaining funding through mortgage-secured, Lombard and other loans, receipts-warrants from public warehouses etc.; manners, forms and advantages of interest-based association into coops, mechanization rings, clusters etc;

(v) provide services not only to agricultural producers but also to processors and merchants as well, i.e. to all participants in the chain of production, on the following: production, market fluctuations, business economics, ecological and other requirements for environmental protection, production practice conditions, standards and protocols, business plans etc.;

(g) provide evaluation and monitoring of the program for the development and work of the local advisory services, including the licensing of mentors and advisers; the monitoring should cover not only the advisors and their mentors but their clients as well – farmers, producers and other beneficiaries of the advisory services.

Conclusion

New knowledge, methods and technologies in primary agriculture, apart from theoretical education and raising the general education level, make up the form of intellectual capital the relatively swift growth of which enables the fulfilling of one of the criteria of sustainability of the production potential of agricultural and rural development, that the *overall stock of capital* (natural and human) not drop during a foreseeable period of time. This satisfies the prerequisite of ensuring a certain level of substitution between the various forms of capital, i.e. that the inevitable decrease of natural capital in agriculture (soil degradation, global warming, spreading of arid areas, change of purpose) be compensated by an increase in the available human, primarily intellectual capital, through the implementation of new agro-bio-eco-technological knowledge in production.

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