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**Article**

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# Challenges for Sustainable Development of Agricultural Holdings

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**Abstract:** Agricultural holdings have a very important role for the sustainable socio-economic development. Contemporary, the farms' activity is mainly determined by the market mechanism. Market imposes rules on agricultural holdings' functioning, on both the type and the scale of agricultural activities, agricultural production mode, as well as the sale conditions. The market mechanism forces the agricultural holdings' orientation on the economic objective achievement, aside from the agricultural production externalities. Those externalities are not the market transaction subject and are not a part of farmers' economic account. Agricultural production externalities, however, are the subject of increasing society' interests. Those interests particularly relate to natural environment protection and food supply. Referring to the above, there is a challenge to meet the requirements of a market, as well society. In order to meet the various agricultural holdings' challenges, there is a need to take action leading to micro- and macroeconomic criterion convergence of agricultural production. This is the fundamental principle of the sustainable development concept, which includes agriculture and agricultural holdings – the basic economic unit of this sector. Meeting these challenges requires taking into account the political factor to eliminate adverse effects of economic activity. The purpose of the article is to indicate the main challenges of agricultural holdings, determinants and measures of their sustainable development.

**Keywords:** sustainable development, agricultural holdings, challenges, conditions, measures

**JEL codes:** Q01, Q12, Q56, Q13

## 1. Introduction

The idea of sustainable socio-economic (civilization) development, launched into the spotlight of social discourse near the end of the 20th century, is more and more often being shaped as various concepts, for which attempts at implementation are being made on all levels of the global community. The premises for the science community's rapidly growing interest in sustainable development may be sought in the urgent need, or even necessity for a shift of trajectory of the,

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currently dominant, industrial development, due to the, increasingly prominent, environmental limits, as well as undesirable economic and social results. The complexity of the dilemmas needed to be addressed through sustainability, in order to cope with the challenges of the contemporary world, mainly related with the realization of the concept of sustainable development, also poses a great methodological challenge from the scientific perspective.

The economic area of particularly great importance for sustainable development is agriculture, wherein the main entities are agricultural holdings, which shall be the scope of interest of this paper. The importance of agricultural holdings, understood as entities involved in agricultural activities, i.e. the production of agricultural goods, is reinforced by several key aspects. Firstly, agricultural holdings remain indispensable in food production, i.e. of goods, which satisfies the most basic of human needs. The role of foodstuffs in sustainable development is undeniable. Secondly, agricultural holdings, in the food production process, utilize resources and services derived from the natural environment, both directly and indirectly. What is more, they remain the single largest user of land, ergo the natural environment. Such use is mainly concerned with water and mineral consumption, coal sequestration and greenhouse emissions, as well as maintaining biodiversity and soil fertility. Therefore, they make a very important contribution to the functioning of ecosystems and the regeneration thereof. Thirdly, agricultural holdings generate resources for the production of non-food goods for human consumption. One might even say that after a fascination with artificial products, a revival of interest may be observed, in "natural" products. It may be worth adding that agricultural holdings, participating in biomass production, through the use of solar energy, generate a true added value for the planet, which in turn creates a basis for a brand new prospective form of goods manufacturing, i.e. bio-economy, intended to replace economic growth based on non-renewable resources, with the use of solar energy for the production of renewable resources, i.e. biomass. Fourthly, agricultural holdings create jobs and provide sources of maintenance for the largest percentage of the population. Granted, employment rates in agriculture in developed countries, and generating economic value thereby (income) remains marginal (a few percent), but in many high-population, developing states this sector remains dominant. Fifthly, agricultural holdings contribute immensely to the perseverance of rural communities, especially those peripheral to urban centres, and in most cases remain the bastion of tradition, culture and national values.

Throughout the ages, agricultural holdings produced goods in harmony with nature,

utilizing natural resources and family labour, mainly for own needs. This state of affairs has changed significantly with the advent of capitalism and the industrial revolution. Following the imperative of capital multiplication, capitalism sought ways for its accumulation mainly through industry. In order for industry to develop, cheap workforce and food were needed. Both could be delivered by agriculture, provided it be modernized. The modernization involved the subordination of agricultural holdings to market mechanisms, which intensified the need for money (commercialization), as well as the processes of production intensification, concentration and specialization. Such processes constitute industrial modernization of agriculture - the development of the industrial agriculture model.

The example of developed countries indicates the efficacy and microeconomic effectiveness of such a model, due to its ability to supply cheap and abundant food. However, a problem was encountered; it turned out that the production of agricultural goods, in such a way is accompanied by increasingly significant external effects on other market players and nature (ecosystems). These effects are not reflected either in market transactions, nor farmer decisions. External effects are of dual nature: one kind generates costs for others, the other, decreases common and public goods. For this reason, these effects are the object of a growing social interest and undertakings, which could possibly eliminate some of the market failure. The effect of market failure is producing an excess of negative effects and an inadequate amount of positive ones, in relation to social demand.

From the economic perspective, it is about actions to minimize discrepancies between the micro and macroeconomic criteria in steering agricultural production. The former is applied by enterprises (in this case, agricultural holdings), maximizing their private objective function, and the latter should be applied by the state, to maximize the social objective function. This is a task mainly for institutions run by the state, which determines the field - boundary conditions - of activity of the market mechanism.

The purpose of the article is to indicate the main challenges of agricultural holdings, determinants and measures of their sustainable development

The presentation of the issue in question shall commence in the following order. Firstly, we shall address social needs and the demand for goods and services produced by agricultural holdings, next we shall present the main conditions for the process of their creation (production), and look at the instruments, which may be used by political institutions in determining the

production decisions of farmers. Specific actions shall be presented, to be taken by agricultural holdings, as well as farmers, in order to meet the challenges of sustainable development. Our deliberations shall result in certain conclusions and postulates directed at these institutions.

## 2. Social Demand

Modern times have demonstrated the significance of agriculture in the provision of goods and services not subject to market transactions, and at the same time of significant importance for social welfare. The core issue is the multifunctionality of agriculture, which became the object of significant interest in recent years (Woś and Zegar, 2002; Huylenbroeck and Durand (eds.), 2003).

It turned out that agriculture – agricultural holdings – aside from producing foodstuffs and raw materials for the production of other goods, is also possessive of a variety of other functions useful for man as well as nature. Such functions are mainly environmental, social, economic, and cultural, which also take on various forms depending on the level: local, regional global (IAASTD, 2009; Zegar, 2012). Furthermore, being the other side of the same coin, the production of agricultural goods, is accompanied by some negative external effects that *ex definitione* deprecate social welfare. The volume of these effects, akin to goods and services increasing social welfare, is dependent on the method of agricultural production, i.e. the model of agriculture (agricultural holdings) and the integral thereto agricultural practices.

Two basic models of agriculture have been distinguished, which encompass agricultural holdings, i.e. industrial and sustainable. The former is governed by the microeconomic criterion and the growth imperative (accumulation), as well as the ever increasing industrialization<sup>1</sup>. The latter is governed by the macroeconomic (social) criterion, which accounts for social needs (expectations). The former has solved the food quantity problem, but not the issue of farmer income or food security (eliminating hunger and malnutrition, and food quality). The latter is currently being developed and encounters some resistance, resulting mainly from the collision of the microeconomic criterion adhered to by agricultural holdings, with the macroeconomic (social), which, better or worse, expresses social needs.

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<sup>1</sup> The industrial model of agriculture is a response to challenges of the capitalist formation, as a manner of capital accumulation mainly in industry, and resolving the agricultural issue by way of farmerization.

This lack of specificity of the social criterion stems from difficulties in social valuation <sup>2</sup>, which must reconcile the interests of individual social groups and the "silent" market players (i.e. the natural environment – ecosystems – and future generations). Such valuation ought to also account for the so-called "values stemming from the Decalogue, as well as the civilizational achievements of man.

A lesson in history, related to the recurring scourge of famine has put forward in social valuation the increase in food production, which was possible with the industrial model, which increased harvests and the efficiency of farm animals, mostly through the use of fossil fuels and progress in biology (genetics). However, the success of this model, succinctly described by the metaphor of "cheap and abundant food" ravaged the natural environment, degrading the ecosystems. In its current form, it simply cannot continue. Thus a fundamental challenge to agriculture appeared, which also applies to agricultural holdings, i.e.: **how to increase agricultural production, without increasing environmental pressure?** (See: Woś, 1988; EC, 2011; GOS, 2011). Empirical analyses of agricultural holdings indicate a significant conflict in this respect (See e.g. Toczyński et al., 2013; Wrzaszcz, 2012c, Zegar, 2011). However, it would seem that this challenge should be broadened, taking account of the multidirectional relations between the functions performed by agricultural holdings and negative external effects<sup>3</sup>. The crux of the matter is therefore, **performing the function on a socially desired level, and simultaneously minimizing the negative external effects.**

In their decision making process, farmers follow the economic account (calculations), based on first and foremost the economic benefit – the microeconomic (private) benefit criterion. In the case of the industrial model, dominance of the economic benefit – profit maximization – is uncontested. In the case of the sustainable model, the motive of economic benefit is also dominant, as anything else is unfeasible in an economic unit. However, such dominance is not unconditional, as non-economic values, possessed, valued or adhered to by individual farmers, are also taken into consideration. The dominance of economic benefit is reinforced by market mechanisms (the imperative of competition, and growth), and the progressing subordination of agricultural holdings

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<sup>2</sup> Social valuation should be understood as the manner of "evaluating different alternative uses of a given resource, including subjective positions (and evaluations) of interests groups" (Woś and Zegar, 2002: 31).

<sup>3</sup> "The most important challenge comes down to the question of how to feed the world, at the same time preserving biodiversity and capacity of the global ecosystem to provide environmental services and freeing mankind from risks resulting from abusing synthetic chemicals and other artificial growth-inducing substances" (Zegar, 2012: 16).

to corporations encompassing an entire food production chain. The decision-making freedom of farmers is more and more limited.

The increasing awareness of the non-food functions of agriculture expands social needs. The problem is that the autonomous market rewards only the results of the production of food and raw materials for other purposes. With regards to other goods and services, the peculiarity of the market is revealed in that it causes the generating of an excess of negative external effects and an insufficient amount of positive ones. The former are transferred onto other market players, taxpayers and future generations, while the latter decrease the provision of ecosystem services. This fails to meet social needs, the satisfaction of which requires the involvement of political institutions – i.e. of the state, which has the power to use certain instruments to satisfy these needs.

Not accounting for R. Coase's theorem, the issue pertains legal-administrative (prescriptive) instruments setting out boundary conditions for farmer decisions, and economic instruments (subsidies, fees, penalties), which directly affect farmer economic calculations. Each has its own set of advantages and disadvantages<sup>4</sup>. In this situation the **challenge of converging the private and social optimums** arises, subordinate to the main challenge. The crux of the matter is for **farmer activities aimed at achieving private goals, to simultaneously lead to achieving social goals**. However, a problem arises here, hindering the state's impact on farmer decisions, due the role of a third partner, i.e. the corporations, which, by incorporating agricultural holdings in vertical food production chains, not only limit the freedom of choice of farmers, but also – having at their disposal, great economic power – policy-related capabilities of the state. This in turn means the elimination of institutional barriers for rapacious exploitation of nature in the name of private economic benefit.

Efficacious and effective application of instruments for satisfying social needs for goods and services produced by agricultural holdings, i.e. positive external effects and eliminating negative external effects, requires prior identification and evaluation thereof. The problem of identification of external effects stems from the progress of knowledge – learning of natural connections, the increasing rarity of resources and qualities of the natural environment, as well as new social expectations. Learning about connections within ecosystems is of critical importance for shifting progress onto the track determined by the new paradigm – transition from anthropocentrism to biocentrism, which is necessary for sustainable development. On the other

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<sup>4</sup> This issues concerning the instruments of ecological policy, are presented in (Zegar, 2007).

hand, the problem of valuating external effects – both positive and negative – arises only because they are not the subject of market transactions, although they remain the effect of the manufacture of products existing directly on the market.

The valuation of external effects is necessary, so that political institutions may determine the instruments needed to prompt (force or encourage) farmers to consider (internalize) them in the economic calculations, on which they are basing their business decisions. These instruments, in all actuality, are to transform social need into social demand and subsequently into market demand. At the same time, a lack of market valuation of external effects necessitates the search for other ways of valuating them, based on a social rationality or even an existential criterion. Previous attempts of valuating external effects of agriculture, in particular of agricultural holdings is not satisfactory. Therefore, their valuation **poses a significant challenge to science**.

### **3. Determinants of Agricultural Holdings` Sustainable Development**

The development of agricultural holdings is dependent on many conditions. These may be generally divided into internal and external. The former include mainly local natural-soil conditions, including climate, and organizational-economic conditions of an agricultural holding, as well as individual predispositions of its administrator. The latter include conditions, which form the surroundings of an agricultural holding: economic, market, social and institutional. External conditions for all intents and purposes, remain outside the influence of the agricultural producer, who needs to adapt their business operations to the environment, wherein they are conducted.

**Local natural-soil conditions** are, alongside economic-organizational, the basic determinants of an individual holding running (Krasowicz et al., 2007: 55). An agricultural holding operates based on the local ecosystem, as it is what enables agricultural production. Without natural resources and the use of natural ecosystem processes, agricultural production is not possible. Depending on the local conditions, production potential of an agricultural holding changes. The better the natural-soil conditions, the greater the production capacity of an agricultural holding. Better soil conditions, not only facilitate running a farm in accordance with sustainable development principles, but also contribute to favourable economic performance (Kuś and Krasowicz, 2001: 286). These are the most basic argument in support of "appreciating" and respecting the natural surroundings of an agricultural holding.



In Poland, natural-soil conditions are below the EU average, which does not ease the exercising of the tasks of sustainable development facing agricultural producers. The list of adverse factors includes: lower temperature, shorter vegetation period, less precipitation, large percent of poor and acidic soils, low soil macroelement content, prevalence of light soils, high share of soils in danger of erosion. Additionally, these conditions reinforce the role of farmer knowledge and ecological awareness, and subsequently, the importance of specific agricultural practices.

Climatic conditions affect agricultural production. Climate change forecasts indicate a number of hazards and difficulties, which the farmer will have to overcome (Jankowiak and Kędziora, 2009: 15-27). In the case of plant production, these dependencies are of a direct nature, and indirect for animal production. Climate change forces farmers to adjust their agricultural activities, in particular those regarding plant production. Global warming may not only accelerate the plant vegetation period, but also affect the growth of weeds and pests. Therefore, an increasing need arises for searching out appropriate solutions, both of an agrotechnical nature, as well as in the area of crop protection (Grzelak and Stępień 2011: 82).

**Organizational-economic conditions of an agricultural holding, as well as individual predispositions of farmer** are important, internal conditions for agricultural production. The possibility of sustainable development of an agricultural holding is to a significant degree determined by its current organizational, production and economic situation. If the organisation of plant and/or animal production differs significantly from the desired standards of sustainable development, a change in intended direction, is much harder for the agricultural producer, it is a long-term and expensive process. Another factor in line with these kinds of conditions, are the predispositions of the farmer managing the holding.

Introducing changes and undertaking a certain economic risk related to changing the organization of agricultural production, requires the agricultural producer to possess specific qualities such as: openness, willingness, conviction about the relevance of undertaken actions, commitment, knowledge, devoting time, as well as determination and strength. These are personal characteristics necessary for reorganizing a holding towards sustainability.

Conditions for agricultural production of an external nature form the broadly understood surroundings of an agricultural holding, which "forces" particular actions on the side of the farmer. Oftentimes, these conditions are not favourable for introducing changes in agricultural production, falling within the scope of principles of agricultural sustainable development.

Certainly, a significant challenge for agricultural holdings are the **economic conditions, both close and far**. These conditions include a number of various elements that indirectly affect agricultural production, such as the broadly understood issue of material capital in agriculture, and the condition of the technical infrastructure in rural areas (which constitute the close economic conditions), the level and pace of economic development, bringing about technical, technological and biological progress, as well as implementing innovation (far economic elements).

The problem of material capital applies to the economic situation in agriculture, and appropriate prices of agricultural products, and by extension, retaining financial liquidity. Although this problem is directly of an economic nature, it is reflected in environmental issues (e.g. the possibility of investing in infrastructure improvement in agricultural holdings), as well as social (e.g. the standard of living of an agricultural family). The unfavourable economic situation in agriculture is partially diminished by government subsidies. However, these funds directly affect the farmer's remuneration only in part, and are mostly "intercepted" by other entities within the food production chain, e.g. manufacturers of chemicals for industrial production.

The condition of the technical infrastructure in rural areas is recognized as one of the most serious barriers for multifunctional development of agricultural holdings. Underdeveloped infrastructure lowers the standard of living of family members and the farming standard, as well as determines the low appeal of rural areas for potential investors. Usually, budgets of local government units are insufficient to improve the local infrastructure as required by the local community and potential investors.

The level and pace of economic development translate into the scope of the broadly understood progress and implementing innovations. Progress in the technical, technological, or biological scope, as well as various innovations (i.a. technical and organizational)<sup>5</sup>, which, by design, are to introduce favourable changes in economic activities, may also facilitate achieving sustainability in agriculture. However, such projects are costly and take a long time to implement, while the benefits generated through them may be delayed (e.g. environmental benefits and return on the investment). Additionally, they require long-term research prior to implementation, which shall confirm their assumed effect on the economy society, and the natural environment. A current example is, the widely discussed in various circles, issue of GMOs – *Genetically Modified*

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<sup>5</sup> A positive example is the use of natural processes in agricultural activity, e.g. sustainable intensification (Tittonell, 2014; Firbank et al., 2013), natural technologies of production (Kud, 2015; Herbinger, 2015), integrated and precision agriculture (Sosnowska, 2015; Rozbicki, 2015).

*Organisms*, which is guided by favourable production, environmental, and economic changes. Scientific verification of the assumed multilateral benefits of genetically modified organisms in agriculture, however, undermines this, and roots justifiable doubts in society (Wiackowski, 2008).

A different type of external conditions, facing agricultural producers, is created by the **market mechanism**. As a business entity participating in the market, an agricultural holding adapts to the rules thereof and achieves on this account, economic benefits, as well as bears the direct and indirect negative effects. The market is a perfect tool for stimulating the microeconomic effectiveness, making use of the mechanism of competition. If we analyze the market from the perspective of social effectiveness (macroeconomic), and take account of the time factor in assessing its operation, the excellence of the market is contested (Zegar, 2007). The market is unable to deliver the necessary amounts of public goods, and incapable to cope with the external costs, which is regarded as a sign of its defect (*market failure*).

The market mechanism stimulates the industrial development direction of agricultural holdings, i.e. subordination of its organization, production techniques and technology, as well as economics, solely to the principles of the, traditionally understood, market competition. The present market conditions have no favourable effect on the economic situation of agricultural holdings. The problem of selling agricultural products at a fair price (i.e. such that would at the minimum cover the costs of production and farmer income) is more and more prevalent. Farmers, as entrepreneurs, must be active on the market, although they remain at a disadvantage in the face of the increasing strength of the global corporations.

Unfavourable price relations – price scissors – of agricultural products and means of production do not make this task easier. Economic conditions for agricultural production resulting from the existing price relations, translate into the size of the agricultural holdings and farming intensity (Heady, 1967: 484-531). Economic factors necessitate increasing specialization of the farms, which in turn leads to e.g. reducing the number of animals kept in agricultural holdings engaged in plant production, and consequently, a reduction in the amount of produced natural fertilizers, which are extremely important for soil fertility and its productivity (Kuś and Kopiński, 2011: 66]. Too intensive processes in this respect may lead to difficulties related to environmental and social sustainability.

Another type of external conditions for agricultural producers are **social conditions**. In contrast to those described earlier, conditions of a social nature stimulate agricultural holdings to

focus on sustainable development. It should be emphasized that the increase of society's awareness with regards to environmental goods and nutritional qualities of foodstuffs, which directly translates into a growth of demand for local and regional produce, and a growing interest in direct cooperation with an agricultural producer.

The market segment of ecological /organic products, characterized by high nourishment and health values, accompanied by higher prices is increasing (Rembiałkowska, 2006: 56-76). This is a result of a growth in demand for higher quality, natural products, of excellent taste, supplied by regional and local markets. Improvement in the economic situation of households, as well as increased social awareness, foster interest in safe food. Consumers more and more often, expect foodstuffs produced in harmony with nature, as it guarantees its safety for human health. The increasing social awareness related to the impact of foodstuffs on health is a stimulus for agricultural producers to conduct operations respecting and utilizing natural laws.

In connection with the increasing contestation of the quality of foodstuffs offered by large business entities, consumers are looking for more reliable sources to purchase food. Of universal interest are various kinds of markets/local markets. Small and medium farmers are not geared towards cooperating with supermarkets (which are mainly interested in cooperation with large holdings supplying a significant quantity of agricultural produce), but form local markets, where they offer their produce for sale. Direct producer-consumer contact creates the best conditions for obtaining information on the value of the object of the transaction, production conditions, as well as possible negotiations of its price (Wrzaszcz and Zegar, 2014b: 36).

Direct consumer-producer relations allow for omitting various elements of the food production chain, which would constitute additional components influencing the final price of the product. Local markets are also an excellent place for the sales of niche products, including organic, especially sensitive to transport and storage. Promoting local food products is beneficial for the environment (decreased energy consumption for transport), consumer (direct possibility of obtaining information about production), the local community (creation of jobs and income sources, development of local entrepreneurship), and is economically reasonable (economic surplus goes directly to the producer, and the consumer receives a measurable benefit in the form of a lower price for the products purchased).

The last amongst the analyzed conditions of agricultural activity are **institutional conditions**. This is the second, alongside social, type of conditions, which may significantly

contribute to sustainable agricultural development. Spreading of sustainable agricultural practices on the farm requires the implementation of multilateral institutional activities to correct the undesirable effects of agricultural activity, or even prevent them outright. Institutions of the state are responsible for developing relevant government programmes and legal standards aimed at sustainable development of agriculture, as well as the level of preparation of services of agricultural advisory centers, to assist farmers in the execution of the assumed tasks. Institutions of the state shall also be responsible for providing an adequate system of agricultural insurance (mainly social, but also additional related to running a farm).

The EU agricultural policy focuses on issues related with the sustainable development of agriculture and rural areas, including agricultural holdings<sup>6</sup>. This is directly translated into national agricultural policies and relevant legal regulations, as well as development strategies<sup>7</sup> and government programmes supporting agricultural producers<sup>8</sup>. Particularly, the last decade witnessed the importance of various government plans and programmes<sup>9</sup>, aimed at environmental protection, assistance in shaping local entrepreneurship, maintaining the viability of rural areas, accelerating investment processes in agricultural holdings, as well as direct financial support of farmers. Implementation of various government instruments translates into the number of beneficiaries of such actions, and the quality of agricultural practices. The scale of implementation of pro-environmental practices in agricultural holdings is conditioned by legal regulations setting principles of financing agricultural operations under the EU Common Agricultural Policy (i.a. practices related to good agricultural conditions, requirements of mutual conformity) (Wrzaszcz 2012c: 177-210).

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<sup>6</sup> A synthetic review of EU reforms and agendas since 1992, related to sustainable development (the McSharry reform, Treaty of Amsterdam, Agenda 2000, CAP Reform of 2003) is presented in (Zegar, 2012: 288-317; Matuszczak, 2013: 104-111).

<sup>7</sup> An example of government activities supporting multifunctional and sustainable development in the long-term perspective is *the Strategy for Sustainable Development of Rural Areas, Agriculture and Fishery for 2012-2020*. A long-term main goal of activities for the development of rural areas, agriculture and fishery has been defined as follows: improving the quality of life in rural areas and effective use of their resources and potentials, including agriculture and fishery, for the sustainable development of the country. See [www.minrol.gov.pl/Informacje-branzowe/Strategia-zrownowazonego-rozwoju-wsi-rolnictwa-i-rybactwa-na-lata-2012-2020](http://www.minrol.gov.pl/Informacje-branzowe/Strategia-zrownowazonego-rozwoju-wsi-rolnictwa-i-rybactwa-na-lata-2012-2020).

<sup>8</sup> The impact of the EU CAP on the environment in the context of sustainable development of Polish agriculture is discussed in: (Kociszewski, 2014: 124-157).

<sup>9</sup> *The Plan for Rural Development for 2004-2006, Rural Development Programme for 2007-2013, Rural Development Programme for 2014-2020*. These programmes can be reviewed on the website of the Ministry of Agriculture and Rural Development, see: [www.minrol.gov.pl](http://www.minrol.gov.pl).

The scale of implementation of various activities falling under the scope of sustainable development of agricultural holdings largely depends on the involvement of the agricultural advisory centres (AAC) (<http://www.cdr.gov.pl/o-instytucji/informacje-ogolne>). The tasks of the AAC have been defined by force of an Act, highlighting actions for the increase of agricultural income levels, raising the market competitiveness of agricultural holdings, fostering sustainable development of rural areas, as well as increasing the level of professional qualifications of farmers and the general rural population. Agricultural advisors employed in voivodeship and regional AAC branches are involved in direct cooperation with agricultural producers, covering an interdisciplinary scope of advisory services, including organization of trainings and information meetings for farmers, and preparation of analyses and popular-science publications. These advisory institutions have the role of transferring current knowledge in the field of agricultural production, including binding legal standards. Due to direct cooperation with the advisor, farmers have the possibility of expanding their qualifications and improving the functioning of an agricultural holding. In connection with the fact that experienced farmers rarely benefit from the various forms of education (e.g. postgraduate studies), and more often gain knowledge during various types of courses, while the most popular and fastest form to achieve useful information is cooperating with an agricultural advisor.

Another element in line with institutional conditions is the agricultural social insurance system. This system fulfils a number of functions with regards to farmers, the most important of which include securing farmers and their families against negative consequences of deprivation or limitation of work possibilities (e.g. as a result of disease, disability, or age preventing professional activity), as well as a generational change in agriculture. Such insurance is of significant social and economic importance, both from the perspective of the insured, as well as the society and state. In a social respect, the functions of the agricultural social security system are expressed in stabilizing the situation of members of the household and agricultural holding, and contribute to maintaining continuity, thus fostering the perseverance of rural areas (Karwat-Woźniak and Chmieliński, 2014). Such a system of agricultural social security certainly protects farmers and contributes to sustainable agricultural development.

For over 10 years farmers have had the possibility to insure their agricultural production from unforeseeable events (Act of 7 July 2005 on insuring agricultural cultivations and livestock (Journal of Laws of 2015 item 577, with later changes). Such insurance is increasingly popular

amongst farmers, which is on one hand affected by more and more frequent, unforeseen circumstances, which translate into measurable production-economic losses of agricultural producers, and on the other, the important role of government institutions that subsidize insurance premiums. Since such insurance relate both to plant and animal production<sup>10</sup>, they contribute to stabilizing multidirectional agricultural production, and by extension, the economic situation of agricultural producers. Security of agricultural production against unforeseeable events (e.g. hurricane, flood, hail, draught, frost or mandatory slaughter of farm animals) is undoubtedly an essential element facilitating the sustainable development of agricultural holdings<sup>11</sup>.

The presented internal and external conditions indicate that a business entity such as an agricultural holding needs to overcome various challenges to be able to pursue sustainable development. Part of the conditions mentioned is favourable for implementing these principles, while others call for maintaining the previous, industrial direction of development. The method of organizing agricultural production in an agricultural holding is a result various multidirectional forces, indirectly and directly affecting management of an agricultural holding. Due to the dominant number of external conditions for the development agricultural holdings, harmonization of the micro and macroeconomic criteria is not an easy task.

#### **4. Measures of Agricultural Holdings` Sustainable Development**

Conditions for sustainable development are reflected in specific farmer activities. In order to meet various challenges facing agricultural holdings, it is necessary to take actions aiming to harmonize the micro and macroeconomic criteria of the agricultural production process. This is a fundamental basis of the concept of sustainable development of agricultural holdings. Those actions should apply both to an agricultural holding, as well as directly to its manager – i.e. the farmer.

Undoubtedly, the basic action is organizing agricultural production in such a way, as to include minimizing the use of natural resources and delivering favourable environmental effects. The elements of organizing a farm in a way facilitating the implementation of the sustainable development principles are: family nature of a farm, pro-environmental agricultural activities,

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<sup>10</sup> A list of crops and livestock included in this security is available at: <https://bip.minrol.gov.pl/Informacje-Branzowe/Ubezpieczenia-upraw-rolnych-i-zwierzat-gospodarskich/Ubezpieczenia-upraw-rolnych-i-zwierzat-gospodarskich-w-2016-r>.

<sup>11</sup> More information on insurance concerning agricultural holdings: <http://www.cdr.gov.pl/57-aktualnoci/cdr-informuje/1833-ubezpieczenia-w-rolnictwie-2016-r>

cautious approach to changing the production potential of an agricultural holding and production-organizational processes, the multi-directionality of agricultural production, and also production systems for integration of agricultural production and environmental protection.

Activities of particular importance, directly undertaken by the farmer include: increasing their professional qualifications and cooperating with advisors and representatives of government institutions in a wide scope, including the operations of the agricultural holding and the desired and obligatory standards of management.

Poland is dominated by **individual, family agricultural holdings**. For environmental economic and social reasons, family farms are consistent with the concept of sustainable agriculture (Woś, 2004: 41). These holdings usually operate with the use of traditional methods, with low mineral fertilizing and pesticide consumption, as well as industrial fodder in the feeding of farm animals, especially cattle. Decreased consumption of external means of agricultural production usually results in the need for greater human involvement. Sustainable development of holdings also includes non-production activities such as agritourism. On one hand, such activity may constitute an additional source of income for an agricultural holding and household, on the other however, they require increased work force, related to a new business activity. Previously unused work capacity, both within and without the holding, creates the potential for the development of additional business activities, e.g. based on the property of an agricultural holding, at the same time receiving measurable benefits.

*Agricultural holdings, especially family ones, are not only a food factory, but are treated as a home, family, as well as an element of the rural landscape, and a carrier for national culture, tradition and values (Zegar, 2012: 114).* A farmer and their family, through combining agricultural operations with running a household, determine the viability of rural areas. Family agriculture contributes to achieving a higher level of self-sufficiency on a regional scale, reducing excessive concentration in agriculture, processing and trade, and to a direct protection of natural resources. Family agriculture is also credited with shaping social stabilization, strengthening statehood and national identity (Zegar, 2012: 114). A family holding is a form of capital accumulation for the benefit of future generations. The involvement of multiple family members in cooperative efforts, not only creates common property, but also social bonds. Time spent with each other allows the family to bond and reconcile business and domestic responsibilities. Farmers put much value in



the familial nature of the holding, which permits them flexible work time and sharing various duties with members of their families (Wrzaszcz, 2012c: 199).

The main principle allowing **agricultural production with respect for natural resources** is competent crop rotation and plant fertilizing, in proportion to soil fertility and type. This is the basic principle for sustainable agricultural production. Crop rotation, which can be defined as a rational sequence of cultivated plants, considering their diverse needs concerning positions in crop rotation, comprises the canon of traditional agrotechnics (Manteuffel, 1984: 310). Proper crop rotation and fertilization should ensure a positive balance of organic matter in the soil, recognized as the basic principle of proper management in agriculture (Kuś et.al. 2008: 13). Positive balance is the necessary condition for ensuring productivity of agricultural cultivations and their supply. Organic matter and its conversion into humus, plays the main role in creating and maintaining soil fertility at a high level, i.e. favourable for plant growth and yields, their physical, chemical and biological properties. Humus content in the soil leads to obtaining crops of high quality and increasing yield levels.

Agricultural activity largely influences the natural circulation of matter and energy, thus creating specific risks for the balance of ecosystems. Therefore, it is particularly important to ensure a closed circulation of nutrients, in the fertilizers-soil-plants system. The fertilization level should be adapted to the alimentary needs of cultivated crops under local conditions (soil quality, climate), as reversing the effects of irrational fertilizing practices is very difficult and oftentimes impossible. Fertilization should balance alimentary needs of plants, but should not create excessive reserves of macroelements in the soil (Fotyma et.al., 2010: 53-75).

The most serious hazards generated by agriculture are biogenic compounds of nitrogen and phosphorus, which may get to ground and surface waters, and in the case nitrogen, also into the atmosphere (OECD, 1999, cited in Kopiński, 2007: 21). The basis for setting fertilizer dosage is the balance of basic nutrients i.e. nitrogen, phosphorus and potassium. The fertilizer balance enables proper determination of the quantity mineral elements proper for the needs of cultivated crops, which is reflected in their productivity, as well as the rationalization of expenses incurred for fertilizers.

Another extremely important agricultural practice is to maintain a proper soil pH. Since most soils in Poland are acidic or highly acidic, the process of liming gains particular importance. Liming has a multidirectional effect on the soil. Lime in the soil is necessary for maintaining its

correct structure, physical-chemical properties, appropriate conditions for microorganisms, proper use of applied macro- and microelements by plants, and thus their proper growth and development. The practice of liming, and neutralizing soil acidity, not only improves the soil condition and increases plant mineral absorption, but also allows the cultivation of a broader range of more demanding plants in terms of soil pH, including root and leguminous crops (Hołubowicz-Kliza, 2006: 8-23). Considering that nutrient-rich soil is the basis for proper plant growth and development; funds invested in calcium fertilizers will be returned through achieved production levels and material benefits.

An important issue is **a competent approach to introducing changes with regard to the production potential** of an agricultural holding, in particular changing arable land, **as well as the intensification, specialization, and finally concentration of agricultural production**. The purpose of these processes is to generate higher economic benefits for the agricultural producer. Although their impact on the natural environment and society may be both positive and negative, the direction of their impact depends on local environment-soil conditions of the agricultural holding. An important role is played by the current organization and resources available in an agricultural holding, as well as the current level of advancement of designated processes and the pace of their changes. This justifies the need for a complex analysis of the state of a farm and the planned resource and production changes. An increase in the potential of a farm, and the occurrence of processes, such as intensification or specialization, may be consistent with the farm development towards sustainability.

The area of an agricultural holding is one of the basic factors determining the possibilities of its sustainability (Kuś and Krasowicz, 2001: 286; Krasowicz, 2005: 35). Larger holdings have an appropriate production potential, including lands, which permits the precise conducting of production processes therein. A larger area of a holding increases the possibilities with regards to crop rotation and the proper balancing of organic matter and nutrients in the soil (Toczyński et al., 2013: 134; Wrzaszcz, 2010: 79; Wrzaszcz, 2012a: 40-42). A larger area also allows the holding to achieve higher economic performance, a more beneficial work remuneration, and as a result, economic sustainability (Sadowski, 2012: 318).

More favourable economic performance, is reflected in a higher standard of living of the farmer's family. This result is extremely favourable, in light of the growing significance of sustainable development in agriculture. The relation between the size of the farm and its

environmental sustainability is not of a linear nature. The largest holdings also have the widest opportunities with regards to achieving an adequate level of economic sustainability, however, they often suffer from an environmental problem, due to conducting simplified production, often focused solely on plant production. In practice, the simplified crop structure is connected with an increased consumption of industrial production means, resulting in unfavourable fertilisation balance and water contamination. Abandoning animal production also brings about difficulties in maintaining soil fertility (Krasowicz, 2005: 35).

Similar relations are present in the case of specialization and intensification of agricultural production. Depending on the level of specialization, agricultural holdings may have a favourable effect on the natural environment, or create hazards for their surroundings (Krasowicz, 2005: 35). These dependencies are very complex and require increased attention. Specialization means increasing production of the agricultural product – plant or animal – with the use of modern production methods. The purpose behind specializing is the improvement of farming efficiency and gaining a market advantage resulting from lower costs or a higher quality of production and larger quantities of produced materials. Specialization facilitates technological and technical progress that leads to higher productivity and a decrease in the labour-intensity of agricultural production. *The condition for specializing is the proper adjustment of the production direction to habitat factors, and economic-organizational circumstances of a holding, and the region* (Andreae, 1963 cited in Kuś, 2013: 95).

Although agricultural holding specialization is a result of economic issues, it should be adapted to the environmental and social surroundings. Specialized holdings do not have to generate hazards for the natural environment and may even possess a high level of sustainability, including environmental. However, this requires slightly more effort and knowledge from the farmer. Specific opportunities with regards to sustainability are presented to holdings specialized in rearing animals fed in a grazing system (concerns mainly cattle), as opposed to poultry or pig farms (Krasowicz et al., 2007: 60; Wrzaszcz, 2012c:140-142).

On the one hand, animal production positively affects the level of environmental sustainability of holdings, but at the same time stocking density in an agricultural land is crucial, as holdings focused on high-intensity animal production must seek markets for natural fertilizers, and purchase feed for their animals (Kuś and Kopiński, 2011: 66). On the other hand, more and more frequent holding specialization in the area of plant production is reflected by a growing

number of no-livestock holdings, which are progressively more dependent on external means of production (mineral fertilizers), use specialized, simplified crop rotation, which may pose a threat to soil fertility (Kuś et al., 2008: 32).

Another important issue is farming (plant and animal production organization) and production intensity. The intensity of plant production organization is defined on the basis of the structure or area of individual cultivations, while the intensity of animal production organization results from livestock structure or numbers. Production intensity is usually defined by the level of costs – total or a selected group thereof – with regard to area of arable lands.

The process of heightening intensity – i.e. intensification (Harasim, 2006: 115) – may apply both to changes in farming intensity and production intensity. Similarly, to specialization, the intensification process may be both beneficial and threatening to nature (Wrzaszcz, 2012b: 114). Moderate intensification of agricultural production organization involves varying the crop structure, as well as maintaining animal production, which favourably affects soil balance results. Furthermore, rational and proper application of industrial means of agricultural production, which is the primary determinant of production intensity, should not threaten the natural environment. However, the unrestrained intensification of organization and production disturbs the functioning of the ecosystem.

In holdings with a very high intensity levels, the involvement of production factors (including external) and natural resources is so high, that they generate significant environmental costs. Excessive intensification leads to environmental degradation. Therefore, it is advised to seek methods to heighten intensity by way of agri-ecological processes, as well as within the capacity of the local environment (See e.g. Ripoll-Bosch et al., 2012; Björklund, 1999).

The above discussion concerning specialization and intensification of agricultural production, indicated a special significance of the **multi-directionality of agricultural production** – combining plant and animal production in the agricultural holding, in the context of their sustainable development. Such holdings have wider possibilities with regards to maintaining a closed circulation of organic matter and nutrients, thus are less dependent on market processes, as compared to one-directional holdings. They also have the widest possibilities to achieve production-environmental sustainability. Due to combining two directions of production, the obtained natural and organic fertilizers are allocated to fertilize the soil, while a part of the cultivations is used as feed for livestock kept in the holding. Public statistics indicate however, that

as much as every third holding does not conduct animal production. The reasons for resigning from multi-directionality are mainly economic, i.e. the decreasing profitability of animal production, in consequence of the market situation, as well as regulations on animal welfare and environmental standards (Zegar, 2014: 22).

An important issue is also the **management system**. Apart from the traditional model, it is worth enumerating the ecological and integrated systems. Legally speaking the former two include a farm as a whole, and the latter applies to individual cultivations. In the context of sustainable development, each of them may provide various profits for the farmer and their social and environmental surroundings, however, by definition, it is the ecological and integrated systems (Sosnowska, 2015; Rozbicki, 2015), which emphasize the idea of special protection of the natural environment. Since in the last decade, the ecological production system underwent a dynamic development, we shall discuss it in more detail.

The ecological production system has probably the greatest requirements of the human factor involvement – an adequate knowledge level and work force. Considering the pace of development of ecological holdings, an area can be noticed, wherein a part of workload surplus may be effectively used, at the same time contributing to their further development. Ecological holdings to a broader extent, realize environmental objectives, as compared to conventional holdings. Restrictive assumptions of ecological production determine the specific attitude of a farmer with regards to conducted operations, and thus obligate them to produce foodstuffs of high nutritional value in accordance with the surrounding ecosystem (Zegar, 2008: 114). Unfortunately, with regards to economic benefits, ecological holdings tend to differ *in minus* from conventional holdings, and therefore pose a problem with their economic sustainability<sup>12</sup>.

Subsidies for ecological producers are unquestionably a significant financial aid, however, they fail to fully compensate the differences arising e.g. from increased workforce, logistics, and sales. While the market (grocery shops) often offers the price for organic products for farmers similar to the price of the products obtained by conventional methods (Komorowska, 2009: 151; Borecka and Szumiec, 2013: 100).

**Actions undertaken in an agricultural holding are a result of the decisions and knowledge of an agricultural producer.** Implementing the principles of sustainable development

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<sup>12</sup> The issue of ecological agriculture is discussed in, i.a.: (Wrzaszcz and Zegar 2014a: 39-58; Wrzaszcz and Zegar 2014b: 48-64).

in an agricultural holding requires a lot of skill from the agricultural producer. A frequent reason for incorrect production decisions, negatively affecting the natural environment, is the lack of proper knowledge on part of the farmer. The level and scope of knowledge of the farmer is the basic factor conditioning their production and non-production decisions related to the functioning of a farm, and the implementation of progress and the direction of further development (Schultz, 1964). The direction of sustainable development of an agricultural holding requires the farmer to possess diverse, interdisciplinary qualifications, based on professional experience and education, as well as their gradual supplementing, in particular in the scope concerning environmental protection.

Verification of farmer knowledge is, however, very difficult, therefore, their level of education is considered as a viable substitute scale. A higher level of education fosters better use of the means of production. Better educated farmers generally achieve higher production-economic results. Along with the increase in qualifications of farm managers, and by extension their knowledge and ecological awareness, changes are introduced to agricultural management, in particular with regards to the organization of agricultural production, in the scope of its impact on the natural environment (Wrzaszcz, 2012b: 103-104, 115).

The level and scope of farmer knowledge depends, however, on many factors, i.a. their own motivation and need of its broadening, as well as time and financial constraints, including in the scope of cooperation with various consulting bodies providing services in the scope of agriculture economics or environmental protection. Currently, of increasing importance is participation in various meetings, courses or trainings, usually carried out by advisory centres providing services for agriculture. Participation in such forms of gaining knowledge allows, quickly and easily, to obtain information regarding combining traditional agricultural production, and modern technologies based on natural processes. By such activity, the farmer invests both in themselves and in the farm, increases their ecological awareness and the probability of achieving sustainability of their own agricultural holding. The acquired knowledge affects further business activity of the farmer, including the ability to use government programmes, adequate to the chosen development direction of an agricultural holding.

## 5. Summary and Main Conclusions

The article focuses on challenges facing agricultural holdings, the determinants of agricultural activity, and measures, which may be taken by an agricultural producer, in order to realize the objectives of sustainable development.

The basic challenges include social needs and the demand for goods and services generated by agricultural holdings. Meeting this challenge however, is no easy task. An agricultural holding operates under certain conditions (market, institutional, economic and social), which heterogeneously affect the direction of the development of agricultural holdings. Part of the conditions mentioned is favourable for implementing these principles, while others call for maintaining the previous, industrial direction of development. The method of organizing agricultural production on a farm is a result of various multidirectional forces, indirectly and directly affecting management of an agricultural holding. Due to the dominant number of external conditions for the development of agricultural holdings, harmonization of the micro and macroeconomic criteria is not an easy task. On the other hand, a number of specific actions may be identified, which, at the level of an agricultural holding, foster reconciling various objectives and fall within the scope of sustainable development.

The conducted research points to the following main conclusions:

1. There is a growing social demand for goods and services delivered by multifunctional agriculture.
2. The farmer aiming to fulfil the microeconomic criterion, focuses on producing goods valued on the market. This process of agricultural production is accompanied by external effects, which are not an object of market sales. External benefits of agricultural production are generated in shortage, while external costs, in excess.
3. A challenge before agriculture is to deliver desired agricultural products and public goods, while minimizing pressure on the natural environment.
4. A challenge is also to harmonise the microeconomic (considered by farmers) and the macroeconomic (important for the society) optimums. An important role here, is assigned to governmental institutions, which are expected to prepare relevant financial instruments that include i.e. boundary conditions of agricultural production, and the creation of an institutional environment.

5. In the context of sustainable development, farmers should define not only the short-term function of purpose, but also the long-term. Realizing this concept requires defining, implementing and connecting various kinds of activities, adapted to the local economic conditions of agricultural activity.
6. The complexity of the examined issue is a challenge, not only for farmers and government institutions, but also for researchers, who should prepare useful methods concerning the internalization of external effects of agricultural production.

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## *Wyzwania zrównoważonego rozwoju gospodarstw rolnych*

### *Streszczenie*

Gospodarstwa rolne pełnią bardzo ważną rolę w zrównoważonym rozwoju społeczno-gospodarczym. Współcześnie działalność gospodarstw rolnych jest głównie determinowana przez mechanizm rynkowy. Rynek określa zasady funkcjonowania gospodarstw rolnych, dotyczące zarówno rodzaju i skali podjętej działalności rolnej, sposobu produkcji rolnej, jak i warunków jej sprzedaży. Mechanizm rynku wymusza orientację gospodarstw rolnych na realizację celów ekonomicznych, abstrahując od efektów zewnętrznych produkcji rolnej. Efekty zewnętrzne produkcji rolnej nie są przedmiotem transakcji rynkowych i jak dotąd nie znajdują odzwierciedlenia w rachunku ekonomicznym rolnika. Efekty zewnętrzne produkcji rolnej są jednak przedmiotem coraz większego zainteresowania społeczeństwa. Zainteresowania te odnoszą się chociażby do ochrony środowiska przyrodniczego oraz walorów zdrowotnych dostarczanej żywności. W związku z tym, pojawia się wyzwanie sprostania wymogom zarówno tym o charakterze rynkowym, jak i społecznym. Wychodząc naprzeciw różnym wyzwaniom gospodarstw rolnych zachodzi potrzeba podejmowania działań zmierzających do harmonizowania kryterium mikro- i makroekonomicznego procesu produkcji rolnej. To fundamentalna podstawa koncepcji zrównoważonego rozwoju, która obejmuje także rolnictwo, w tym gospodarstwa rolne – podstawowe jednostki gospodarcze tego sektora. Sprostanie tym wyzwaniom wymaga uwzględniania także czynnika politycznego, by korygował on niepożądane skutki działalności gospodarczej. Celem artykułu będzie przedstawienie głównych wyzwań gospodarstw rolnych, uwarunkowań oraz działań prowadzących do ich zrównoważonego rozwoju.

**Słowa kluczowe:** zrównoważony rozwój, gospodarstwa rolne, wyzwania, uwarunkowania, działania