TRANSFORMATION MANAGEMENT OF ECONOMIC AT RURAL AREAS

Collective monograph

edited by

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The results of investigating the transformation management of economic in the context of developing rural areas have been presented in the collective monograph, based on the positions of inter-subject approach. The peculiarities of financing and state supporting of agriculture under the conditions of modern market economy have been considered. Management, ecological, economic, and social paradigms of developing rural areas have been elucidated. Considerable attention has been paid to the questions of logistic management of agricultural production. The prerequisites for stable management, ecological, social, and economic development of rural areas have been defined. The question of transforming management of economic in the context of providing stable development of rural areas has been investigated.

The collective monograph is a part of research theme "To work out scientific directions of organizational, management, economic, financial and social development, and regulation in agro-industrial complex, on the branch level and in the organization-legal forms of market economy" (the number of state registration 0111U002780)

The monograph is aimed for scientists, teachers, executives and specialists of state administration bodies, specialists of agro-formations, post-graduate students, and everybody interested in the questions of developing agro-industrial complex on the basis of rational nature usage.

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Table of contents

Introduction

This monograph largely represents a complex of scientific researches implemented within the framework of international cooperation of the academic staff from Poltava State Agrarian Academy (Ukraine) and Czestochowa University of Technology (Poland). As an exception we need to mention two scientific works that are the results of research with the involvement of four affiliate organizations from Ukraine and Poland such as Zabolotnyi Institute of Microbiology and Virology of National Academy of Science (Ukraine), National University of Life and Environmental Science (Ukraine), Kharkiv National University of Economics (Ukraine), Opole University (Poland).

All presented achievements were implemented within the statutory activity and as a result of the initiative scientific cooperation and individual scientific interests.

Since the range of scientific interests and joint research projects in both institutions is very broad, the subject of this monograph is slightly dispersed. In my opinion, that is a major positive aspect of this research project. This particular feature permits to demonstrate existing developments and the potential for further cooperation to the colleagues and foreign partners.

The close cooperation in the use of innovative tools for sustainable rural development is a priority in the modern Ukraine.

Studying and using experience of Polish colleagues provides Ukrainian scientists not only with wide prospects for implementation of new management techniques, IT and technological solutions in the agricultural sector, which is a priority in Poltava region, but also gives the opportunities for elaboration of European development strategies and for adaptation to the traditions of European scientific community.

Experience of Poland in adjusting to the demands and realities of the European community (primarily in the field of agricultural production) and its realization, especially in the context of the active movement of Ukraine towards European values, gives us the opportunity to hope that our cooperation will continue to be useful and effective. We believe that it will contribute to the development and prosperity of both educational institutions as well as both countries, in general.

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Table abstracts

Chapter 1

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DIFFUSION OF MANAGEMENT OF KNOWLEDGE AND INFORMATION TRANSFER IN RURAL AREAS

Abstract: In the modern economy, we can observe a need for an increasingly comprehensive view and consideration of management in agribusiness. Factors connected with management in the sphere of agribusiness caused farmers-entrepreneurs to take into account issues resulting from the process of management a greater extent than before. In an agricultural holding, like in every enterprise, in order to become competitive and survive on the market it is necessary to adjust production to current needs, invest in the development (resulting in the development of rural areas), improve the quality of products and modernise the farm. An entrepreneur-farmer has to predict and effectively meet consumers' needs. The aim of the paper is to show how to take rational decisions in the area of management of an agricultural holding using knowledge, resources and motivation. However, management of an agricultural enterprise, i.e. an agricultural holding, is specific, as decisions that are taken often refer not only to production and investment, but also to creation of activities that resort to solutions in the area of management.

Key words: management, knowledge and information transfer, rural areas, infrastructure

Chapter 2

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MANAGEMENT OF ENOTOURISM AS AN OPPORTUNITY FOR MODERN FARMS

Abstrakt: Wine tourism is one of the directions of tourism development. The attractiveness of this segment of market has caused that many people consider wine-growing and production of wine as a potential source of income. Lately, in Poland, vineyards have also been built, and with it, production of wine has been started. The operations of the vineyard owners may support promotion of region and its assets. The aim of the present article is to present the meaning of wine tourism in agribusiness. Management of wine tourism is an opportunity for farms and inhabitants of rural areas. Particular attention was paid to the development of wine tourism in Poland. Logistics operations in wine tourism were described on an example of one company.

Keywords: wine tourism, enotourism, management in tourism

Chapter 3

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PROBLEM QUESTIONS OF MANAGEMENT OF FINANCIAL EXPENSES AND PERSONNEL COSTS AT AGRICULTURAL ENTERPRISE

Abstract: The contents of developing phases and implementing production the efficient system of production costs management depending on directions were considered in the article. The level of nominal and real manufacturing income of population in Poltava oblast' and in Ukraine was estimated. The structural orientation of costs of agricultural products was defined. The peculiarities of financial expense and personnel costs of agricultural enterprise were generalized.

Key words: management, expenses, financial expenses, personnel costs, agricultural enterprise, management of financial expenses.

Chapter 4

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DEVELOPMENT OF RESIDENTIAL AREAS IN HARMONY WITH NATURE

Abstract: The article presents the basic principles of organic (natural) farming in "Agroecology" are: soil preserving technologies, that is, seed bed is processed to depth of 5 cm for all the crops while surface is mulched with harvest residues; soil fertility is restored with the aid of organic fertilizers (manure - at least 24-26 t/ha, non-tradable crop residues and green manure crops); synthetic fertilizers are not applied (nitrogen is supplied through entering legumes into crop rotation (more than 20% saturation); agro-technical measures to protect crops from weeds and stubble crops (cruciferous green manure sown after harvesting, which has allelopathic effect on weeds); crop protection from pests and diseases with the aid of agricultural practices, prevention and biological methods; correction of land use patterns and optimal crop structure modelling. The proposed work based on the example of private enterprise "Agroecology" is used for environmental education in rural schools in Poltava region, as well as in higher education establishment, including Poltava State Agrarian Academy, specialized education centers and non-formal education institutions. The program of residential areas develepment should always take into account human activities and its problems, natural feature and value of the environment (be in harmony with nature), cultural and historical heritage of rural areas.

Key words: agroecosystems, organic farming, crop rotation, biological activity, soil microorganisms, environmental education

Chapter 5

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FINANCIAL SUPPORT OF ORGANING FARMING: PROBLEMS AND PROSPECTS

Abstract: The article justifies the necessity of the development of organic agriculture through its state and financial support. Characteristics and statistics of crediting the agrarian sector economics in Ukraine are given. Disadvantages of the existing system of crediting agricultural producers have been defined. We identified weaknesses of the existing system of lending farmers and support. The experience of international support for organic agricultural production in Poltava region has been presented. The ways of ensuring the implementation of eco-innovative technologies to organic agricultural production have been determined.

Keywords: organic farming, financial support, organic agricultural products, state support, the agrarian sector of economics, crediting, insurance of credit risk, eco-innovations.

Chapter 6

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LOGISTICS SYSTEMS OF FOOD BUSINESSES OPERATING IN RURAL AREAS

Abstract: In the paper, there have been presented the issues associated with the significance of logistics systems in food businesses. The attention has also been drawn to the essence of the information transferred in the framework of logistics sub-systems, particularly in entities operating in rural areas. In the last part of the paper, there has been described the Discover Great Food program and there has been made the assessment of the integration of actions in logistics systems of the manufacturers of the awarded products, who conduct their business activities in rural areas.

Keywords: logistics systems, logistics information, Discover Great Food program

Chapter 7

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HOLISTIC PARADIGM OF SMALL BUSINESS MARKETING AND ITS ROLE IN RURAL DEVELOPMENT

Abstract: A number of signatures of social and economic rural development in Ukraine was exemined. A number of problems based on this analysis was identified and their deterioration was provided. As an unemployment problem-solving measure in rural areas and thereto related earnings hiccup, other social and personal problems the small business activation in various rural industries was proposed. In addition to the employment and profit level effect it will also optimize the rural infrastructure development, acculturation and so on. At present the small business development in rural areas is possible only on the basis of marketing. The problems of management in marketing activities of domestic small businesses in a down economy were formulated. The general principles of management in marketing activities of small businesses were defined. Their implementation gears the operation of enterprises to modern realities of the Ukrainia, economic system and promotes rural development. The holistic marketing paradigm is adequate to modern requirements. It provides a comprehensive and systematic approach to marketing activity, the company review as a part of a single system with the consumer.

Keywords: marketing activity, small business, holistic paradigm, revitalization of small business, rural development, management in marketing activities.

Chapter 8

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MANAGEMENT OF ADDED VALUE FOR THE CUSTOMER IN AN ORGANIC AGRICULTURAL HOLDING

Abstract: The author defined the concepts of organic farming, organic food and organic agricultural holding, presented the characteristics of the latter, and conditions that an agricultural holding has to fulfil to be granted the status of an organic one. Further, the chapter presents diagnosis of the situation of organic farming in Poland in terms of the number of organic agricultural holdings and their area, examines the strengths and weaknesses of organic farming and added value for the customer offered by organic agricultural holdings in the context of the customer's preferences and expectations as well as willingness to incur higher expenses connected with purchasing organic food.

Keywords: organic farming, organic food, added value for the customer

Chapter 9

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INNOVATION BUSINESS ACTIVITY OF COMPANIES

Abstract: The article contains an analysis and evaluation of selected issues of innovation activity of companies in economic theory and practice. Given the progressing processes of globalization, companies are forced to seek for such fields of business activity that enable growth of competitiveness. One of such areas is the innovation business activity of companies stimulated by EU funds as part of innovation projects and programs. On account of this, the determinants of innovation implementation have been put forward and the possibility of applying a mathematical model including optimization parameters has been pointed out. There has also been conducted an estimation of the level and scope of innovation processes in companies, on the basis of survey research.

Keywords: innovation in companies, model optimization, EU projects

Chapter 10

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ECONOMIC INNOVATIONS OF LOCAL SELF-GOVERMENT ON THE TERRITORY OF UKRAINE IN THE LATE XIX - EARLY XX CENTURIES: HISTORICAL PERSPECTIVE

Abstract: The work highlights the economic innovations developed by elected local governments (zemstvos) in Ukraine in the second half of the XIX – early XX centuries. The methods of their activities have been analyzed, carried the focus on the most relevant achievements has been carried out, the experience of the best practices useful for our present days has been gained. Special attention is paid to the periodization of economic activities of the local government. Analysis of economic benefits of zemstvos is based not only on scientific papers of the contemporaries, but also original sourses have been used, in particular the anniversary comprehensive collections printed for the 50th anniversary of zemstvos, works by economists, financiers, statisticians of the second half of the XIX – early XX centuries.

Keywords: Russian Empire, Ukraine, district council (zemstvo), the economic activities.

Chapter 11

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MANAGEMENT DECENTRALIZATION AND REFORM OF LOCAL SELF-GOVERNMENT OF RURAL AREAS IN UKRAINE: PROBLEMS AND PERSPECTIVES

Abstract: The substance of management decentralization and local government was considered. The problems of management decentralization and reform of rural areas in Ukraine were determined. The reasons of unsatisfactory state of rural community were revealed. The ways of development of local rural self-government were grounded.

Key words: decentralization, management, local self-government, reform, local community, development, rural areas.

Chapter 12

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METHODS OF SIMULATION MODELING APPLICATION IN THE MANAGEMENT DISTRIBUTION OF INVESTMENTS BETWEEN COMPANIES

Abstract: In this article we discuss the advantages of using Monte Carlo method as one of the simulations modeling method for solving optimization problems on the distribution of investments between companies to decision-making. The work contains algorithm of the problem solving and an original computer program folded in the programming language VBA, and also the results of simulation with the Solver tool among MS Excel. Comparative analysis of the effectiveness of different methods showed that the Monte Carlo method is more powerful in terms of the stochastic nature of economic factors and is suitable for the implementation of a large number of model runs by using random number generators.

Keywords: economic and mathematical model, simulation model, Monte Carlo method, uniformly distributed random numbers, program macros, optimal allocation of investment

Chapter 13

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CMR AS A TOOL ENABLING ONE TO MODEL INFORMATION IN THE AGENCY FOR RESTRUCTURING AND MODERNIZATION OF AGRICULTURE

Abstract: Nowadays flow of information is very important both in companies and in public institutions. CRM allows collecting information and makes easier information's flow. Both the IT system and conceptual approach to the customer are intended to build a lasting relationship between the customer and the enterprise, and anticipate their needs. IT-CRM allows you to organize and classify available information. It allows managers to have the ability to generate reports, make an agreement or build contract. The concept of CRM can help to build strategy, set priorities, arrange the relationship with the customer. Both tools interact perfectly with each other. The overriding objective is to acquire a new customer or improving relations with existing customers. Nowadays, company or institution have to take care of every single client. CRM gives you the ability to identify needs, and it often results in acquiring new contacts.

Key words: CRM, enterprise, company, the value of relationships, management.

Chapter 14

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BASIC MODELS, MECHANISMS AND INDICATORS OF ORGANIZATION'S SUSTAINABLE DEVELOPMENT IN THE AGRICULTURAL SECTOR OF ECONOMY

Abstract: The basic concepts have been determined:development, sustainable development, expanded reproduction and economic growth, innovative economy and entrepreneurial society. Basic approaches to the interpretation of the concept «sustainable development» have been considered and the place of sustainable development of agricultural enterprises in the sustainable development of society has been established. Features of the agricultural sector, that carry a direct impact on the sustainability of agricultural enterprises' development have been highlighted. The basic areas of research have been analyzed to develop a system of indicators for monitoring, evaluation and control efficiency to achieve the objectives - indicators of sustainable development.

Keywords: development, sustainable development, organization, agricultural enterprise, agricultural sector of economy, development model, tool, indicators of sustainable development.

Chapter 15

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THE LEADER'S ROLE IN INCREASING THE MANAGEMENT EFFICIENCY OF THE ORGANIZATION

Abstract: The problems of leadership are critical to achieving organizational effectiveness, that's why the analysis of leadership role validity in increasing the management efficiency of organization and the peculiarities of innovative leadership are important at the modern stage of development. The objective is disclosure of the contents and features of a leader's role and its influence on the management effectiveness of the organization. The result proved that the effectiveness of leadership and management related to the organization personnel's readiness to introduce innovative changes, especially in management. The creation of administrative innovations in the organization is the key to improving the efficiency of management in the organization.

Keywords: leader, head, manager, innovative leadership, leadership effectiveness, authority**.**

Chapter 16

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INFORMATION SYSTEMS AND TECHNOLOGIES IN LOGISTICS – THE EXAMPLE OF THE „X" COMPANY

Abstract: Globalisation, increasing competition and changing requirements of clients may be indicated as challenges that nowadays businesses must face. To fulfil all those requirements it is necessary to use modern information systems and technologies, what has been known for years. Those tools are extremely important especially in the area of logistics that plays significant role in nowadays economy. It is well known that to meet the requirements mentioned above it is necessary to overcome problems in logistics that become more and more enhanced because of constantly changing requirements of customers, who expect customization of offers and their diversification in consequence. Customers expect to be provided with fast and safe deliveries while business partners anticipate the highest possible level of reliability and flexibility. At the same time products must be moved all over the world quickly and efficiently. Thus, there is no way to obtain all the mentioned goals using traditional methods of logistics management. More sophisticated tools, that exploit information systems and technologies, are required in this case. The paper includes the presentation and discussion on information systems and technologies that are used in logistics by the management of the "X" company.

Key words: information system, electronic stock exchange

Chapter 17

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INNOVATIVE ACTIVITY AND INFORMATION TECHNOLOGY IN THE CONTEXT OF DEVELOPING RURAL ECONOMY

Abstract: Management of an enterprise located in a rural area is often identified with poorly developed enterprises. Nevertheless, agricultural enterprises are very frequently so well developed from a technological viewpoint that they may be compared to large manufacturing enterprises in other areas. The Internet and innovations are strongly rooted in the notion of the economy and its development that these notions would seem to be identical and most definitely dependent on each other. In the herein paper, analysis of enterprises operating in rural areas has been presented in the context of analysing the actual dependencies between innovativeness and information technology.

Key words: innovations, development, rural economy.

Chapter 18

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IT TECHNOLOGY TO ELIMINATE THE RISK IN MEAT SUPPLY CHAIN IN JAPAN AND THAILAND

Abstract: The paper discusses the problem of safety in meat supply chain which is under ongoing processes of control and still needs further improvement and development of tools that will provide the best ways to eliminate any risk of occurrence of ailment. The basic and always actual dangers of possible outbreaks of BSE and bird flu diseases are discussed in this paper in terms of IT technology implemented in order to fight these threats at initial stages of meat supply chain. Japanese and Thai examples illustrate the effective results of innovative IT solutions put into practice to eliminate the risk in meat supply chain.

Key words: IT, risk, meat, supply chain

Chapter 19

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MANAGEMENT OF DRINKING WATER QUALITY

Abstract: The complex method of drinking water purification is presented in this article. The clay material (sorbent) of known composition and the probiotic preparation based on Bacillus subtilis were proposed to use for treatment of water. It was possible to improve the water quality and disinfect it by means of this method. The results of experimental studies are presented. The advantages and disadvantages of the proposed method of purification of drinking water are shown.

Key words: drinking water, sorbent, clay raw material, probiotic, nitrate-ions, pH

Chapter 20

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INFORMATION TECHNOLOGY IN ENTERPRISE MANAGEMENT IN RURAL AREAS

Abstract: The paper is to explore the possibilities of the application of modern information technology by the manufacturing company operating in a rural area. In the theoretical part, the focus of attention is the problem associated with the functioning of information systems in the company. In the subsequent part of paper, under the information system, there is characterized the flow of information which constitutes the information process. There are discussed the components of management information system. In the empirical part of the paper, using descriptive analysis, there is presented the case study of the functioning of the maintenance information system in the manufacturing company operating in a rural area. There has been proven the impact of the application of modern information technologies on effectiveness of the functioning of maintenance processes. In the final part of the paper, the attention is drawn to the occurrence of feedback between the implementation of modern information technologies in the company and its pro-development attitude towards local rural community.

Keywords: information system, flow of information, enterprise management.

Chapter 21

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TRANSFER OF INFORMATION IN AGRITOURISM USING PORTALS AS PART OF THE LOGISTICS MANAGEMENT OF RURAL AREAS

Abstract: In the article, the role of internet advertising in agritourism services promotion was presented.

On the base of literature the significance of this promotional tool in agritourism is presented. Part of portals with the offer of rest at farmers is easy to be found on official websides of any municipalities, others on agritourism associations' portals. The best option is possessing by farmers own webside of their agritourism farms. In logistics management in agritourism, the information flow from farmers providing agritourism services to potential tourists is best seen thanks to internet portals. In the empirical part of the article, the results of surveys carried out with 31 owners of agritourism farms functioning on the area or very close to the Ojcow National Park were presented. The survey focused mainly on the role of the internet in agritourism promotion and its significance in logistics management of agritourism services.

Keywords: agriturism, logistics management, rural areas.

Chapter 22

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THE APPLICATION AND DEVELOPMENT OF INFORMATION TECHNOLOGIES IN LOGISTIC MANAGEMENT OF AGRICULTURAL FARMS

Abstract: The application of IT Technologies in agriculture has constituted a very important direction in economic development over the past few years. Increasing the production efficiency of agricultural farms has always constituted a challenge for the experts in the field of mechanization and IT implementation. The constant technological progress has brought a multitude of possibilities for the improvement of the efficiency of agricultural farms. A manifestation of the wide application of IT technologies is the development of the techniques and tools for precision agriculture. The author of this paper presents the possibilities of applying the locating system technology in precision agriculture in the context of logistics management. The aim of the herein paper is the general analysis of the possibilities of adapting new technologies in the Polish agricultural sector

Keywords: IT technologies, precision agriculture, logistics.

Chapter 23

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TELEMATICS IN AGRICULTURAL MACHINERY

Abstract: Agriculture today has the ability to use communication technology between vehicles in the field and the base. Telematic systems offer quick and convenient access to detailed information about vehicle, employee, product and work. There is a whole series of data that can be obtained from telematics systems depending on built-in and connected sensors. More advanced telematics systems offer features of fleet management and can help to manage a farm. The investment in telematics systems can be for the farmer an opportunity to enter the world of computer-aided farm management.

Key words: management, agricultural farm, telematics, communication.

Chapter 1

DIFFUSION OF MANAGEMENT OF KNOWLEDGE AND INFORMATION TRANSFER IN RURAL AREAS

Brzozowska Anna, Galych Oleksandr

Introduction

Effective management of agricultural holdings can lead to profitability of agricultural activity. This refers in particular to such behaviour as: breaking patterns, shaping adequate attitudes, acquiring information, modernisation, creating groups of agricultural producers, and production innovation. In the agricultural and rural sector, EU support is particularly important, as it provides a unique chance for modernising agriculture and making a civilizational breakthrough in rural areas on an unprecedented scale.

The concept of management in rural areas and in agricultural holdings should be considered from the perspective of integration of management and assignment of an agricultural holding. This approach means a full integration of managerial principles and processes occurring in rural areas and agricultural holdings at every level of operational, strategic and normative management. A farmer managing an agricultural enterprise is a person who not only wants to gain financial benefits from his/her work, but also has large motivation and feels satisfaction from daily life, which can be related with behavioural school of management.

Characterising the problems of management of agricultural holdings in the light of academic literature, it has been stressed that effective use of funds leads to economic growth in rural areas. Observing diversification of the development of rural areas, the chapter highlights possibilities of entrepreneurs-farmers using offered assistance through strategic management, logistic support or modernisation of logistic infrastructure. It makes an attempt to indicate rationale and conditions and to identify possibilities of activating logistic support in rural areas. It points out that the modern dynamics of rural development caused by a range of integration processes and continuous assumption of new functions by rural areas results in a noticeable infrastructure development and is conducive to the development of other spheres of life in rural areas.

When undertaking activities that use management processes, it is necessary o take into account the integration of knowledge and information transfer among agricultural entrepreneurs, which enables further modernisation and development of investments in the area of:

– flood preventive measures, dams and weirs, small water retention, land reclamation and irrigation,

- repair and maintenance of the existing and new irrigation systems based on corporate governance of re-established and new water companies,
- sewage system, purification plants, landfill sites and other facilities connected with sanitation of rural areas,
- reconstruction of factory, agricultural and gmina roads that ensure easy access to fields and farm areas as well as hamlets and villages,
- development of enterprises providing supply and sales services as well as processing and trading enterprises, including a separate network for trade in organic raw materials and food products,
- development of neighbourly, team, cooperative and private technical services in the area of mechanisation, transport, repairs, assembly and construction,
- improvement of veterinary and zootechnical services and the development of other agricultural services, including consulting, accounting, designing, banking, information as well as scientific and technical services.

The analysis presented by the Authors allows for formulation of a paradigm showing that knowledge and information transfer has an effective impact on a more effective process of managing agricultural holdings in rural areas.

Due to expected benefits of using the transfer of knowledge and information management, it becomes an attractive link of the economy, characterised by integration and coordination of economic entities operating in its area.

Factors impacting transfer of the use of knowledge and information in managing agricultural holdings in rural areas

With the development of the market, new schools and directions emerge in management, bringing constantly new elements into the theory and practice. Both these spheres have an impact on each other, with practice being usually the more active element. As theoreticians show [Grudzewski, Hejduk, 2006, pp. 176-178], the theory of management rarely preceded practice and imposed various innovative solutions. Most often, theory comments, analyses, generalises and popularises the best practical solutions in a given period and in a specific set of conditions. These solutions are more and more widely used in practice, as we can observe constant learning and improvement of knowledge among theoreticians, who present new solutions to practitioners. Knowledge on management becomes increasingly extensive and varied, allowing for practical use of tools that are adequate to plans and conditions of their implementation. Study of management is still evolving, and new theories are added to it. Analysis of the sphere of management should take into account its different aspects connected with changes of the evolution of orientation. As evolutionary theory shows, orientation in management follows two paths [Drucker, 1992, pp. 75-76]. On the one hand, there is transformation in the collective activity of people leading to a situation where the systems of relationships and dependencies between economic activity

participants become increasingly complex. This leads to the expansion of the subject of the theory. The second path refers to the development of methods and instruments for acquiring knowledge and processing it into rules that are useful in practice. Both the subject of the study and the cognitive and creative activities of the study itself are subject to evolution. With reference to management of agricultural holdings and rural areas, we can clearly indicate the evolutionary character of these changes. This is connected with the market on which entities of this type are functioning.

Management solutions should be used to support the transformation of rural areas and raise awareness of their inhabitants through adaptation of the transfer of knowledge and information allowing for change of agricultural holdings. Effective use of the management of knowledge and transformation transfer may significantly accelerate economic growth in a given rural area as well as overcoming structural barriers to the development [See more in: Rudnicki 2008, p. 7; Sobków 2004a, p. 29; Sobków 2004b]. This also involves payments to farmers, which are becoming a stimulator for transformation and development of rural areas, e.g. when payments are used for modernisation of agricultural holdings, specialisation of production [Wielewska 2004, p. 229].

In countries that were candidate members of the European Union until 1 May 2004, difficult and expensive adjustment processes were carried out. The European Union supported candidate members, both in technical and financial terms. Poland, which was among the candidate members at that time, was a beneficiary of this support as part of PHARE, ISPA and SAPARD programmes [Wielewska 2004, p. 229].

Both structural and regional policies are focused on spatial development. This increases their synergistic effect which integrally covers rural areas [See: Kot, Brzozowska 2001, pp. 78-81; Wiatrak 2005, pp. 611-622; Łapińska 2009, p. 182; Duczkowska-Małysz 2009, pp. 19-47], with the main function being agricultural production and taking into account the requirements of environmental protection. These objectives are pursued through the EU's Common Agricultural Policy [Wigier, 2007, p. 22; Wilkin 2010, pp. 264-268]. which has been subject to historical evolution since the period 2007-2013, increasing the process of integration based on the assumptions of Mansholt and Mc Sharhy's plan [Hadyńska, Łuczka-Bakuła 2003, pp. 95-100; Wilkin, 2003, p. 241]. Agenda 2000 and taking into account Fishler's reforms. The above-mentioned reforms refer to instruments for a structural policy and put particular pressure on multifunctional development of agriculture and rural areas, with management as one of their main objectives [Nowicka-Skowron, Stachowicz 2009, pp. 60-61.

Rationale for managing agricultural holdings in the aspect of logistics of rural areas

Skills possessed by persons implementing the process of management in rural areas should be an integral part of knowledge transfer, forming three basic groups:

conceptual ones (they help managers to understand how different parts of an entity impact each other and the whole); interpersonal ones (connected with the need of understanding and capability of establishing proper relations with people, holding job interviews, forming partnership-based relationships with other entities and ability to solve problems); technical ones (specific skills that are used by people when doing their work) [Ghillyer, 2009, pp. 10-11].

Due to the symbiotic relationship between management and knowledge transfer in rural areas, an increasing number of managers in agricultural enterprises appreciated not only the commercial values of this correlation, but also contributed to development in a number of areas of daily life [Bruska 2012, pp. 43].

Factors in the development of enterprises include efficient management and professionalism of the managerial staff, i.e. farmers and their nearest environment [Sudoł., Matuszak 2002, pp. 213-219]. Both business and non-business activity require the use of knowledge on management.

With the development of rural areas and modernisation of agricultural holdings, there are concerns about gradual modernisation of agricultural equipment and optimisation of methods of acting. The imbalance between the two above-mentioned areas of activity refers to factors that are in principle advantageous for the development of agricultural production, such as the functioning of producer groups. Lack of real competition, caused by a limited number of such organisations in rural areas (with their development so far rather not being too dynamic), determines the occurrence of quasi-monopolist phenomena as part of the activity of a given producer group, especially one that is focused on resources or joint production activities, which may have a negative impact on economic effects of its activity. The phenomenon of intermediation[1] (development of services for agricultural holdings) in the area of management is thus becoming one of the factors in reversal of the negative phenomena of pushing rural areas into peripheries in order to increase non-agricultural activities. Of importance is also the development of sustainable economy in rural areas, which due to concentration of environmental pollution in areas of high urbanisation is usually associated with urban areas, but from the above-presented perspective it seems to be one of significant elements of potential multifunctional development of agriculture [Wilkin 2010, pp. 269-272]. Agricultural production provides key components determining the development of sustainable energetics (biomass), determines effective management of potable water tanks (often localised in areas of intensive farming). The consequence of the use of the concept of sustainable development in rural areas manifests itself in optimisation of the structure of movements on the local scale, as cost-effectiveness of e.g. transport of biomass, which is the key element of the system of sustainable

[1] Intermediation means emergence of new agents in the structures of market channels, in particular distribution channels.

energetics, is limited by the radius of around 50 kilometres [Markowski 2006; Bruska 2012, p. 50].

While urban systems require additional measures connected with the implementation of the principles of sustainable development, the implementation of "green economy" in rural areas does not pose bigger difficulties due to available land and labour resources. Due to the past backwardness and marginalisation of significant part of rural areas, potential transformations in this direction may radically reduce the differences between the city and the country, increasing the territorial cohesion of the country. "Without a reasonable vision, the process of transformation is very easily split into a not very ordered set of undertakings, which are often not harmonised with each other, leading to nowhere or in the wrong direction" [Bratnicki 1998, p. 47]. A positive consequence of the implementation of managerial processes aimed at sustainable development of rural areas is the local character of solutions popularised in this approach. In the theory of sustainable development, the concept of ownership is replaced by access to and disposition of resources, which is in compliance with the tendencies of the development of le-agile supply chains.

In the conditions of rural areas, the practical implementation of this postulate materialises e.g. in sharing of agricultural machines and equipment, which allows fro reduction of the costs of using equipment and facilities. Processing of agricultural products, which includes recycling of detritus or goods which are not fully fit for consumption, is implemented in the light of activities aimed at increasing the share of biomass in the structure of sources of renewable energy. Apart from that, they may naturally become an element of production cycle of sustainable agricultural production as part of the option of recycling or re-entry into use. It is also possible to reduce or eliminate the use of a lot of materials in agricultural activity, which, contrary to urban areas, is connected in rural areas with a little autarkic approach to the use of biofuels by agricultural producers. The extension of similar possibilities to include alternative sources of energy will not only ensure the creation of a favourable structure of movements in rural areas (reduced demand for goods transported from "outside"), but it will also contribute to the improvement of profitability of agricultural holdings, and thus the development of the whole sphere of services connected with their sustainable functioning [Bratnicki 1998, p. 47].

Development dynamics is a term ascribed not only to urban areas. The pace of changes taking place in the modern world also has a strong impact on agriculture. As a result, in the present conditions not only gmina but also farmers have to adapt to changing conditions of functioning in a highly competitive environment [Doh 2000, pp. 555- 571]. Nowadays, a farmer cannot focus exclusively on agriculture. In order to ensure development of his/her enterprise [Malara 2008, pp. 31-32] and a resilient functioning of his/her farm, he/she has to become an entrepreneur reaching for solutions from the area of management or marketing - marketing effectiveness may also be achieved thanks to the scale of benefits, promotion of the global image and

reputation, as well as global customer loyalty, which is the key [Żmija, Matysik-Pejas, Szafrańska 2010, pp. 43-64], to be able to manage it consciously. As a result of the process of implementation of these principles in the sphere of agribusiness, agricultural holdings are currently perceived as enterprises and it is necessary to look for optimal solutions in the sphere of management (fig. 1) using four functions for that purpose [See more in: Griffin 2004, p. 8; Machaczka 2008, pp. 40-41; Pabian 2013, p. 197]:

– planning,
– decision-making,
– organising,
– leading (motivating and controlling agricultural enterprises in rural areas).

Authors do not fully agree on the number and names of these functions. For instance, L.W. Rue and L.L. Byars complement this set by an additional function: personal [Rue, Byars 2009, pp. 5-6]. The basic definitions of these functions and their mutual relationships have been presented in figure 1.

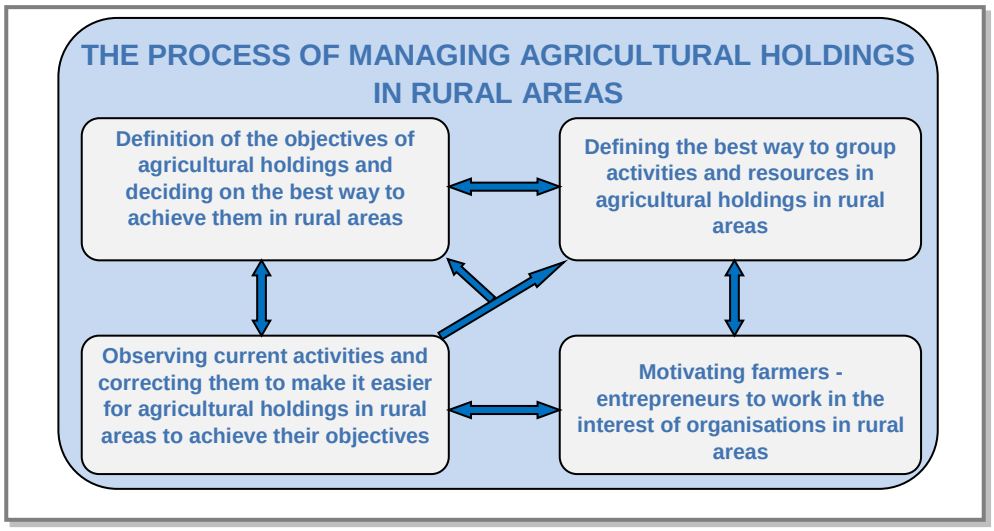

Figure 1. The process of managing agricultural holdings in rural areas

Source: Own work based on: [Griffin 2004, p. 8].

The multi-task character of the problem of economic cooperation in the face of globalisation processes dictates stringent requirements for managerial functions supporting this cooperation. An integrated environment for management of economic activity will arguably be eventually built [Chaberek 2002, p. 47] Thus, management takes place in conditions of close relationship with the environment, which comprises all the elements of the economic, political and social world. Until recently, economic entities perceived their environment as static one, and events taking place in it as easy

to predict. However, the last twenty years of the 20th century saw processes in the political, social and economic world that completely changed the view of farming conditions. This current also includes the issues of agribusiness as a sphere of implementation of principles and solutions for management of knowledge and information transfer aimed at shaping the system of the flow of goods and information on agricultural and food markets. This activity, aimed in particular at the development of agricultural holdings, is reflected in issues connected with agricultural logistics.

Analysis of problems connected with the conditions of management in agribusiness shows that this problem has not been fully examined or addressed by theoreticians. This means that both decision-makers and managers of agricultural holdings and rural areas may have a problem with appropriate application of principles and solutions necessary for achievement of the assumed effects of their activities. The sphere of knowledge and information transfer, which has been ignored so far, does not provide the possibility of achieving an expected effect of synergy and added value in agribusiness.

Infrastructure in the development of agricultural holdings and rural areas

Dynamics of the development of a given rural area strongly depends on its accessibility, therefore much emphasis should be placed on the development on rural infrastructure. Appropriate land use by laying utility lines, i.e. electricity, water and sewage system, not only increases the value of a given land, but also decreases costs of new investments, being thus a driver for increased attractiveness of a given area. Such activities require significant financial outlays and are often a break on further development of infrastructure of such a region. The priorities of the authorities should be to ensure the development of other than agricultural forms of activity in conditions of sustainable development of agricultural market as well as revival of rural areas and space. Such activities are aimed at increased competitiveness of rural areas and care for environmental protection as well as raising ecological awareness of residents. Activity of the authorities may significantly speed up the pace of infrastructure development and development of rural areas inhabitants' awareness of benefits of investment into infrastructure. [Pięcek 2001; Gładysz 2009, pp. 110-101]. However, in some cases incomplete knowledge of entities operating in rural areas on the development of infrastructure constitutes a kind of barrier to the economic development of gmina and agricultural entities. Thus, what is necessary is increased involvement in education on economic and financial issues, as well as knowledge of programmes, in order to more precisely formulate the strategy [Kaplan, Norton 2010, pp. 52-65; Krupski, 2010, pp. 4-10] of the development of a given region.

In literature research, infrastructure is often understood as a development factor which initiates the element of development and impacts how this process is carried out. According to the semantic interpretation of the term infrastructure, it is the basis for

a certain system or construction, foundation for a higher system [Kuciński 1994, p. 155; Dżbik 1995, p. 82]. One of the definitions states that infrastructure is a set of equipment and institutions that provide services without which the functioning and development of a certain system or its fragment would not be possible [Ratajczak 1999, p. 11]. Infrastructure is especially important for the economy and for ensuring appropriate living conditions for population.[2]

Classical division of infrastructure distinguishes two sub-systems: economic and social ones. The aim of economic infrastructure, which is also called technical infrastructure, is to ensure proper functioning of the economic sectors (which include: equipment and institutions from the field of communication, energetics, water management and environmental protection) and integration of spatial layouts. The second aspect of infrastructure (social infrastructure) comprises selected public institutions and equipment that allow individual communities and the whole society to exist and function properly providing services in the area of trade, education, culture and public order, among other things.

Further divisions of infrastructure present its further types: information infrastructure, which involves devices designed to send information along with telecommunication institutions, and business infrastructure, which comprises institutions that cover enterprises, facilitating investment and conducting of economic activity.

Based on academic literature publications, we can distinguish characteristics of infrastructure: ancillary character, general accessibility, durability, high capital intensity, long period of capital freezing and an abrupt way of costs generation.

Infrastructure fulfils a transfer function, creating appropriate conditions for reliable flow of information, services, people, capital or spatial flow of goods [Nowakowska-Grunt 2008, p. 71]. At the same time, infrastructure meets demand for services generated by consumers as well as enterprises, thus fulfilling the service function [Ficoń 2009, p. 45]. Another function of infrastructure refers to integration, i.e. it creates necessary spatial connections, contributing also to the coherence of the territory, which is significant in relations between peripheries and the centre. Nowadays, infrastructure is often an important element when choosing a place of work or residence, fulfilling at the same time a localisation function, which manifests itself also in the decision-making process [See more in: Bednarczyk 2001, p. 28] in the location of economic activity [Leśniewski 2011, nr 7-8, pp. 44-47; Grzybowska 2009, pp. 99-104] – impact on costs of conducting business activity. The acceleration

[2] In academic literature, apart from the term infrastructure the concepts of public capital, network and public amenities are functioning. This is connected with different definitions of infrastructure and with research conducted in different periods of the development of infrastructure studies [See: Ratajczak 1999, pp. 11-17].

function is the most important function of infrastructure. Its aim is to activate an area economically through an appropriate level of its use.

Infrastructure can also mean equipment, roads and institutions necessary for proper functioning of the economy, including agriculture in a giver area, with appropriate facilities which allow agricultural holdings to properly function in terms of production and distribution [Mendyk 2009, pp. 72-73].

The development of infrastructure, and infrastructure itself, has a significant impact on mobilisation of rural inhabitants and areas, and thus on eliminating civilizational backwardness in terms of broadly understood external and internal infrastructure, which includes:

- buildings and equipment,
- stocks, raw materials and finished goods,
- network of roads and transport routes, stopping points, trans-shipment o goods, auxiliary devices in the services of transport routes and transfers of people [Nowosielski 2008, p. 153; Ciesielski, Szudrowicz 2001, p. 14].

Mobilisation of rural areas and modernisation of agriculture depends on how dynamically and in what direction infrastructure is developing.

Extent of infrastructure development. It includes: level of wealth of gminas, activity of local authorities in the area of obtaining structural funds, activity of inhabitants of rural areas, density of human settlements determined by historic, environmental, economic and social factors.

The basic characteristics of infrastructure include technical and material integration that enables long-term planning. Thus, infrastructure determines effectiveness of business activity, in particular technical infrastructure [Kwapisz 2003, p. 334], i.e. technical measures used in the process of the flow of products and in information processes. They include:

- means of transport and equipment designed for internal movement and transportation of production means and agricultural crops between production and warehousing buildings, as well as for external transportation [Skowronek, Sarjusz-Wolski 2008, p. 82],
- gmina roads, waterworks, sewage system, gas pipelines, sewage treatment plants, electricity, landfills, treatment of municipal waste and heating network [Cyplik, Fechner, Janiak, Kołakowska, Langer, Mendyk, Nowak, Olejniczak, Piechociński, Przybycin, Rydzkowski, Stajniak, Szyszka, 2008, pp. 22-69],
- buildings designed for production and storage of agricultural products, including livestock buildings, cold stores, warehouses, silos, tanks, etc., which are necessary during agricultural production [Basiewicz, Gołaszewski, Rudziński 2007 pp. 157-160],
- packaging designed to protect agricultural products and specialist loading units [Harrison, van Hoek 2010, p. 33],

– means for collection, flow and processing of information designed for controlling logistic processes; they include devices and their systems as well as software applications [Abt 2001, pp. 130-132].

The level of infrastructure development has a significant impact on investors' interest or lack of interest in particular rural areas, which has a large influence on the development of non-agricultural activity. A good level of infrastructure has also a significant impact on social and economic progress and improvement of living conditions of inhabitants of rural areas. It is accompanied by the improvement of health status of inhabitants of rural areas, their hygiene, ecological awareness [Gładysz, 2009, pp. 110].

Infrastructure, especially the IT area, has a significant impact on management of agricultural holdings and on social and economic development of rural areas. The implementation of knowledge transfer depends to a large extent on the availability of the individual IT elements of infrastructure. Information systems are designed to ensure proper information [Morawski, Kobyłko, 2006, pp. 11-17; Goban-Klas 2006, p. 289] to organisations and economic entities, creating thereby a regional network of necessary information about the state of an economic entity and its environment. Other characteristics of an information system include: processing, storage and transmission of information between an enterprise's units and between business partners - consumers and competitors. Proper transmission of information between different levels of an enterprise serves a coherent operation of individual units at every stage of the supported economic process. Information flow and computerisation of a given region lead to increased interest of inhabitants of rural areas in non-agricultural activity, and thus reduction of the number of young people who move to cities.

A rural area with extensive infrastructure not only makes young people stay in a given region, but also attracts new people who previously lived in an urban area. However, it is not the number of available facilities in a region but the quality of services and attractions they offer that increases the region’s attractiveness. Young people more and more often choose facilities where they can meet a lot of their consumption needs at the same time. Examples include supermarkets and shopping malls, which offer entertainment, cultural, services, commercial and gastronomic sections and may include banking and public services facilities [Wojewódzka-Król, Rolbiecki, 2010, p. 26]. Areas with such a well-developed infrastructure become an attractive alternative to urban areas, combining the peace of the countryside and entertainment offered by urban agglomerations.

Agricultural holdings function based on infrastructure, as effects of their activity will to a large extent depend on efficiency in management, especially in the case of dynamics of changes in agriculture. A well managed infrastructure facilitates fast but efficient distribution of goods and services expected by the customer.

Summary

Currently, there are not extensive studies of the process of management in agricultural holdings and rural areas. The reason for this lies in self-determination of farmers as entrepreneurs, specific agricultural activity and separate legal regulations. One of more important rationale for increased interest in issues of management of agricultural holdings and rural areas are possibilities of using knowledge and information transfer. A range of new challenges arising from changes and increasing globalisation of markets, transformations of common and agricultural policy, increasing costs connected with the infrastructure of agricultural holdings and rural areas and effective management should cause diversification of economic activity in agriculture. Management and development of the infrastructure of rural areas concentrate around the use of knowledge and information transfer. An efficient process of management is an effect of an increase and development of agricultural activity.

Logistic infrastructure has a significant impact on the social development of inhabitants of rural areas and is conducive to the improvement of their living conditions through modernising and equipping flats and livestock building with waterworks, sewage system, gasification, and power infrastructure, which effectively increases the living standards, improves the effectiveness of agricultural production, facilitates work in agricultural holdings, and supports interpersonal contacts through cultural and social facilities and better communication with cities.

The development of agricultural holdings and rural areas should result from adaptation of knowledge and information transfer and assumption of increasingly new functions by rural areas, and it will have a significant impact on the increase in effectiveness and competitiveness of agricultural holdings and rural areas.

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Chapter 2

MANAGEMENT OF ENOTOURISM AS AN OPPORTUNITY FOR MODERN FARMS

Judyta Kabus

Introduction

Nowadays, enotourism (wine tourism) is treated as consumer activities exposing their interest in wine industry. It has become a popular form of travel for a special group of tourists. This hobby consists in taking part in wine industry events where people can taste various kinds of wine, learn about the production process, talk to the wine producers, or visit vineyards. Enotourism is one of the directions of tourism development, which has an established position in part of the countries of the Old Continent, as well as the New World. It is especially popular in Germany, France and Spain.

The attractiveness of this market segment caused that many people consider wine-growing and production of wine to be a potential source of income. Also in Poland vineyards have started to be established and production of wine was set in motion. However, the importance of development of small wineries is not due to the profits for the individual owners of vineyards, but also due to potential benefits for the region, as a result of, among others, larger intensity of tourist movement and services connected with tourist service, contributing to the emergence of the so called multiplier effects. Also in Poland there are created conditions for using such form of tourism. Districts that were lately involved in the wine tourism industry are, among others: Województwo Lubelskie, Małopolskie or Podkarpackie [Mazurkiewicz-Pizło 2012, pp. 633-645].

The development of enotourism plays an important role in building the region brand, enabling its identification. The name of wine that uses the name of region builds knowledge of this region, its assets, for example regional dishes, traditions, regional cultural heritage etc. Wine tourism may be considered in two ways. As a new direction of tourism development, which may constitute an original and trendy form of spending free time and as a potential for development of rural areas, and, as a consequence for the region, which is significant from the point of view of insufficient development of Polish villages.

The aim of this paper is to present what enotourism is, and to describe how actions in the scope of enotourism develop competitiveness of farms, thus enabling overcoming difficulties, and allowing for dynamic development of agribusiness.

Enotourism as an opportunity for agribusiness

A unique kind of business activity developed on certain rural areas is wine tourism, also called enotourism. Due to the growing competition on the worldwide wine market and the production excess for which it is hard to find consumers, there has been noted an opportunity for supporting development of this kind of tourism. For certain regions of lower competitiveness in the wine industry, the focus on wine tourism has provided an opportunity for survival in a difficult situation [Porter 2000, pp. 15-34]. For many of the regions that developed their tourism assets to the highest level, the tourism function has become dominant, while maintaining fundamental meaning of wine production. The phenomenon of moving in order to taste wine in the places of their production was developed in ancient times, however, only last century it started to take on a more organized form. In Germany, in 1920s, there have been developed some educational paths, and in the 70s they were already existing in all the wine regions of RFN [Gołembski 2002, pp. 91-92]. During the last ten or so years the wine paths have gained in popularity in all the significant countries dealing with production of wine, especially those of rich traditions in this field. The occurrence of wine tourism is observed mainly on the rural areas where exist basic objects of wine industry, that is wineries and vineyards. According to Hall and others, the development of wine tourism has positive influence not only on the economy of a given region, but also favors maintaining of geographically-cultural individualism, by aspiring to maintain interesting specifics and tradition of area 36. In order to have a better understanding of the motivation of a consumer using enotourism services, it is advised to sketch his/her profile. Very often such person has higher education, income higher than the average salary, is aged above 25 but most frequently between 35-45, while this age bracket exposes a tendency to become lower; couples or men who are travelling by themselves, while, at the same time, the percentage of women travelling alone is growing; working in a position that requires higher professional qualifications, such as: managers, representatives of freelance jobs, highly qualified specialists. Apart from that it is necessary to pay attention to the factors driving people travelling to wine regions. According to Cambourne and Macionis, the most important motives connected with enotourism are wine purchase, events and traditions connected with wine, spending free time with friends, wish to visit rural areas, including vineyards, as well as urge to find out information about wine, learning about local cuisine and other tourist attractions. The subjects profiting from the development of wine tourism are mainly businesses providing farm tourism services and producers of wine, but also a wide range of other subjects including: restaurant and hotel owners, local authorities, tourism agencies, companies that deal with manufacturing additional products connected with enotourism and providing additional services, schools and other educational institutions, as well as various organizations dealing with ecology, sports, education, gastronomy and other kinds of business operations. The above listed, and

other subjects may draw various benefits from the fact of expansion of enotourism in the region. Kowalczyk lists the following benefits [Kowalczyk 2003, pp. 27-33]: increase in the salary level of farmers, wine-makers or wine producers; development of the tourism services and the like; improvement of the image of the region that is often threatened by economic stagnation; promotion of maintaining the identity and culture of a region, promotion of active pro-ecological attitudes among the region's inhabitants; promotion of ecological farming. The wine tourism is developing in many regions of the world. It is considered to be a source of income and an important factor influencing the competitiveness of a whole region. In this the macroeconomic sense, enotourism is treated as an activity that is reflected in the whole region. On many areas where winery is developing, there has been noted a connection between the revenue coming from wine tourism and the increase in income coming from other sources. Increased revenue is directly connected to the growing number of tourists interested in wine.

Enotourism may be seen on three levels:

- production of wine,
- tourism agencies,
- consumers.

This shows that wine tourism is a form of consumer behavior, strategy thanks to which a given region, wine market and attractions connected to it develop [Carlsen 2004, p. 5-13]. It is also a marketing opportunity for wineries' owners or producers of wine, to sell their products directly. Wine may be one of many attractions in a region, it is connected with food, culture and art, as well as accommodation or handicraft. Enotourism increases economic, cultural and social values of a region. It also constitutes a part of national, international tourist image of a region.

Enotourism management is mainly the ability to reach a particular group of tourists who are open to acquiring knowledge on wine, the process of its production, and widely understood wine culture. Enotourist is expected to buy at least one bottle of wine while wine-tasting events.

The growing interest in wine tourism is for multiple reasons, mainly:

- frequent travel to regions of Spain;
- growing fascination with food, cooking, which stimulates growing consumer awareness of the alcoholic beverages they consume, including wine, which complements food;
- increase in the multiplicity of wine tastes.

Agribusiness recognizes potential in enotourism and is developing this sector on a larger scale.

Planting is an important factor changing the landscape of rural areas, making it more diverse and creating picturesque scenery. It also contributes to using land that has not been used before, for example slopes. Wine tourism, similarly to other forms of

tourism, may serve as a factor that stimulates regional growth. Farmers, by planting vines, may diversify their income. Moreover, they are forced to exhibit entrepreneurial mindsets, as the raw material they produce has to be processed into wine, and then sold. These mindsets may serve as a reference model for other members of local community. The owners of wineries often for unions and meet in order to share experiences, broaden knowledge, conduct training courses, make purchases and undertake initiatives that serve the development of winemaking and enotourism. Such actions additionally help nurture social bonds and cooperation within a region. Establishing wineries is a part of a concept of multifunctional countryside development, which is a condition for development of rural areas, and is to be realized by widely understood entrepreneurial activities of inhabitants or these areas. Enotourism management means management of many components. The root of a winemaking product is the people who work in wineries, organize festivals and winemaking events. Each of these components requires different managerial operation [Tul-Krzyszczuk, Kołakowska-Paszkiewicz 2008, p. 43]. The assets of a given area are also important, as is the scenery, climate, well-marked trails, proper standard of accommodation and food.

Enotourism is seen as a stimulant of increase in the number of tourists visiting a given region, which, in turn, generates higher revenue for the whole region. Thanks to enotourism, the awareness of the wine brands and wineries.

Optimum management of wine tourism enables experiencing a particular lifestyle, and includes also demand and factors connected with supply; it constitutes an educational component and may be a part of a broad farm tourism offer.

Enotouristic in Polend

An important factor for the development of wine industry is legal situation which hinders or facilitates wine production in a given country. Countries of rich traditions of planting vines and where this branch of economy is of high importance, use preferential regulations, for example lack of excise duties for wine in France. Producers in EU also use subsidies supporting agriculture. In Poland these regulations are not beneficial. Wine is subject to a relatively high excise (158 zł per hectoliter), compared to beer (7.79 zł per hectoliter). Apart from that, advertising possibilities are strongly restricted by the Act of Upbringing in Sobriety and Counteracting Alcoholism, which puts wine in a less privileged position than beer. These regulations concern selling of wine in Poland, but it is worth underlining that Polish wine is not officially in the course of trade. Despite introducing changes in 2008, which are beneficial for the production of wine (described in the next sub-chapter), there are lacking, among others, regulations concerning putting a product on market, which in practice disables legal selling of product [Gaworecki 2003]. Another issue which is of key importance, is knowledge. Production of wine is unique with regard to the fact

that it requires not only large theoretical knowledge, but also largely understood practice. In regions with many years of tradition this knowledge is transferred "from father to son", which means that it is a kind of tacit knowledge – hidden knowledge, concentrated on people, which sometimes happens to be reluctantly handed down to others, difficult to be codified and often impossible to be applied on other areas, due to climatic differences that are important in this area of business. In Poland, the lack of this kind of knowledge due to the fact that production of wine gradually dropped (together with entering EU it was delegalized), and renewal of winemaking traditions, are strongly connected with building of this valuable resource [Mazurkiewicz-Pizło 2013, pp.54-56]. It also concerns theoretical knowledge that has already been codified – there is little literature on winemaking in Poland – it is just being established by the current generation of producers. In this matter the factor of globalization is of special importance – it facilitates flow of people and knowledge between countries. In case of Poland, this knowledge often comes from cooperation between wine producers from countries located to the west and south of Poland, which are most similar in terms of climate.

Naturally, winemaking in Poland is still conducted on small scale. Some people treat a winery as a hobby, others engage in this kind of activity directly. Such form requires additional operations.

According to data registered by Polish Agricultural Market Agency (AMA), the number of wine producers displaying willingness to sell officially, is systematically growing. In years 2013/2014, 52 registration applications were submitted, which constituted 40% more than in previous years. It was most probably influenced by relaxing legal regulations concerning owners of wineries (Table 1).

Table 1. The number of wineries registered in AMA in particular marketing years

Marketing year	**2008/2009**	**2009/2010**	**2010/2011**	**2011/2012**	**2012/2013**	**2013/2014**
Number of business entities	25	21	20	26	38	52

Source: AMA, www.arr.gov.pl [dostęp: 22.12.2015]

Production of wine in Poland is not a new trend. The Poles drink imported wine, but also local wines. Some of the local wines can be bought in good wine shops, but in order to taste most of them, people should visit a winery. The biggest centers of Polish wineries are situated in the area of Zielona Góra, in Podkarpackie, Małopolskie districts and along the westernmost fragment of Wisła river. More and more wineries offer possibility of visiting, connected with tasting, some of them organizing wine and sommelier workshops. In many cases, apart from winery, there function local agri-tourism farms offering accommodation. In the gastronomic offer of Polish wineries one may also count on good-quality home-made food, most often prepared on the basis

of local products. On the enomap of Poland we also can find places that offer conference-training facilities

Year by year, enotourism in Poland presents itself in a much better way, in some places there function wine academies, in other areas, the potential of wine is used during wellness and SPA treatments. The beautifying influence of wine is invaluable. Moreover, it is important to mention that the very location of wineries favors relaxation and enables full, undisturbed rest.

Enotourism in our country is developing, winemakers see large potential in it, therefore, they invest not only in wineries alone, but also in the neighboring gastronomic and accommodation facilities. Enotourism is becoming of great potential for the owners of Polish farm owners and inhabitants of rural areas.

It seems that Polish enorourism will be developing in two main directions. One is small winemaking businesses that will combine the privacy of communing with wine, with simultaneous improvement of the offer. Another way of Polish enotourism will be larger investments.

Recipe for success on the more and more demanding winemaking market lies mostly in application of new technologies, change in product offer, and interesting strategic innovations [Brzozowska 2013, p. 31-36]. Many Polish businesses focus on distribution, thus creating professional logistics centers. In order to keep the growing tendency of income, as well as to keep the leader position in the winemaking industry, companies focus on innovation, first in the way of supply to the customers [Otola, Skowron-Grabowska 2006, pp. 55-65]. Thanks to the logistics center, trading partners and customers can receive their orders faster and more efficiently. Efficient logistics opens new opportunities for change in the structure of product offer.

The report of KPMG LLC from year 2014 shows that average adult Pole in 2013 had bought 5.5 liter of wine, spending 27 Euro. In comparison, an average Czech Republic citizen bought 21.4 liter of wine (spending 104 Euro), and an average Slovak – 19.1 liter worth 145 Euro. This shows how great potential Polish winemaking market has, and that it brings significant income possibilities when investing in innovative undertakings.

Also, the success of cider in 2013 and 2014 opens new possibilities. Research of KMPG LLC shows that almost 3.5 million of adult Poles drinks cider a few times a year. These estimations show that its sales may reach even 90 million liters during the next 5 years.

"Jantoń" company is opening a new logistics center at the beginning of March. It has been equipped with a first high density pallet storage system in Poland – AutoSAT [www.jantoń.pl]. Thanks to this investment, there was created a first place (on such scale) in the country that is equipped with innovative high-racking system – technology facilitating identification of goods, and ecological pallet tracks powered by batteries, enabling delivery of pallets to docking stations. This investment was done

with maximum concern for the environment, substantial water and energy saving, in the whole production system.

The implemented solutions enable optimization of intralogistics processes of the Jantoń company, and, as a result, even higher level of customer service. The proposed system of high density pallet storage system with platform operated by radio control, is an innovative solution that will enable Jantoń company to efficiently apply cubic capacity of magazines and improvement of work safety.

Implementation of this technology allowed for building modern docking stations. Their innovative construction enables removing pallets that are also located in the end of the row. Thanks to that, the pallets may contain diverse assortment of products, which largely facilitates logistics processes when planning the loading. The new system also allowed for increasing storage potential by 6000 pallets.

In the new center there was applied the Warehouse Management System (WMS system). It is a complex IT system helping in identification of each pallet, by giving it individual logistics code. The system facilitates recognizing, in any moment, where and to whom a given pallet was delivered. The logistics center warehouse was designed in the way that it contains enough space for mixing assortment. It enables adjusting the offer to the needs of Jantoń's cutomers. Thanks to the option of mixing they can order pallets with different assortment, which significantly increases the profitability of an order. Increasing space for the purpose of mixing also improved the efficiency of the process [www.jantoń.pl].

The new logistics center also means new quality of loading. The docking stations enable packing 5 cars at a time. Pallets are delivered by modern, high-standard 4-wheeled "Cesab" forklift trucks. The result of cooperation of Jantoń company with OMV Polska LLC is modernization of solutions in inbound logistics and replacing internal combustion engine forklifts with electrically powered ones. OMV Polska solutions enabled Jantoń company adjust internal transport means to the highest standards, in terms of savings and ecology, but, most importantly, safety and work ergonomics. For the purpose of loading forklifts, there was created a battery room enabling saving energy in the delivery process.

Conclusions

- The wine industry in Poland is demonstrating European dimension and highest quality, also technological.
- The interest in winemaking and enotourism is increasing not only for the winery owners, but also among tourists and local authorities
- The local authorities seek for opportunities to promote region and make local tourism offer more attractive
- Enotourism is the future of tourism industry in Poland

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Chapter 3

PROBLEM QUESTIONS OF MANAGEMENT OF FINANCIAL EXPENSES AND PERSONNEL COSTS AT AGRICULTURAL ENTERPRISE

Gorb Oleg, Myrna Olha, Serdiuk Olha

Statement problem in general and its connection with important scientific and practical tasks

The study of cost management is extremely important due to the stable growth of profitability of business entities, providing solution of the strategic and tactical problems of industrial production and financial policy. Overstated costs, including the reproduction and using human resources is a factor that limits the competitiveness of products hinders the entering the producer to new markets. Cost reduction and efficient use of resources of the enterprise on the contrary guarantee stability in the current economic conditions and achieve a higher level of the profitability. The necessity of improving the mechanism of cost management caused by such factors [Крушельницька 2010, p. 179]:

- increased competition on the markets of materials and raw materials;
- changing and instability of prices for production resources;
- determining the technical methods of measuring, collecting, analyzing and preparing information for the evaluation, planning and decision-making to optimize costs.

M.V. Volkova emphasizes on the expediency of forming a unified system of management costs [Волкова 2011, p. 207], the advantages of which are classified by: ensuring the production of competitive products on the basis of cost and prices optimization; operational availability of adequate, high quality information on the cost of certain products; the ability to use flexible pricing; providing objective data for making the systems of enterprise plans; an opportunity to assess activities of each sabdivision of the company from a financial point of view; improving the substantiation of managerial decision making.

A significant place in the management of expenses is assigned by M. O. Ivasyshyn [Івасишин 2013, p. 300] to the service function of budgeting – expenses the analysis because owing to analyzes created and implemented an opportunity to reduce the level of uncertainty of information for management decisions and thereby minimized the risk of management system as a whole.

Analysis of major studies and publications where the solution of the problem was initiated

Cost analysis is an effective tool for management analysis, it provides the necessary information to help make better business decisions. Scientists paid much attention to the issue of an effective system of cost management. S. F. Golov [Голов 2008, p. 30] considers cost management as a fundamentally new system that enables you to accurately track, analyze and control costs. Studies have shown that most authors consider that it is advisable to analyze the dynamics of spending in absolute indicators and by their structure. Such methodical approaches do not fully meet the needs of farm management practices. Given the level of costs of agricultural enterprises in Ukraine, solving problems of controlling the cost for reproduction and using of labor resources meets to the requirements of today.

Setting objectives

Efficient system of cost management gives managers the possibility of cost control and its forecasting. It provides the ability to select the most effective ways of developing agricultural enterprises, adoption of operational and strategic management and economic decisions, especially in the area of human resources management. The article is an analytical review of expenses for reproduction and using the labor resources in agriculture which reveal specifics of managing these costs. Sequential presentation of the questions of the research involves solving such problems:

1. To assess the situation regarding the income levels of the population in Poltava region and Ukraine.
2. To identify the structural orientation of the costs for agricultural production.
3. To generalize the peculiarities of financial costs and personnel expenses of agricultural enterprise.

The main material of the research

The deterioration of the social and economic situation in Ukraine was caused by mass unemployment, inflation, accompanied by increased differentiation of the population by main social and economic indicators: wages, money saving, pattern of consumption. These figures have an affect on the forming of the monetary income per capita (tab. 1).

Steady trend of nominal growth and the tendency of the real incomes decrease of the population was fixed. The average real income per 1 person in 2014 decreased respectively to 2012 by 23.2%. Increasing the level of nominal and real wages under the conditions of financial economic reform must be provided through the establishment of economically and socially feasible level of minimum wages. Stage-by-stage approach to the real size of the subsistence minimum, improvement of

the mechanism of income tax through further liberalization of the tax system, reducing the tax burden on labor payment fund of enterprises, establishment of optimal tax rates depending on the income and prevent any discrimination. Ensure equal approach to citizens at definition of tax liabilities, as well as adherence to social justice.

Table 1. Incomes of the population of Ukraine in 2012-2014 %

Indicators	Years			The absolute deviation 2014 from 2012, (+; -)
	2012	2013	2014	
Available income per one person, UAH	25,206.4	26,719.4	27,700.3	2,493.9
Poltava region	24,027.2	25,371.2	26,998.5	2,971.3
Average available income per 1 person, UAH	2,119	2,240	2,308	189
till previous year, %	114.5	105.7	103	x
Average real available income per 1 person, UAH	2,108	2,245	2,059	-49
Real available income per 1 person, % till previous year	113.9	106.1	91.6	x
Poltava region	113.1	106.1	95	x
Average monthly nominal salary per 1 person, UAH	3,041	3,282	3,480	439
till previous year, %	114.4	108.2	93.5	x

Source of the information: calculated according to – Державна служба статистики України. Україна 2013: статистичний збірник, с. 180-185; Україна 2014: статистичний збірник, с. 24.

In the current economic conditions almost every agricultural enterprise must solve the task of the management of production costs, determine the conditions to achieve their efficiency. All stages of construction and implementation of an effective system of production costs management be determined by objective and measures must be developed for its implementation (tab. 2).

The activities on the first stage of an effective system of cost management of agricultural enterprises are aimed at solving the following problems: collecting and analyzing the information about expense; identifying trends of level changes, scope and structure of costs of production and product unit; regulating and planning expenses in terms of the elements, of production units and products of livestock farming and crop growing sectors.

The analysis and the current control of costs allow the reformation of the production management system in time. The manager influence acquires the features of a timely impact on production, supply, marketing and other processes.

Table 2. The sequence of development and implementation of an effective management system of production costs

Stages	Content	Result
Preproject research and determination of the main objectives of the enterprise in the management of production costs	Analysis of the actual state of implementation of production costs on the major areas of manufacturing processes and departments. Evaluation of the effectiveness of their formation and grounding the ways of increasing the efficiency of their management	The real state of spending
Project and calculation stage	Collecting information on implementation the directions to improve the system of production management costs and increasing their management efficiency	Determination of the main functions of cost management and their objectives in increasing their efficiency of the current system of cost management. Ensuring the effective functioning of the newly created system.
Implementation of the system of production cost management.	Following the process of implementation of the system of production cost management. Evaluating the effectiveness of its functioning at the stage of implementation of new or modernized functional sub-systems of the system of production cost management.	Creation of a working group of managers for the development of a plan for system implementation, which defines the main terms of performance of the main events and responsible persons are appointed.

Source of the information: composed by the authors based on: К. В. Чичуліна, О. С. Петровець, 2015.

Classical methods of cost analysis of agricultural enterprise require consistent implementation of analytical operations: generalizing cost analysis for all types of enterprise's; activities cost analysis on certain types of activities (operational, financial, investment); cost analysis on individual directions of production and business activities (expenses plant growing industries, livestock, farming agricultural services, administrative expenses); the analysis of the costs per 1 UAH and / or 1 centner of products per 1 UAH of total rendered services; factor cost analysis; analysis of

operational activity costs according to economic elements. This algorithm is based on the financial and statistical reporting and is held, as a rule, according to the results of the reporting period (quarter, year). Its aim is to assess the dynamics of costs as a separate direction of the analysis or considering changes in income when financial results are analyzed. In our view, production cost analysis should be performed more often, for rapid response to the reformation of the environmental conditions and adapt to changes of equipment, technology, staff, range of products, etc. However, the algorithmic sequence of analysis of costs for economists should have advisory character and used depending on the purpose of research partially or comprehensively. The analysis requires consideration of different approaches to the calculation of operating costs depending on the completeness of their coverage.

Funding sources for each group of personnel costs should be structured (tab. 3).

Table 3. The structure of personnel costs by the source of funding

Group of expenses	Source of funding
The costs associated with wages. Expenditures connected with the ensuring of the personnel selection.	Cost of products (goods, work, services)
Administrative management	Individual budget or cost of products (goods, work, services)
Expenditures connected with the provision of education or introduction into specialty for employees.	A certain fund, the amount of which is planned for the year
The costs connected with the changing place of residence of the employee when planning a business project	Costs related to the implementation of the business project
Expenditures on staff reductions	Reserve fund

Source of the information: composed by the authors based on: О. Ю. Амосов, 2014.

Reimbursement of personnel expenses depends on the source of their funding.

With the formation of an effective cost management system its structure has practical implications by which we mean the ratio of individual groups of costs according to certain features. The analysis of the cost structure is aimed at justifying measures to save all kinds of resources and reducing production costs, choosing optimal methods of calculation, forecasting dynamics of production costs, developing pricing policies and strengthening the market position of the agricultural enterprise.

It’s necessary to analyze the dynamics and structure of the actual cost of the agricultural enterprise according to particular algorithmic sequence at the initial stage (tab. 3).

Table 3. The dynamics and structure of the actual operating costs of the State Enterprise "Agricultural enterprise Mashivske Penal colony State Administration of Prison Service of Ukraine in Poltava region (№ 9)", 2012-2014

Indices	Years						Deviation in 2014 from 2012	
	2012		2013		2014			
	thosanands UAH	%	thosanands UAH	%	thosanands UAH	%	thosanands UAH	percent
All operating costs	11,693	100	12,438	100	15,712	100	4,019	-
Including the cost of sold products (goods, work, services)	10,575	90.4	10,845	87.2	14,585	92.8	4,010	2.4
Administrative costs	762	6.5	885	7.1	943	6	181	-0.5
Sale expenses	242	2.1	199	1.6	139	.9	-103	-1.2
Other operating costs	114	1	509	4.1	45	.3	-69	-.7

Sources of information: calculated according to the statistical statements.

There was a significant increase of actual operating costs of the investigated company during 2012-2014 – from 11,693 thousand UAH to 15,712 thousand. UAH, i.e. 4,019 thousands UAH, due to rising cost of sales to 4,010 thousands UAH while decreasing the amount of sales and other costs of 103 thousand UAH and 69 thousand UAH respectively. Such significant changes in the dynamics of actual operating costs led to structural changes. The share of cost of sales in the structure increased by 2.4% points with the decrease in the share of administrative costs by .5%, the cost of sales - by 1.2%, other operating expenses – by .7%.

The analysis of structure of actual costs allow determine the composition of material production costs, which should be analyzed to make timely, operational business decisions at agricultural enterprises, in particular, the cost of marketed products (goods and services). Currently existing forms of statistical reporting of agricultural enterprises do not provide recording information according to the elements particularly of sales, let us consider the articles of production costs in plant growing branches (tab. 4) and livestock farming (tab. 5), with sufficiently high representativeness, it will allow to describe the cost structure of the investigated company.

Table 4. The structure of production costs of crop production of the State Enterprise "Agricultural enterprise Mashivske Penal colony State Administration of Prison Service of Ukraine in Poltava region (№ 9)", 2012-2014, %

Kinds of products	Direct material costs	Direct labor payment costs	Other total direct costs and general production costs	Depreciation ation of fixed assets
2012				
Corn for grain	89.9	7.7	2.4	0.9
Barley	92.0	5.5	2.5	1.3
Oats	86.4	8.0	5.7	2.3
Sunflower for grain	96.0	2.8	1.2	0.4
Soya	95.2	2.3	2.6	1.6
Total	93.7	4.5	1.9	0.8
2013				
Wheat	85.8	5.7	8.5	1.2
Rye	87.8	4.1	8.2	4.1
Corn for grain	74.1	4.1	21.8	1.0
Barley	82.8	4.6	12.5	2.2
Sunflower for grain	76.3	3.4	20.3	0.6
Soya	94.0	3.2	2.9	1.9
Total	81.0	4.5	14.5	1.2
2014				
Wheat	78.7	2.9	18.4	2.5
Rye	82.2	4.1	13.7	3.1
Corn for grain	82.6	4.1	13.3	3.1
Barley	75.0	4.9	20.1	4.3
Oats	83.9	2.4	13.7	4.8
Sunflower for grain	86.0	3.4	10.5	3.7
Soya	90.9	3.2	5.9	3.2
Total	81.0	3.7	15.3	3.3

Sources of information: calculated according to the statistical statements.

Because of the fact that production costs affect the final financial result, they are the most important, they need a more detailed and operational analysis as to their assessment for the establishment of the amounts and reasons for deviations and timely response to the negative dynamics. It is considered appropriate (in this case, according to the direct material costs) to conduct pre-studies project and generate reports on their results every week or every ten days. Thus the conclusions concerning these costs should be done in less than usual time that will simplify their analysis and allow form an effective system of cost management.

Table 5. The structure of production costs of livestock farming produce of the State Enterprise "Agricultural enterprise Mashevske Penal colony State Administration of Prison Service of Ukraine in Poltava region (№ 9)", 2012-2014, %

Kinds of products	Direct material costs	Direct labor payment costs	Other total direct costs and general production costs	Depreciation of fixed assets
2012				
The growth of live weight of:				
-cattle	80.3	8.5	11.2	2.0
- pigs	77.8	10.6	11.6	1.1
- sheep	77.4	8.6	14.0	-
- poultry	54.5	29.5	15.9	4.5
Milk	84.5	8.5	7.0	1.6
Eggs	57.6	24.2	18.2	6.1
Total	81.8	9.1	9.1	1.6
2013				
The growth of live weight of:				
-cattle	68.1	10.3	9.1	2.0
- pigs	74.7	11.3	14.0	1.1
- sheep	71.0	8.7	20.3	6.1
- poultry	52.4	29.5	18.1	4.2
Milk	84.1	8.9	7.0	1.6
Eggs	41.8	35.3	23.0	6.3
Total	81.1	10.0	8.8	1.7
2014				
The growth of live weight of:				
-cattle	79.2	14.3	6.5	1.3
- pigs	80.3	10.7	8.9	.0
- sheep	50.6	21.6	27.8	.1
- poultry	67.6	14.9	17.5	4.5
Milk	68.9	20.9	10.2	4.8
Eggs	44.0	17.3	38.7	13.8
Total	73.5	17.3	9.2	3.0

Sources of information: calculated according to the statistical statements.

The structure of the production costs of the State Enterprise "Agricultural Enterprise Mashivske PC SAPSU in Poltava region (№ 9)" by economic elements shows the ratio of certain types which were consumed in the process of production of

resources (factors of production). According to the cost structure by economic elements the production at the State Enterprise "Agricultural Enterprise Mashivske PC SAPSU in Poltava region (№ 9)" can be classified as belonging to one of three types: raw material intensive, labor-intensive, capital-intensive.

In 2014 the structure of production costs of plant growing product of the agricultural enterprise was dominated by direct material costs in a variations from 75% in the production of barley to almost 91% in growing soybeans. In livestock farming in 2014 direct material costs also prevailed and all for types of products exceeded 73% of total production costs, the direct labor payment costs were on the second place - more than 17%.

Thus, agricultural production at the State Enterprise "Agricultural Enterprise Mashivske Penal colony State Administration of Prison Service of Ukraine in Poltava region (№ 9)" can be described as a material intensive. Therefore, the main reserves to reduce the production cost of production of both branches are saving material resources, optimizing the use of raw materials and materials, and organizing logistics (material and technical provision).

Another major cost analysis during the implementation of industrial and economic activity of agricultural enterprises is the analysis of operating expenses by economic elements and per 1 UAH of marketed products. Determining the structure of operating expenses by economic elements allows define the role of individual elements in the total costs and identify reserves of their prospective decrease. According to Accounting Standard number 16 "Expenses" the operating expenses are divided by elements on: material costs, labor costs, deductions for social events, depreciation and other operating expenses (tab. 6).

While investigating structural changes in operating cost of sales at State Enterprise "Agricultural Enterprise Mashivske PC SAPSU in Poltava region (№ 9)" in 2014 compared to 2012. A slight decrease in the share of material costs in the structure of operating expenses and increase the share of labor payment costs - by 3.4%, and a gradual increase in spending for social events, the amount of which under the law is correlated with the size of labor payment. The identified tendencies that demonstrate certain regularity as reducing the share of material costs, depreciation and other operating expenses are accompanied by increased share of other costs. The analysis of operating costs level per unit of sales during the years 2012-2014 showed the decrease in the actual material costs and per 1 UAH of depreciation marketable products, the economic effect of which is offset by in significant reduction in revenues from product sales (3.3%) and leads to the reduction in profit in 2014 compared to the 2012 by 26 thousand UAH.

Table 6. The elements of operating expenses of the State Enterprise "Agricultural Enterprise Mashivske Penal colony State Administration of Prison Service of Ukraine in Poltava region (№ 9)", 2012-2014.

Indices	Years						Deviation	
	2012		2013		2014			
	thousands UAH	%	thousands UAH	%	thousands UAH	%	thousands UAH	persentage
Operating expenses - total	16,809	100	12,183	100	15,694	100	-1,115	-
per 1 UAH of marketable products	1.1	x	1	x	1.1	x	0	x
Material costs	9,829	58.4	5,053	41.5	8,546	54.5	-1,283	-3.9
per 1 UAH of marketable products	.7	x	.4	x	.6	x	-.1	x
Salary expenses	4,147	24.7	4,264	35	4,415	28.1	268	3.4
per 1 UAH of marketable products	.3	x	.4	x	.3	x	0	x
Spending for social events	717	4.3	780	6.4	889	5.7	172	1.4
per 1 UAH of marketable products	.05	x	.06	x	.1	x	.05	x
Depreciation	887	5.3	775	6.4	736	4.7	-151	-0,6
per 1 UAH of marketable products	.06	x	.06	x	.05	x	-.01	x
Other operating expenses	1,229	7.3	1,311	10.8	1,108	7	-121	-0.3
per 1 UAH of marketable products	.08	x	.1	x	.08	x	0	x

Sources of information: calculated according to the statistical statements

Conclusions

Thus, the importance of research cost indices are the indicators by which the performance of agricultural enterprises for a certain is on the stage of pre-project investiganions period. The drawbacks in the formation of effective cost management system, including the reproduction and use of labor resources are identified. A detailed analysis and assessment of the dynamics and structure of the level of cost at the agricultural enterprise, grouped by types of branches has been made.

The main direction of future work is a factor analysis of production costs, which will help to identify the factors that affect the amount of the cost of production most of all.

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Chapter 4

DEVELOPMENT OF RESIDENTIAL AREAS IN HARMONY WITH NATURE

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Biosphere is a part of the Earth crust, atmosphere and hydrosphere with its composition, structure and energy determined by past and present activities of living organisms as defined by our compatriot Academician Volodymyr Vernadsky. Biosphere makes up to 0.4% of the planet volume. The problem of increasing biological productivity of biosphere is solved by conservation and improvement of natural biocenoses and agricultural biocenoses [Kots, Morgun, Patyka, Petrichenko, Nadkernichnaya, Kirichenko 2011; Patyka M.V., Patyka V.P. 2014, pp. 5-10; Kalinichenko A., Kopishynska, Kopishynskyy, Kalinichenko 2015, pp. 73-78; Modzelewska, Kalinichenko 2015, pp. 264-271]. Biosphere serves not only as a source of natural resources for the human, but also as a receiver of the waste resulted from production and vital activities; it is much more complex system, it is the foundation of life in which biota itself provides environmental stability. The biosphere has its economic capacity limited, with the excess of the limits disrupting stability of both biota and the environment. Within the limits of biosphere economic capacity ecosystem is capable of quick restoring all kind of imbalances in the environment keeping its state stable in this way. Going beyond the limits leads to failure of biota to establish balance, as well as to disorder of biological cycle of substance, degradation of ecosystems and pollution [Gadzalo, Patyka, Zarishnyak 2015; Hvozdiak, Pasichnyk, Yakovleva, Moroz, Lytvynchuk, Zhytkevych. et al. 2011].

Plant component of an agrobiocenose is formed and ruled by human. For example, agrobiocenose's instability due to the occurrence of adverse weather conditions (such as drought, excessive humidity, overcooling etc.) can be compensated through appropriate farming practices. Temporary stability of agrobiocenose can be supported by human [Kots, Morgun, Patyka, Petrichenko, Nadkernichnaya, Kirichenko 2011; Gadzalo, Patyka, Zarishnyak 2015; Report of the Conference of the Parties on its eleventh session, held in Winthoek, 16-27.09.2013].

At the heart of the biosphere system there is a diversity of its components. This diversity provides stability of the whole system, ensuring survival of its certain part under any local, whole-planet and cosmic processes (solar flares, cosmic showers of ultrahigh energy particles, etc.). However, to preserve the diversity we cannot allow one species (population, clone, etc.) to develop large enough to begin displacing (eating, shading, trampling, poisoning) all other species.

It does not matter to the biosphere system – what species, populations, or

individuals comprise it. It is only necessary that they existed in sufficient quantity, diversity and certain balance frames.

At the turn of the 20th and the 21st centuries, humankind did not always act in a positive manner towards the nature. And this very circumstance largely caused aggravation of the world's many political, economic and environmental, ethnic, inter-regional, inter-faith relations problems – these facts were confirmed at the UN conference in Rio de Janeiro (1992) and the Earth Summit in Johannesburg (2002). The debates at the Earth Summit showed joint efforts of all countries in the fields of economics, politics, technology, science, culture and education being capable of preserving environment at some ecologically reasonable level given that collective mind and organized work of the united nations focus on implementation of this idea.

For a long period of rapid industrial development humanity has been ignored natural processes established in biological communities that resulted in danger of disorder in environmental systems productivity. Particularly noteworthy are adverse changes taking place in intensive agriculture [Kots, Morgun, Patyka, Petrychenko, Nadkernychnaya, Kyrychenko 2011]. It is estimated that currently our planet is inhabited by about 30,000 weed species, 10,000 species of harmful insects and other arthropods, 3000 species of nematodes, 120,000 species of fungi, 100 species of pathogenic bacteria and 600 species of pathogenic viruses [Hvozdiak., Pasichnyk, Yakovleva, Moroz, Lytvynchuk, Zhytkevych et al. 2011; Popov, Dorozhkina, Kalinin 2003]. In many countries, synthetic pesticides play a key role in plant protection due to their efficiency against target objects [Trybel, Stryhun 2013, pp. 324-336]. However, their widespread and often uncontrolled use leads to accumulation of pesticides and their metabolites in biocenoses and, consequently, to disturbance of nutrition chains, suppression of natural regulators of the harmful agents number and pollution [Patyka, Makarenko, Mokliachuk, Sereda, Shkatula, Hrynyk 2004]. Agricultural products that contain pesticide residues lose their value and becomes potentially dangerous for human health [Łozowicka, Hrynko, Kaczyński, Rutkowska, Jankowska, Mojsak 2015, pp. 142-150]. Furthermore, the widespread usage of pesticides causes harmful agents' population resistance leading to necessity of increasing doses and frequency of pesticide treatment, which, in its turn, multiplies negative effects [Łozowicka, Hrynko, Kaczyński, Rutkowska, Jankowska, Mojsak 2015, pp. 142-150; Łozowicka, Konecki 2011, p. 107-119; Matyjaszczyk 2011, pp. 217-224.]

Organic (natural) agriculture can prevent the destruction. Most people understand organic farming as an agricultural practice free of synthetic fertilizers and plant protection agents [Antonets S.S., Antonets A.S., Pysarenko V.M., Opara, Pysarenko P.V. 2010; Verhunov, Davydenko, Tovmachenko 2014]. Organic (natural) system is the most advanced way of agriculture. Its core is a desire to create a "living and healthy soil" through support and enhancing life activity of soil microorganisms with well-adjusted circulation and nutrient cycles. In fact, this well-balanced agricultural system resembles natural ecosystem. Organic farming is a system of agro-ecosystems

management based on maximal use of biological factors for increasing soil fertility, farming practices for protecting plants, as well as on a range of other practices that provide production of agricultural products and raw materials in a reasonable from the environmental, social and costs point of view way [Antonets S.S., Antonets A.S., Pysarenko V.M., Opara, Pysarenko P.V. 2010; Verhunov, Davydenko, Tovmachenko 2014].

In organic (natural) farming, it is recommended to apply classic rules for crops rotation sequence based on proper organization of the territory and optimal structure of areas for specific soil and climatic conditions of each farm. A special requirement is 25-30% saturation of rotation with nitrogen-fixing leguminous crops, which provide plants with environmentally safe biological nitrogen for 50% and even more of their need. Application of organic fertilizers (manure, liquid manure, green manure, straw, peat, sapropel, bird droppings, etc.) as well as some mineral slow-acting fertilizer (basic slag, potassium-magnesium, basalt dust) leads to fertilizing not plants but soil "to bear healthy plants".

Being a major component of agro-ecosystems, microorganisms are characterized by a wide range of diversity and occurrence in nature. All they have a wide range of functions caused by complex relationships and food webs. Interaction between microorganisms and plants in nature serves a variety of functions, which form stable microbial complexes in agro-ecosystems. Thanks to their close cooperation (e.g. endophytes) microorganisms are often used as alternative fertilizers, herbicides and pesticides [Gadzalo, Patyka, Zarishnyak 2015].

Private enterprise "Agroecology", which located in the central part of Poltava region on the left bank of Psiol River at Mykhaylyk village (Shyshaky district) and headed by Hero of Ukraine Semen Antonets, meets all the above requirements, having long-term experience. Soil there is typical deep low humus medium loam chernozem on loess. Waste soil tracts lie on solid moderately drained watershed plateau. High content of silt (24%), humus (5%) as well as saturation with calcium and magnesium alkali provides relatively high ability to form valuable from an agronomical prospective cloddy-granular structure, enabling the formation of favourable water-physical properties [Antonets S.S., Antonets A.S., Pysarenko V.M., Opara, Pysarenko P.V. 2010].

Soil protecting agriculture was established at the farm in 1976 followed by soil protecting biological agriculture in 1979, and soil preserving organic agriculture in 1990. Since 1979, the farm produces environmentally safe products for children, therapeutic and preventive nutrition. This is the experience of state and global scale. Delegations from different regions and countries come there to learn this experience.

Yield of grain crops rose by 97% at the farm, in particular of early grain - by 110-116%. Sugar beet yield increased by 64% and sunflower by 74% (Table 1).

Crops rotation, tillage systems, fertilization, crop protection from weeds, pests and diseases, machinery, tending crops systems – all were developed and adjusted at the

farm. The best varieties were selected. There is own seed production too. Crops of no lower than second reproduction are growing there. Tillage system switched to minimal soil treatment in 1990. This allowed reducing threefold fuel consumption, costs of tillage, and enabled appropriate timing of technological operations in growing crops [Antonets S.S., Antonets A.S Pysarenko V.M., Opara, Pysarenko P.V. 2010].

In the farm's crop rotation, corn for silage (as a predecessor of winter wheat) was replaced with sainfoin. This was preceded by thorough scientific research. Corn for silage is extremely inconvenient crop in biological agriculture, especially in cold springs. If heat is not sufficient, corn "sits" in the ground, does not grow and weeds overgrow it. Herbicides have not been applied in the farm since 1979 [Antonets S.S., Antonets A.S., Pysarenko V.M., Opara, Pysarenko P.V. 2010]. Therefore, in cold spring they had to mow corn along with weeds and use as green fodder, and then to sow buckwheat. Replacing silage corn with sainfoin allowed obtaining green mass yield of 250-350 kg/ha; it gives good silage, 1 kg of which contains 180 g of protein (to compare - 80 g/kg in corn, animals' need in it -120 g/kg. In addition, sainfoin enriches soil with biological nitrogen.

The farm follows the optimal timing of sowing wheat. These terms provide the best wintering and the least damage from opomyzid, wheat and bread flies. Sugar beets are usually sown early, right after early spring crops. Early sowing, good and even crops against no-plough soil treatment allow diminishing losses from pests, such as beet weevils and beet leaf miner that come out of the soil according to the temperature gradient. The technologies stipulate about 18 preventive measures to avoid the harm imposed by weeds, diseases and pests without using any pesticides in organic farming.

Table 1. Effect of organic farming implementation on increasing crop yield in PE "Agroecology" (metric centner/ha)

Years	Total grains	Winter wheat	Spring barley	Oat	Sunflower	Sugar beet
Yield for 1971-1975 (before implementation)	26.1	29.2	25.2	27.1	16.1	255.0
Average yield for 1986-1990	48.9	63.2	53.3	37.0	28.6	292.0
1991-1995	46.1	57.3	51.2	33.3	21.3	393.2
1996-2000	41.7	43.3	38.2	36.5	24.4	399.6
2001-2005	38.8	48.3	33.8	36.6	16.8	295.0
2006-2010	48.9	56.8	42.5	47.0	23.0	487.7
2011-2014	Stable development maintained					

Source: [Antonets S.S., Antonets A.S., Pysarenko V.M., Opara, Pysarenko P.V. 2010].

Implementation of soil biological farming systems has a significant impact on the livestock industry.

Organic farming system started from first steps towards subsurface tillage, which is

a separate trend in agriculture now. Its production's philosophy is to care for the constant reproduction of soil fertility. Fertile land itself is a unique living and constantly self-improving body. There is more than 2 kg of bacteria, streptomycetes and fungi, 100 g of ciliates and other protozoa, up to 50 g of nematodes, mites, springtails, up to 100 g of molluscs, woodlice, spiders, millipedes and other insects, up to 500 g vertebrates in the layer depth of 30 cm of 1 m^2 area. This whole biological mass sustains because it eats out up to 10 kg of organic matter for the season.

This unique plurality of plants, animals and microorganisms, and especially their biodiversity that thrive in the conditions created for them - this is the vivifying soil, which best properties are preserved and multiplied in fields of "Agroecology". Life organization of biodiversity, especially microbial life, is based not primarily on the genome, species or ecosystems, but on use of terrestrial resources diversity according to the principle of labour division, which follows from the history of the life evolution on earth.

What is special about development of "Agroecology"? It exploits natural factor. That is, helps nature in every way to ensure everything taken from the ground being returned back into it. How can it be done? First of all with the aid of crop rotations. The second, seeds should not bring pathogenic microorganisms into fields. And let us say again, "Agroecology" is the only farm saturating crop rotation with 20% legumes, while the average figure in Ukraine is 6%. It provides plants with natural available biological nitrogen fixed from the air by microorganisms (bacteria). Plants give nutrients to microorganisms and microorganisms fix nitrogen. There is about 8 tons of nitrogen in air over every square meter of earth's surface. However, nobody can use it, except these microorganisms. Air always circulates in soil and nodule bacteria living on the roots of legumes, associative and free-living, reduce this nitrogen to available for plants ammonia nitrogen. This nitrogen is not harmful for environment, it decomposes slowly, not instantly as fertilizers do. When applying fertilizers, only 20-21% of their amount is uptaken by plants, and the rest just get into water bodies and foods. Contrary, biological nitrogen remains in soil [Patyka., Hnatiuk, Buletsa, Kyrylenko 2015, pp. 12-20].

For the ability of leguminous plants to enter into symbiosis with specific for a particular species or group of species nodule bacteria they may live in different soil and climatic conditions of Ukraine being able to fix up to 125-380 kg/ha of atmospheric nitrogen per growing season (Table 2) [Verhunov, Davydenko, Tovmachenko 2014; Patyka, Hnatiuk, Buletsa, Kyrylenko 2015, pp. 12-20; Kots, Patyka, Morhun 2009, pp. 344-386; Patyka, Tykhonovych, Filipiev, Hamaiunova, Andrusenko 1993; Patyka, Kots, Volkohon, Sherstoboieva, Melnychuk, Kalinichenko, et al. 2003]. Thanks to symbiotic nitrogen fixation, legumes form a high yield of low-cost vegetable protein without application of expensive, energy-intensive and environmentally hazardous mineral nitrogen fertilizers. After harvesting, more than 30% of biologically fixed nitrogen remains in stubble and root residues and then used

by the next crop [Tihonovich, Provorov 2009].

Inoculation of seeds with efficient strains of nodule bacteria obtained through breeding process allows realising up to 15-50% of symbiotic nitrogen-fixing capacity, and the remaining reserve can be used by the means of optimization conditions for the symbiosis functioning.

Table 2. Symbiotic nitrogen fixation and biological nitrogen income in Ukraine

Crops	Nitrogen fixation (kg of nitrogen/ha/year)	Nitrogen remained in soil (kg/ha)	Equivalent nitrogen fertilizer dose (kg/ha)
Legumes (pea, soya, vetch etc.)	50-90	10-20	25-35
Perennial legumes (alfalfa, clover, sainfoin, sweet clover etc.)	90-380	60-120	120-250

Source: [Patyka, Hnatiuk, Buletsa, Kyrylenko 2015, pp. 12-20].

Ukrainian microbiologists and producers of microbiological agents possess a complete set of production and reserve strains of nodule bacteria. Their efficiency in different legumes is shown in Table 3.

Table 3. Effect of nitrogenization on yield and nitrogen fixation in legumes (data of geographic net of experiments)

Crops	Average increase in yield (% to control)	Additional accumulation of protein (kg/ha)	Increase in nitrogen fixation (kg/ha)	Increase in nitrogen fixation (%)
Pea	10.5	102	15–20	30–35
Vetch	12.4	120	20–25	30–35
Soya	18.0	225	35–60	40–60
Lupine	16.6	170	35–55	35–50
Clover	12.0	240	50–70	30–40
Sainfoin	15.5	260	60–80	40–60
Alfalfa	16.8	460	90–120	50–70
Galega	27.8	620	110–150	50–80

Source: [Patyka, Hnatiuk, Buletsa, Kyrylenko 2015, pp. 12-20].

Today, “Agroecology” possesses a whole complex of tests to determine physiological nitrogen optimum for growing crops. One of them is calculation of nitrogen and phosphate fertilizers doses necessary to obtain planned harvest for a particular field taking into account indicators of soil fertility and biological nitrogen fixation capacity.

Approximate calculations of fertilizer doses taking into account symbiotrophics of soya are shown below. The calculations should take into account indicators of biological nitrogen fixation, as well as nitrogen, phosphorus and other elements utilization indexes. For example, the farm is planning to obtain yield of soya grain of 2.5 ton/ha (Table 4).

To form one ton of seeds soya uses 85 kg of nitrogen. Soil is loamy chernozem with

pH of 6.8-7.0, easily hydrolysed nitrogen content in soil of 6.2 mg/100 g. Arable soil layer contains 186 kg/ha of nitrogen. Index of utilization nitrogen from the soil is 60-75%. That means that plants can uptake 139.5 kg/ha of nitrogen from the soil. To obtain the planned harvest plants need additionally 73 kg/ha of nitrogen. It can be supplemented through symbiotic nitrogen fixation in amount of 106.2 kg/ha, which is more than enough for plants.

Table 4. Calculation of mineral fertilizers doses (taking into account symbiotrophic of soya) to obtain grain harvest of 2.5 tons/ha

Index	Easily hydrolysed nitrogen	P_2O_5 according to State Standard (DEST)
Content in arable soil layer:		
mg/100 g of soil	6.2	1.5
kg/ha	186.0	45.0
Coefficient of utilization from soil (%)	75.0	25.0
Utilization from soil during vegetation season (kg/ha)	139.5	11.2
Take out per 1 kg of grain (kg/ha)	85.0	28.5
Uptake by crops for vegetation period (kg/ha)	212.5	71.3
Shortage to obtain planned yield (g/ha)	73.0	60.1
Symbiotic fixation of nitrogen:		
%	50.0	–
kg/ha	106.2	–
Assimilation of phosphorus through phosphate-mobilizing microorganisms		
%	–	25.0
kg/ha	–	17.8
Shortage of mineral fertilizers to obtain planned yield (kg/ha)	–	42.3

Source: [Patyka, Hnatiuk, Buletsa, Kyrylenko 2015, pp. 12-20].

The highest attention should be paid to the ways of controlling microorganisms inhabiting pre-root and root zone of plants. This trend has been intensively developed in the leading countries of the world for more than 40 years. It is called associative nitrogen fixation, which is more large-scale than symbiotic one [Kots, Morgun, Patyka, Petrichenko, Nadkernichnaya, Kirichenko 2011; Umarov, Kurakov, Stepanov 2007]. Long-term research on usage of diazotrophes when growing cereal crops allows to conclude that in modern conditions due to nitrogen fixation we can obtain increase in yield equal to application of 30 kg/ha mineral nitrogen [Kots, Morgun, Patyka, Petrichenko, Nadkernichnaya, Kirichenko 2011; Umarov, Kurakov, Stepanov 2007; Dobereiner 1983, pp. 330-350; Steenhoudt, Vanderleyden 2000, pp. 487-506]. Introduction of diazotrophes in wheat rhizosphere improves total nitrogen content in rhizosphere and phytomass, but cannot fully cover the needs of plants in this element [Kots, Morgun, Patyka, Petrichenko, Nadkernichnaya, Kirichenko 2011; Volkogon 2000, pp. 51-58; Eckert, Weber, Kirchhof, Halbritter, Stojfels, Hartmann

2001, pp. 17-26]. Diazotrophe based formulations promote increase in winter wheat yield by 0.16-0.43 t/ha, raw protein content in grain by 0.2-0.5% and the total protein yield by 2-13%. Commercial formulation Diazofit is recommended for growing wheat, rice, rape, while Ryzoenterin – for barley (Table 5).

It is important to emphasize that the associative nitrogen-fixing bacteria have a stimulating effect due to their ability to synthesize growth-stimulating substances (such as auxins, gibberellins, cytokinins, etc.) in amounts determined by bio-regulatory mechanisms of plant [Lugtenberg, J. de Weger, Bennett 1991, pp. 457-464; Itakura, Uchida, Akiyama, Hoshino, Shimomura, Morimoto, et al. 2013, pp. 208-212]. This is their big advantage over synthetic growth stimulators.

Table 5. Efficiency of Diazofit in different soil-climatic zones

Country	Crop	Increase in yield (t/ha)	Increase in yield (%)
China	Wheat	1.1	24
Vietnam	Rice	0.75	27
India	Wheat	0.6	22
Russia	Wheat	0.25	11
Ukraine	Wheat	0.36	14

Source: [Patyka, Hnatiuk, Buletsa, Kyrylenko 2015, pp. 12-20].

For example, each year in the USA up to 22 million tons of nitrogen (13 million tons of biological nitrogen, and 9 million tons of mineral) is applied in crop production. Besides, mineral nitrogen is applied in an environmentally safe form. The farm "Agroecology" wisely uses natural factor: every year a certain amount of nitrogen is removed from the soil with the harvest but also a certain amount is returned back to the soil. Moreover, due to microbiological and biological factors returned amount is even bigger than taken one.

Scientists of the department headed by Academician Volodymyr Patyka study phytopathogenic bacteria, i.e., those that cause plant diseases [Hvozdiak, Pasichnyk, Yakovleva, Moroz, Lytvynchuk, Zhytkevych, et al. 2011]. The question is, are there any phytopathogenic bacteria in "Agroecology's" fields? Yes, there are. However, their number is small and environmentally safe. That is, they create diversity. If there is a certain amount of pathogenic bacteria, there are their antagonists fighting harmful organisms and producing biologically active substances. Variety preserves the integrity of the biosphere. Diversity is limited in agriculture. It is not like in nature, where dozens of thousands of species interact simultaneously. At the areas where monocrops were grown, there was such a uniformity created that there no organisms left to fight pests, so it became necessary to apply chemicals. It does not happen in "Agroecology's" fields because natural factors are being successfully used here, namely, microbiological nitrogen enrichment – organic matter returns as green manure

that forms humus much easier and faster. Microorganisms decompose straw in the soil.

The powerful aspect of “Agroecology” is usage of organic matter obtained from cows. This matter is kind of a powerful microorganism factory. All the organic residues applied in fields (green manure) are to be enriched with manure (10 t/ha and more). The number of cattle per hectare is optimal at the farm.

At the farm, creative approach to work is exploited. For example, there is sainfoin remained at a field. Roots of leguminous are occupied by bacteria living in symbiosis i.e. plant and microorganisms help each other. And there is growing amaranth too, which contain valuable protein. In pre-root and root zones, there are so-called associative bacteria. Amaranth’s root secretions are very attractive for associative nitrogen-fixing organisms living in soil. Currently this kind of nitrogen fixation is developing in the world. Some microbiological commercial formulation are produced. Moreover, the proportion of nitrogen, which can be produced by these microorganisms is even greater than that of legumes.

If your approach to biosphere excludes violations of the self-regulation and balance mechanisms you can do a lot. For example, after digging potatoes in late July - early August mustard can be sown to grow until the end of October. Mustard is a sanitary plant. If it is incorporated into soil, there are no pathogens causing potato rot for the next 2-3 years; such potato is good at storage. However, undesirable things occur too, particularly in cultivation of rape. So much so, that it returns to the same field in 3-5 years.

The theoretical basis of growing winter and spring rape in rotation is the relationship of plants and soil environment, including microorganisms that living in it. A microbiome in the course of its life creates conditions for the development of other higher forms of life. However, the range of issues associated with the change of microorganisms activity and biochemical processes taking place in the soil as a result of growing plants is complex and in many cases is not yet understood [Patyka, Tykhonovych, Filipiev, Hamaiunova, Andrusenko 1993; Aristovskaya 1972].

Analysis of changes in soil biogenic status, which is characterized by the development of major ecological and trophic groups of microorganisms showed that different groups respond differently to winter rape growing under its different saturation percentage in crop rotation (Table 6). Its returning into rotation earlier than in seven years leads to a reduction in the number and biomass of soil bacteria. Thus, bacteria biomass in rotation options increased 1.8 times compared to monocrop, the number of oligonitrophilic bacteria involved in the transformation of residual organic substances increased 2.3 times, streptomycetes 1.4 times. The number of bacteria able to form colonies on soil agar was 2.1 times higher in crop rotation compared to growing monocrop.

Contrary, fungi content increased 1.8 times while growing winter rape as monocrop compared to crop rotation. Among the fungi, the dominant species were Alternaria brassicicola, Alternaria brassicae, Alternaria tenuis, Phoma lingam, Peronospora

brassicae, Fusarium oxysporum, Botrytis cinerea, which are pathogenic for plants.

Increase in the number of bacilli and streptomycetes in soil rotation points to more profound degradation of organic matter. These groups of microorganisms metabolize compounds that are often unavailable to bacteria, and they develop on substrates poor in available compounds [Patyka, Kruglov, Berdnikov, Patyka 2008, pp. 59-70; Lykhochvor, Petrychenko, Ivashchuk, Korniichuk 2010]. Cellulose-decomposing microorganisms in soil also point out to mobilization processes in it. According to our data (Table 6), the content of these organisms in rotation was 2.6 times as much compared to permanent growing. In crop rotation, the number of cellulose-decomposing microorganisms in 1 g of dry soil was 35,400, while 13,300 in permanent growing. These data confirm the results of our research for flax and tomatoes that is mobilization processes in the soil occur more rapidly when alternating plants than when permanent growing.

Table 6. Number and biomass of microorganisms in meadow chernozem soil when growing winter rape in crop rotation and permanently (average for 2010–2013)

Variation	Bacteria biomass (t/ha)	Bacteria on nutrition media			Oligo-nitrophilic bacteria	Fungi	Strepto-mycetes	Cellulose-decomposing (thousand/g dry soil)
		MPA	MPA+ SA	SA				
		10^6 CFU/g of dry soil						
Crop rotation (return in 7 years)	8.1	28	4.2	196	283	2.7	98	35.4
Crop rotation (return in 5 years)	6.7	24	5.5	175	242	3.4	88	27.5
Crop rotation (return in 3 years)	5.5	17	6.4	146	181	3.8	71	14.2
Permanent growing	4.5	11	7.4	95	121	4.9	69	13.3
$LSD_{0.5}$	2.0	2.5	1.1	15	30	0.5	15	3.3

Source: own work.

Similar changes were revealed in the dynamics of the microorganisms number, which, apparently, was due to certain processes of income and decomposition of organic matter. The most numerous group of saprophytic microorganisms was bacilli and microscopic fungi dominating the soil in crop rotation in the phase of forming pods in winter rape, while the number of oligonitrophilic bacteria was significantly reduced. For streptomycetes, the difference in experiment variations was insignificant.

Our results on biological activity when growing winter rape in crop rotation and permanently is given in Table 7. It shows that growing winter rape in rotation leads to an increase in the emission of CO_2 2.7 times in comparison with permanent growing. Decomposition of linen fabric for 45 days was 32% in crop rotation, while 21% in permanent growing. These data indicate that when growing crops permanently, less favourable soil conditions are created for microorganisms resulting in reducing their biological activity.

Table 7. Intensity of CO_2-emission from meadow-chernozem soil when growing winter rape in crop rotation and permanently

Variation	Intensity of CO_2-emission (mcg/g hour)
Crop rotation (return in 7 years)	5.7
Crop rotation (return in 5 years)	4.9
Crop rotation (return in 3 years)	3.3
Permanent growing	2.1

Note: x/P = 0.05; t_{st} = 2.99
Source: own work

Study on the species composition of bacteria showed that in most cases the same species occurred when growing winter rape both in crop rotation and permanently. However, their occurrence and density of species differed significantly (Table 8).

Table 8. Typical and dominant species of asporous bacteria in rizosphere of winter rape when growing winter rape in crop rotation and permanently

Species	Crop rotation		Permanent growing	
	I	II	I	II
Agrobacterium radiobacter	–	–	21	6
Agrobacterium radiobacter pv. *rhizogenes*	4	–	12	3
Agrobacterium tumefaciens	–	–	19	6
Arhtrobacter globiforvis	65	11	43	7
Arhtrobacter pascens	87	9	6	1
Arhtrobacter simplex	88	7	–	–
Arhtrobacter tumescens	57	3	83	9
Arhtrobacter ureafaciens	2	–	52	2
Brevibacterium fuscum	44	3	8	–
Flavobacterium diffusum	45	3	27	3
Flavobacterium suaveolens	–	–	64	2
Mycobacterium lacticum	57	4	11	1
Nocardia rubropertincta	–	–	54	3
Pectobacterium carotovorum subsp. *carotovorum*	3	–	31	4
Pseudomonas cichorii	–	–	27	2
Pseudomonas fluorescens	54	7	76	8
Pseudomonas marginalis pv. *marginalis*	4	1	35	3
Pseudomonas rathonis	68	8	4	–
Pseudomonas syringae pv. *maculicola*	3	–	41	5
Pseudomonas viridiflava	4	–	32	4
Xanthomonas campestris pv. *campestris*	3	–	41	4

Note: I - the frequency of species occurrence (%); II- species density (%).
Source: own work:

In rhizosphere of winter rape that was grown permanently occurred Arhtrobacter globiforvis, A. tumescens, Flavobacterium suaveolens, Pseudomonas fluorescens, P. syringae pv. maculicola, Xanthomonas campestris pv. sampestris. It should be noted that Pectobacterium, Pseudomonas and Xanthomonas prevailed in permanent growing, while Arhtrobacter, Brevibacterium, Nocardia, etc. (that feature high biochemical activity) predominated in crop rotation.

Previously, we have shown that the population of pathogens of rape bacterial diseases in nature is heterogeneous, namely, that is 78% of high and 11% of low aggressive strains [Zakharova, Melnychuk, Dankevych, Patyka 2012, pp. 46-52]. It should be noted that the most aggressive pathogen appeared to be Pectobacterium carotovorum subsp. carotovorum, and the least aggressive - polyphage Pseudomonas fluorescens. All strains studied by us in rape were quite aggressive. According to their major morphological, cultural and biochemical properties they are related to pathogens of root bacteriosis Xanthomonas campestris pv. campestris, mucosal bacteriosis Pectobacterium carotovorum subsp. sarotovorum and Pseudomonas fluorescens.

Permanent growing of winter rape steady leads to lower yields (Table 9). The data shows that the reduction in yield when permanent growing was 60% compared to growing in rotation. Significant yield reduction was observed in the variation with returning winter rape to the same field after 3 years (24%).

Thus, permanent growing of winter rape significantly influences formation of soil microbiota, with its biomass in soil reducing. The number of bacilli, oligonitrophilic and cellulose-decomposing microorganisms is decreasing, so is biological activity of soil.

Table 9. Yield of winter rape when growing winter rape in crop rotation and permanently

Variation	Grain yield (t/ha)	Increase in yield (to control)	
		(t/ha)	%
Permanent growing (control)	1.33	–	–
Crop rotation (return in 3 years)	1.65	0.32	24
Crop rotation (return in 5 years)	1.97	0.64	48
Crop rotation (return in 7 years)	2.67	1.34	100.7
$LSD_{0.5}$	0.30		

Source: [Patyka, Zakharova 2015, pp. 15-19].

Certain changes are observed in the dynamics of the microorganisms number due to specifics of income and decomposition of organic matter in crop rotation. These data indicate that mobilization processes in soil in crop rotation occur more intensively than when growing rape permanently. In addition, accumulation of rape bacteriosis pathogens, such as Xanthomonas campestris pv. campestris, mucosal bacteriosis Pectobacterium carotovorum subsp. carotovorum, Pseudomonas fluorescens, and microscopic fungi increased 1.8 times when growing winter rape permanently compared with crop rotation, including fungi Alternaria brassicicola, Alternaria

brassicae, Alternaria tenuis, Phoma lingam, Peronospora brassicae, Fusarium oxysporum, Botrytis cinerea, which indicates about rape having lost its phytosanitary properties. Failure to comply with the basic requirements of rape growing technology, especially its high saturation percentage in rotation observed in recent years does not improve, but worsens phytosanitary condition in soils.

Rape intensively exhausts soil, and pathogens spread in crops. That is why it is impossible to obtain good harvest after one, two, or three years [Patyka, Zakharova 2015, pp. 15-19]. Therefore, rape must not be returned into the same field sooner than in 7-8 years. Scientists constantly warn about the danger of intensive approach in agriculture, but, unfortunately, nobody listens to them.

One can understand a farmer sowing rape to get financial benefits today, but we must think of the years to come. At the farm "Agroecology", people are aware that we must take care of soil fertility to be used by their children, grandchildren and great-grandchildren in the future. A little over ten years ago, they rented land of the neighbour farm, which contained only 3% humus, and now it increased to more than 4%. It witnesses about the farm owner being a patriot, a man who cares about earth.

And one more important detail. Ravines here have not been ploughed. They are sources of useful microorganisms that are natural antagonists of pests. They are developing there and then distributed by the carriers.

In Ukraine, there is a good concept of sustainable development of agro-ecosystems developed by specialists of the Institute of Agroecology in 2002-2004. It was reviewed and approved by the Ministry of Agriculture, and a special joint executive order was issued by the Ministry of Agriculture, Ministry of Environment and the National Academy of Agricultural Sciences. Then this concept was brought up to the Cabinet of Ministries. After that, breaks were put on it. If we implemented it, as farm "Agroecology" did, we would not talk today about quality wheat of other states, because we would have our own quality wheat.

That plenty of seeds, which we try to harvest today, is not any kind of salvation, but disaster, because it is produced with the use of chemicals. To obtain ecologically safe natural harvest, it is necessary to introduce farming practice similar to "Agroecology's" one.

Thus, the basic principles of organic (natural) farming in "Agroecology" are as follows: soil preserving technologies, that is, seed bed is processed to depth of 5 cm for all the crops while surface is mulched with harvest residues; soil fertility is restored with the aid of organic fertilizers (manure - at least 24-26 t/ha, non-tradable crop residues and green manure crops); synthetic fertilizers are not applied (nitrogen is supplied through entering legumes into crop rotation (more than 20% saturation); agro-technical measures to protect crops from weeds and stubble crops (cruciferous green manure sown after harvesting, which has allelopathic effect on weeds); crop protection from pests and diseases with the aid of agricultural practices, prevention and biological methods; correction of land use patterns and optimal crop structure modelling.

This research based on the example of “Agroecology” is used for environmental education in rural schools in Poltava region, as well as in higher education establishment, particularly Poltava State Agrarian Academy, in specialized education centres, and non-formal education institutions.

Increasing environmental awareness in agricultural sector is an urgent problem nowadays. It is necessary to ensure improvements among both young and mature population [Sobchyk 2004, 2013].

Environmental education is a task for many institutional, social, political and cultural organizations. Educational institutions play a special role in its implementation. This is due to the fact that they have a long and significant impact on young people. That is why environmental education will result in improving living conditions and raising environmental awareness of the younger generation, first of all, in rising natural culture among people. Quality environmental education results from choosing appropriate forms and methods, as well as from using original and interesting teaching tools. For example, there are all the necessary conditions for training Poltava Agrarian Academy’s students at the farm, including social issues.

The idea of balanced management stems from the concept of sustainable development [Sobczyk 2013; Sobchyk 2004]. Development of crop production is possible as long as agro-ecosystems and biological diversity of natural resources maintained for future generations. Well-balanced crop production (sustainable agriculture) should perfectly realize the following goals:

- to produce high quality livestock (environmentally safe) at affordable prices and in quantity necessary for the needs of the country;
- to ensure such an income of producer of agricultural products, which would be adequate in respect of other sectors of the economy;
- to make it possible to maintain natural balance [Sobczyk 2004, 2013; Biliavski 2002, pp. 18-28; Sob 2004, pp. 150-153; Szewczuk, Biliavski 2002].

The program on residential areas should always take into account human activities and problems, natural feature and value of the environment (i.e., to be in harmony with nature), cultural and historical heritage of rural areas.

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Chapter 5

FINANCIAL SUPPORT OF ORGANING FARMING: PROBLEMS AND PROSPECTS

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Introduction

In the conditions of rapid social development the paradigm of agrarian economy and strengthening the intensity of competition is changing. The integration to the European economic area and the phenomena of globalization, that are sweeping the world, sharpened the contradictions, that existed among the needs of society and the state at profitable high-technological agricultural enterprises that are competitive in the market of organic farming products, the real state of formation profitability, and the traditional system of production organization.

The development of agrarian sector requires using of modern techniques and technologies that provide not only rational use of natural resources, but also restore the disturbed ecological balance. Nowadays the organic farming can be included into such advanced technologies. It is the most dynamic sector of the global agricultural sector owing to stable and high growth rates in 160 countries of the world. However, Ukrainian producers of organic agricultural products in most cases do not have sufficient sources of financing for further production.

The question of financial providing of enterprises engaged in organic farming in Ukraine has been investigated by such famous scientists as: R. Bezus, P. Makarenko, M. Malik, P. Sabluk, M. Khvesyk, V. Shevchuk, and others. However, problems and prospects of financial provision of organic farming in Ukraine require detailed studies in order to ensure its stable development.

The purpose of the article is to identify problems in the financial provision of organic agricultural production, to determine the directions of attracting financial resources to the producers of organic products with purpose of their development and introduction of eco-innovations.

The research is based on the systematic, complex and integrated approach to the development of organic production in the agrarian sector as a system of interrelated and mutually correlated components of ecological, socio-economic, organizational, dynamic nature aimed at ensuring stable development of the industry, satisfying the needs of society in high quality food, maintaining health of the nation, recovering the natural resource potential of the country.

To achieve the objective of the research special and general scientific methods were used, including: the method of abstract logic (study of the essence, principles and

peculiarities of organic farming, forming conclusions); bibliographic method (learning and processing scientific papers devoted to financing organic production); system of generalization (definition of directions of financing organic production in the agricultural sector); analysis and synthesis (to assess the state, dynamics and trends of national financing of the agrarian sector, the impact of macroeconomic factors).

The information base for the study were the legal and regulatory acts, official materials of the Verkhovna Rada of Ukraine, the Cabinet of Ministers of Ukraine, the State Statistics Service of Ukraine, the Ministry of Agrarian Policy and Food of Ukraine, monographs, and scientific-analytical articles by Ukrainian and foreign scholars, the Internet-resources, materials of discussions at scientific conferences, and other analytical reports of the authors.

Presenting the main material

The peculiarities of the organic production envisage for transition period obtaining the appropriate status, and rejection of using agro-chemical means, which lead to initial decrease in cultivation and production volumes. In this regard, the question of the state support of organic agricultural products manufactures arises. Such support of organic farming in the EU and in the neighboring countries includes grants in programs of rural development, legal protection and European and national action plans. State support may also be manifested as through the using of direct and indirect instruments and mechanisms of influence, e.g.: partial compensation of losses during the conversion period, state subsidies per 1 hectare, tax privileges and providing special credit terms, investment in research, training of farmers, advisory support, etc. In 2008 in order to increase the level be being kept informed about of organic farming the information campaign was organized - one of the key instruments of the European action plan concerning organic food and organic farming. In addition, the majority of the EU member states have national action plans, which are now being put into practice efficiently enough [Чайка 2013, p. 41].

In Ukraine Article 33 of the Law of Ukraine "On the production and sale of organic agricultural products and of the raw materials" envisages only state support of the subjects of organic production according to the Law of Ukraine about "State Support of Agriculture of Ukraine" [Про виробництво та обіг органічної сільськогосподарської продукції та сировини, Закон України, 03.09.2013].

Market conditions create equal terms for the development of all business entities. However, the efficiency of agricultural enterprises' activities depends mainly on the natural and climatic conditions, which are hard to predict and, in its turn, this increases the risk of agricultural production and its dependence on additional sources of funding.

Particularly actual is the financial support of organic farming production, which is in the difficult economic conditions because of the legislative imperfections. Thus, in our opinion, it would be appropriate to use such mechanisms of state financial support

of organic agricultural products manufactures, as:

1) compensation of costs on primary certification;
2) providing financial guarantees to producers and exporters of organic products (raw), materials (donations);
3) providing subsidies during the transition period and throughout all the period of production and turnover of organic products and raw materials;
4) introduction of privileged system of crediting;
5) full reimbursement of expenses on insurance risks;
6) providing tax privileges and benefits in using water, leasing land of state communal property, and so on.

It should be noted, that farmers in the developed countries of Europe, who wish to be engaged in organic farming, can get privileged loans and sell their products twice as expensive. In Ukraine, organic production does not receive financial support from the state, and its producers have to rely on their own credits or financial resources.

Crediting of the agricultural sector as one of the priority sectors of the economy of Ukraine becomes more and more profitable every year. It is mainly carried out by the following commercial banks: JSC "Raiffeisen Bank Aval" , JSC "Bank "Kievan Rus", JSC "VAB Bank", JSC "Credit Agricole Bank", PJSC "State Savings Bank of Ukraine". Today, some credit programs are currently offered by JSC "AlfaBank", JSC "Credit Dnipro Bank", JSC "All-Ukrainian Development Bank", JSC "Erste Bank", JSC "PUMB" [Банки стали більше цікавитися кредитуванням АПК, 08.04.2013].

At the same time, government support is still too weak. Nowadays, the Ministry of Agrarian Policy and Food of Ukraine has announced about a completely new system of crediting of agriculture based on the mortgage of land, which will enable to attract additional investments in agro-industrial complex of Ukraine.

Despite of land mortgage as a primary security for getting a loan, the new system provides for the establishment of the State Land Fund as an institution of control over the circulation of land and management of state property land. The Ministry also offers to create State Land Mortgage and Investment Bank and introduce compulsory insurance of agricultural products. The new scheme of crediting involves the introduction of privileged lending (to 10% per annum) in a specialized bank [Чайка 2013, p. 200].

According to the Ministry of Agrarian Policy and Food of Ukraine the requirement of agricultural sector in working capital is 39 billion hryvnias (UAH), which is 1.7 bn UAH more than in 2012. Moreover, the deficit of funds for spring field work is around 7.9 billion UAH. The own funds of agricultural producers are 31 billion UAH. The deficit is planned to be eliminated by using the following directions: commercial loans (3.7 billion UAH), bank loans (3.8 billion UAH), making of forward contracts (300 million UAH) [Економічна правда, http://www.epravda.com.ua].

At the beginning of 2013, 3 billion UAH were involved in the agricultural sector, 2 billion of it were bank loans (66.7%). The greatest volume of their involvement took

place in such areas as: Mykolaiiv (18.4%), Dnipropetrovsk (15.9%), Kyiv (11.6%), Kharkiv (11.0%).

The most popular financial products for the agricultural sector enterprises are: seasonal loans for growing crops, investment for the purchase of agricultural assets, loans for agribusiness (long-term financial products (for 5-7 years) aimed at increasing business) and financial leasing of agricultural machinery. At the end of 2012, banks introduced a new instrument for attracting financial resources - agricultural warehouse receipts. They are documents with guarantee from the warehouse for the stocks of agricultural products of certain producer that can be used as security for the loan.

However, banks impose higher requirements of security property than before. The value of the loan payment by security property varies from 1.5 to 2. It means that if the enterprise provides as a security object with market value 2 million UAH, it can count on the loan of 1 million UAH.

It is worth noting, that in recent years privileged lending has been carried out with by different schemes - from barter to a variety of programs reducing the interest rate on the loan. However, these measures remained ineffective for small and medium-sized agribusinesses [Демиденко, Дивнич 2015, p. 186].

Nowadays, the development of organic agricultural production in Ukraine is due only to entrepreneurial initiatives and international support through the implementation of a number of projects. However, there are about 60 farms in Poltava region, which are interested in producing ecologically pure products. Here, with the support of "Eurasia" foundation the project "Establishment of the regional cluster of producers of ecological products" was started, the goal of which is to provide competitiveness of production of ecologically pure products without transgenic and chemical admixtures.

So far, the attempts to satisfy the consumers' demand in ecologically clean food of Ukrainian production in Poltava region, carried out as a part of this project were not successful, mainly because the manufacturers have to bear the additional expenses for getting the trademark "Ecologically clean and safe", for advertising their products with the trademark, for informing consumers about the benefits of ecologically clean food products and the guarantees provided by this trademark. Thus, farmers do not receive profits switching to the organic methods of management, when additional benefit is offset by the additional costs.

Innovative technologies make it possible to improve the structure of soil, reduce the ecological load and restore its fertility which is necessary to conduct successful organic farming. In this case, the natural potential of plants, animals and landscapes is used, the harmonization of agricultural practices and the environment is provided. The technology of organic farming makes it possible to reduce significantly the use of external factors of production (resources) by limiting the use of chemical fertilizers and plant protection products. Instead, the increase of yields and plant protection is carried out by using other agro-technological measures and various natural factors that are available under the scientific conditions and technical progress. However, organic

farming follows the principles that are caused by local socio-economic, climatic, historical and cultural peculiarities.

Taking into account the importance of the state participation in creating favorable institutional environment for activation of innovation activities of agricultural enterprises in Ukraine it is necessary to implement efficient measures, in particular [Василенька 2010, p. 12].

- providing financing innovation process in agrarian sector of economy;
- effective implementation of measures for stirring up the investment activities of commercial banks, their interest in long-term crediting of innovation process in agrarian sector;
- increasing of foreign investments flow to innovation processes in agriculture;
- -formation of a proper legal environment for innovation activities development, raise motivation of farmers for high-productive and high quality activities by improving the system of economic incentives through changes in tax and customs legislation;
- assistance in developing of highly advanced stock market, venture capital, and business in general, investment and financial sector of economy;
- creating of venture capital funds, the capital of which will be formed with 30-40% of the state participation;
- ensuring the innovation infrastructure development, creating of regional innovation centers;
- formation of innovative society culture: support of scientific publishing houses, scientific and popular publications, expanding educational programs, increasing the level of educational and scientific process, and so on.

In addition, the important point is the formation and education of environmental awareness, firm convictions and moral principles for eco-innovation as "friendly" to the environment activities for all subjects of economic activities (farmers-entrepreneurs, farmers, employees, peasants).

The use of eco-innovations in the agrarian sector which enables better use of primary natural resources will certainly improve the environmental situation in rural regions, promote the formation of stable network structures of support and promotion of leading experience in the eco-efficiency sector, keep and create new work places improving the quality of life.

Thus, for supporting organic agricultural production development the adequate financial state support is necessary, which provides assistance to peasants and farms during their transition to organic production of agricultural products. There are primarily privileged loans for the purchase of seeds, agricultural machinery and young livestock that meet the privileged requirements set for organic products; conducting free state expertise of soil on these farms concerning the content of organic and inorganic substances, and also their chemical and radiological purity; donations (subsidies) during the transition period and so on.

Table 1. Factors restraining the implementation of eco-innovative technologies to organic farming of Ukraine and ways of their elimination

Impact factors	Directions of eliminating negative action of factors	Executors
1. Imperfection of legal regulation	1. Adoption of appropriate legal and regulatory basis concerning organic agricultural production. 2. Adoption of the state program of eco-innovation introduction. 3. Improvement of the legislative basis concerning innovation activities.	1. State executors establishments and authorities.
2. High cost of innovations	1. Providing tax privileges to producers implementing eco-innovations. 2. Using credits. 3. Making lease rent agreement. 4. Developing venture business. 5. Establishing cooperation with innovative product developers and manufacturers of organic products.	1. State agencies and authorities. 2. Financial market entities (banks, leasing and insurance companies, venture capital funds, etc.). 3. Scientific, research and research and design institutions. 4. Manufacturers of agricultural machinery. 5. Manufacturers of organic products.
3. Unavailability for manufacturers because of the limited amount of innovations	1. Establishment of scientific and production cooperation among the innovative product developers and producers of organic agricultural products.	1. Scientific, research and research and design institutions. 2. Manufacturers of agricultural machinery. 3. Manufacturers of organic farm products.
4. Shortage of funding	1. The use of the most necessary innovations in production. 2. Establishment of scientific and production cooperation with the developers of an innovative product. 3. Participation in international grants. 4. Attraction of Ukrainian and foreign investment.	1. Manufacturers of organic products. 2. Scientific, research and research and design institutions. 3. Manufacturers of agricultural machinery. 4. International foundations. 5. Ukrainian and foreign investors.
5. Absence of information about innovations	Presentation of innovations at exhibitions, fairs, etc.	Scientific, research, and research and design institutions.
6. Disinterest of managerial personnel	1. Conducting of promotions among producers of organic agricultural products. 2. Establishing of scientific and production cooperation among developers of innovative product and producers of organic agricultural products.	1. Agricultural higher educational institutions. 2. Manufacturers of agricultural machinery. 3. Manufacturers of organic agricultural products.

Source: the author's formulation.

For manufacturers of organic agricultural product it is advisable to obtain legal status, to make up a business plan for economic development, to be engaged in

manufacturing of these products in compliance with all the standards of organic agricultural production for at least 15 years. In case of violation of the requirements it is necessary to involve the administrative responsibity (fines, withdrawal of the certificate, etc.).

In our opinion, there are some obstacles for the introduction of modern resource-saving innovations to organic farming that can be removed only by cooperation of all organic production participants (Table. 1).

The implementation of the above-mentioned directions for innovation spreading in organic production will contribute to:

- increasing efficiency of organic farming and organic production of agricultural products in Ukraine;
- restoring soil fertility and improving environment;
- increasing the range of organic agricultural products and expanding the domestic market of these products;
- increasing exports of organic agricultural products;
- innovative developing of agrarian sector of economy;
- Ukraine's joining the largest producers of organic agricultural products in the world (Argentina, Australia, the USA, Brazil, and so on.).

Results and conclusions

Today the question of solving the problem of funding, the lack of which prevents the producers of organic agricultural products from introducing eco- innovative technologies (Figure 1), which would allow to increase the efficiency of all kinds of production (economic, environmental, social, technological, technical).

Thus, in our opinion, for the development of organic agricultural production in Ukraine it is necessary to:

1. Envisage public funding by providing subsidies that are equivalent to the direct budget transfers, and are provided for target purposes as an aid for programs and measures of social development.
2. Attach to the list of activities, the activities that will be funded by the state (expenditures on consultations and scientific, and technical provision).

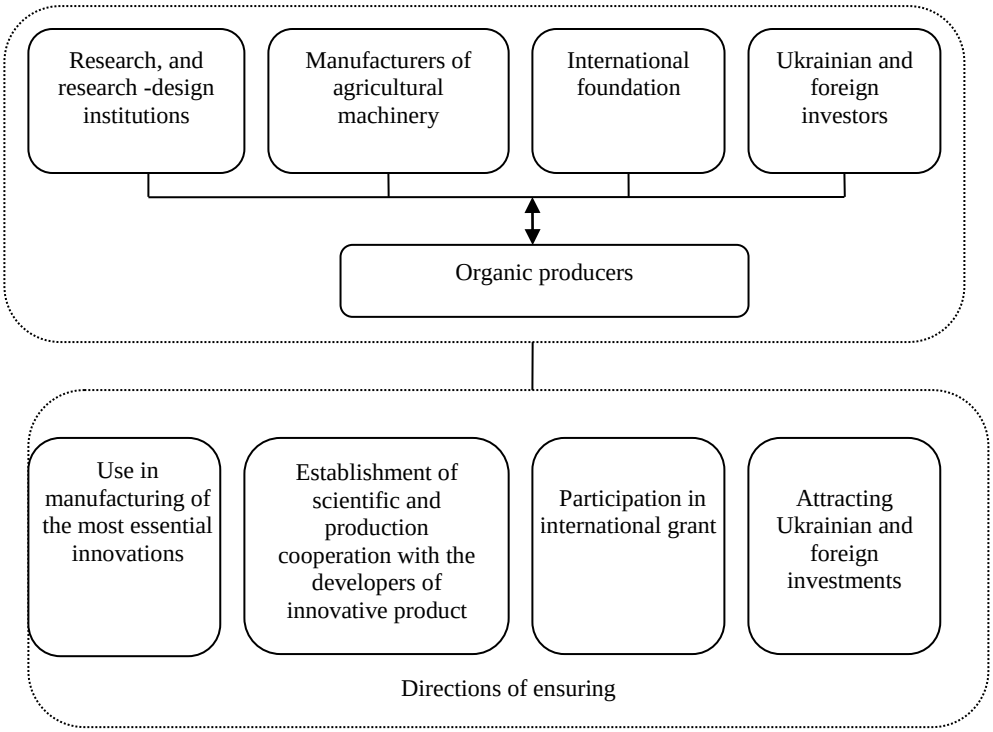

Figure 1. Directions of ensuring the implementation of eco-innovative technologies to the organic agricultural production

Source: the author's formulation.

Conclusions

Organic agricultural production in Ukraine has significant prospects for its development, due to the influence of the following factors: improving the health of the population; maintaining soil fertility and the environment; restoring biodiversity; rural developing and stimulating of local and regional production. However, the lack of the appropriate legal and regulatory basis does not allow to attract necessary financial resources to the sector, preventing the increase of its efficiency. The most available sources of funding organic agricultural production include: foreign and Ukrainian investments, international grants, credit resources (donations), and others.

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Chapter 6

LOGISTICS SYSTEMS OF FOOD BUSINESSES OPERATING IN RURAL AREAS

Baskiewicz Nicoletta, Kempa Ewa

Introduction

The situation of food producers on global markets is not easy and requires the adjustment to many changes occurring in the turbulent environment. In recent times, however, the position of Poland as a producer of food has steadily continued to strengthen in spite of many inconveniences associated, among others, with the Russian embargo. In 2015 Poland, against the background of 109 examined countries, occupied the 28th position in the ranking of the Global Institute for Food Security. Among others, price reachability, access to food and its security and quality are continuously subjected to the research. Poland received the best, maximum score for the programs to improve food safety, access to funding for farmers and the applied nutrition standards [Rolnictwo i obszary wiejskie, 2015, p. 7].

It is worth considering that the significant part of Polish producers of food operate in rural areas using permanent access to raw materials. The coordination of actions associated with the acquisition of agricultural commodities, their processing and the sale of finished goods is possible due to the use of logistics systems. The aim of the paper is the assessment of logistics systems in the management of food businesses operating in rural areas.

The systemic aspect in the logistics of food business operators

The economic situation in Poland and the entire European Union imposes on food business operators the necessity of changes of their operational tactics in the way allowing them to adjust to the turbulent environment in which the essence of logistics solutions is the systemic approach. It allows to choose optimal conditions for solutions and provides a greater opportunity to survive on the market. Logistics as one of the most important processes occurring in transnational network of supply chain is treated in the category of a tool of system optimization and supporting the process of foreign trade.

While considering the creation of the processes and objectives of logistics, it can be noticed that the trends for long-term formation of the desired relationships between the incurred expenses and the achieved effects are stimulated and determined in the framework of so called the system process, expressing the dynamic aspect of the logistics system structure. The sense of this process in enterprises operating in rural

areas is the integration and synchronization of activities of individual elements of logistics and creation of the desired conditions and relationships between logistics activities (inputs) and pursued objectives (effects) [Blaik 2015, pp. 51-52].

The logistics system in food businesses is the set of such sub-systems as: transport, warehousing, procurement, production and distribution along with relationships between these sub-systems and their properties, which are flexible and open, with constant aiming at an increase in the system organization [Gołembska 2010, p. 109].

The application of the systemic approach in the logistics of food businesses may bring about the prevention of sub-optimal partial solutions for the benefit of the best holistic solutions in the area of logistics. It may also enable simultaneous considering the existing constraints in logistics decisions (e.g. in shortages in the structure of the logistics potential) and synergistic effects (e.g. in the form of unused logistics potentials) [Barcik, Jakubiec 2011, p. 74].

All logistics sub-systems in the enterprise create certain quality with the environment and constitute a part of the higher-order system. This means that searching for possible disturbances and problems of the system cannot be limited to its individual elements in which the symptoms are noticeable but it should be extended to all components of the specific system. To achieve this, it is essential to isolate the specific system, determine its significant details, define the structure, analyze all the elements and interactions, specify its environment and conditions, and also formulate the objectives and, in the final stage, observe its behavior. For effective functioning of the system, its micro- and macro-environment are very important, i.e. the course of the cooperation with suppliers and customers and trends on the global market.

The task of the logistics system is the organization and coordination of flows of products and materials and corresponding information. In modern management of the food business, the amount of tasks performed in the framework of the logistics system is increasing since the realities of the contemporary market are based on greater diversity of services and products and the scope of cooperation between suppliers and customers is becoming increasingly global. Wishing to efficiently compete with foreign entities, many Polish producers of food decide on starting their business activity in rural areas, where they can faster and easier acquire raw materials for production and reduce costs of transport in procurement. On the other hand, due to logistics information and development of global distribution, they may attract customers for their goods both domestically and abroad.

The flow of information in logistics systems of food businesses from rural areas

To keep up with the competition and become an equal participant in the global market, Polish companies should continue to invest in their development. The effectiveness of the development and implementation of new technologies depends on the method and efficiency of management in the specific entity. Strong competition

and, consequently, constantly changing market needs require from managers to search for innovation, implement new concepts and modernize the old ones. This is performed to enhance management of the company at different levels of the organization, out of which particularly logistics stands out. It allows for the coordination of activities in the area of the logistics system, being the set of elements (logistics sub-systems) between which there is a specific relationship.

In accordance with the division of the stages of logistics, logistics systems in food businesses can be divided into the following sub-systems [Mróz 2006, p. 36; Pfohl 2001]:

- *procurement logistics*, referring to raw materials, auxiliary materials and consumables, e.g. fruit and vegetables, spices and packaging;
- *production logistics*, including all the activities associated with the procurement of the production process with appropriate goods and transferring intermediate products and finished goods to the distribution warehouse;
- *distribution logistics*, including all the activities and processes aimed at procurement of the customer with finished goods ordered by them at the time previously agreed upon. Due to the specificity of products, which often have short expiry date, it is important that distribution runs smoothly and goods are transported in proper conditions;
- *reverse logistics*, referring to waste to bring about its economically and ecologically
- efficient flow, e.g. the use of waste from the dairy sector as intermediate products in the production of feed for animals

The above division clearly indicates that logistics, as the system, cannot function in isolation from other departments in the entity. The activities performed by some organizational units in the enterprise partially are in line with the scope of the functioning of the logistics system. Therefore, close cooperation with individual functional cells is important, e.g. between procurement and production and between marketing and distribution. As a result of a lack of coordination of these works there may occur organizational chaos bringing about waste of resources of the enterprise. Therefore, the tasks of logistics systems include the facilitation of the transformation of goods and flow of information. With their creation and analysis, it is essential to order and isolate appropriate structures of systems and sub-systems since, at the points of sub-system interlinking, there appear conflicts whose reduction, mitigation or liquidation is dealt with by broadly understood logistics. The analysis of logistics systems needs a look into the logistics activity from different perspectives and this may facilitate the flow of information between sub-systems. The circulation of information performs the supportive function for the operation of logistics systems and it is manifested in the following activities [Pisz, Sęk, Zielecki 2013, pp. 222-223]:

- laying the foundations for the planning and organizing of the flows of goods in the organization,

- laying the foundations for the implementation of any bank flows,
- taking care of good relationships between customers and suppliers and between sellers and buyers,
- assembling all areas of the activity of enterprises, which enables the integration of procurement, production and distribution,
- effective management of the enterprise resources,
- appropriate control of the processes of transport, warehousing and manufacturing,
- laying the foundations for decision-making in the area of business management,
- providing efficient communication with the employees of the enterprise.

The above activities are an inseparable part of the functioning of almost each enterprise, and their coordination is possible just due to information in the area of logistics systems. It is particularly important in the management of the food business where time plays an important role on account of short expiry date of raw materials or finished products.

The development of modern technology provides the opportunity of rapid transfer of information, not only inside the specific organization but also outside, e.g. in contacts with contractors. Therefore, an increasing number of enterprises are set up in rural areas where often there is no comfortable access but where there should not be problems with the transfer of information in the era of the mobile network and the Internet. As a result of such a situation, the product manufactured in rural areas can be promoted efficiently and the producers have the opportunity to use the EU and governmental programs, which provide enterprises with the opportunity to occur on the global market.

The Discover Great Food program as the example of the integration of activities in the framework of the logistics system

The condition for supporting logistics processes in the enterprise and the supply chain is the efficient flow of information, and also the mode of organization, implementation and functioning of logistics systems. This area is very important for the producers of food since their logistics system must coordinate the activities associated with transport, warehousing and storage of products. This issue is particularly important in the case of organizations operating in rural areas which, on account of their location have, on the one hand, the enforced and, on the other, limited opportunities for the promotion and advertising of their products. A good way to transfer information on their own entity and products is the participation in the EU and governmental programs. They provide the opportunity of promotion the best products are included by and obtaining additional funds for the development of the activity.

Poland is an important producer of food in the European Union but, due to strong competition on the demanding market, there is a need for constant coordination of the systemic activities of logistics in the framework of production, promotion and sale.

It is exactly to promote agricultural and food products, there was created the Discover Great Food program in 2004. This program is aimed at motivating producers and processors, operating on the EU market, to increase the quality of products and diversity of food in Poland and the whole Community. Each producer of food operating in the European Union may apply for distinction in this program, while reporting any number of own products.

Agricultural and food products enrolled for this program are subjected to the assessment of the Chief Inspector of Trade Quality, and they also must obtain a positive recommendation of the Scientific Committee for the quality of food products of the Discover Great Food (DGF) program. The mark of DGF is awarded by the Minister of Agriculture and Rural Development for the period of 3 years and, if the producer subjects their product for the assessment again during this time, the right to use the mark may be extended by the next three years. Nowadays, the mark refers to almost 540 products manufactured by nearly 100 producers, operating in different areas of Poland [http://www.minrol.gov.pl/Jakosc-zywnosci/Poznaj-Dobra-Zywnosc/Zasady-przyznawania-znaku-jakosci-PDZ-oraz-wzor-wniosku (accessed on 29.12.2015)].

The placement of the mark on the product packaging may be the form of the promotion of the product since it informs the consumer on its high quality, perfect taste and the fact that it is healthy. The mark of "Discover Great Food" is a trademark and making any changes in its look is unacceptable. The basic version of the mark is presented in figure 1.

Figure 1. The basic version of the DGF emblem

Source: http://www.minrol.gov.pl/Jakosc-zywnosci/Poznaj-Dobra-Zywnosc/Zasady-przyznawania-znaku-jakosci-PDZ-oraz-wzor-wniosku (accessed on 29.12.2015)

The principles of the placement of the quality mark of DGP http://www.minrol.gov.pl/Jakosc-zywnosci/Poznaj-Dobra-Zywnosc/Zasady-przyznawania-znaku-jakosci-PDZ-oraz-wzor-wniosku (accessed on 3.01.2016)]:

- the basic version – consists of two overlapping ovals below which there is the inscription "Discover Great Food" distributed in a circle and written in capital letters;
- the color of the quality mark – the inside of the upper oval is white and its border, oval and inscription are red,
- achromatic version – permissible in justified cases, when the application of the full color version is impossible, e.g. with black and white printing,
- minimum dimensions of the quality mark – the mark smaller than 13 mm can be illegible,
- the background of the quality mark – the quality mark should be placed against a white background,
- the protective field, i.e. the area in which no inscription or graphics may appear – to determine the protective field there has been used the square with the side equal of two magnitudes of the "R" letter.

The customer, seeing the mark of DGF wants to buy the specific product since they have a guarantee that it is of high quality confirmed by specialists.

Many enterprises decide on the participation in this program in spite of strong competition and high requirements since they realize that the placement of this mark on the packaging is the form of transferring the information to the customer concerning the fact that they make the right choice while being driven by the familiar graphics since they appreciate high quality.

Different entities participate in the Discover Great Food program. Some are already known on the market, others only want to promote themselves. However, the fact that some of them join the program again indicates its great popularity among the producers of food. The success of the program implemented by the department of agriculture is confirmed by the fact that the awarded products have been produced in entities operating in both big city areas and rural ones (Tab. 1).

As it can be seen from the Table above, among the awarded products are different food products and the manufacturers have their headquarters practically in the whole area of Poland.

The participation in the Discover Great Food program provides the producers with the opportunity to promote their goods in many places in Poland and abroad since they take part in international fairs and exhibitions. Only in 2015 the promotion of the Discover Great Food program took place in the following cities [http://www.minrol.gov.pl/Jakosc-zywnosci/Poznaj-Dobra-Zywnosc/Dzialania-informacyjno-promocyjne (accessed on 3.01.2016)]:

- The International Grren Week (GRÜNE WOCHE 2015) – Berlin, January 2015;

- AAHAR 2015 – New Delhi (The International Food and Hospitality Fair Aahar – March 2015,
- IFE London – March 2015,
- SIAL China – May 2015,
- Piknik POZNAJ DOBRĄ ŻYWNOŚĆ – Warszawa May 2015,
- WORLD FOOD Azerbaijan – May2015,
- House of KIDS (SAFE KIDS) – KPRM, Warszawa May 2015.

Table 1. The examples of products labelled with the DGF mark which have been manufactured in rural areas.

The name of the producer and the place of the activity	The name of the awarded product
PPUH Henryk Kowalczyk - Poczesna	Roast beef, sirloin, loin
Mróz S.A - Borek Wielkopolski	Small steamed sausage
Zakłady mięsne "Olewnik – Bis" Sp. z o.o. (meat processing plants) - Drobin	Roast sausage, sausages from the old smokehouse
"AGRO DANMIS" Gramowscy Sp. J. - Wyszyny	Fruit goat yogurts
Firma Euro Trade Dominik Majchrzak - Chorzyna	Delicatessen pickled cucumbers 290 ml, pickled cucumbers 720 ml
Zakład Przetwórstwa Owocowo-Warzywnego "Orzech" Sp. z o.o. (fruit and vegetable processing plant) - Kolbuszowa	Plum jam, spaghetti sauce, sliced beets, marinated pepper
Browar "Amber" Sp. z o.o, Sp. komandytowa (brewery) - Kolbudy	Natural Amber, Johannes, Grand Imperial Porter
FANEX sp. z o.o. - Radonice	Ketchup no VII, 'gyros' sauce, salsa Mexicana sauce, thousand island sauce, dill and mustard sauce

Source: Author's own study based on the Catalogue "Discover Great Food" 2014, *http://www.minrol.gov.pl/Jakosc-zywnosci/Poznaj-Dobra-Zywnosc/PDZ-katalog* (accessed on 3.01.2016)

It is worth mentioning that each year the catalogue is issued in which one can find the awarded products and their manufacturers.

Each of the places mentioned above provided the producers with the opportunity to attract new customers but it also could be the inspiration for creating new products and improving own logistics systems through the search for new distribution channels and development of the production sub-system.

Conclusions

All economic entities are in the changing economic environment, both endogenous and exogenous, which frequently forces the organization to changes in many areas of activity [Rybak 2013, p. 17]. The changes provide the opportunity to adjust to the market conditions but they are impossible to make without appropriate information in the framework of the logistics system. In case of lack of information, decisions taken

by management may be wrong and have serious consequences for economic development.

For many entities, a great change was the transfer or opening of the company in rural areas where investments are usually less expensive and, moreover, they provide an opportunity to create larger warehouses or distribution centers.

The support for the establishment of enterprises in rural areas are the EU and governmental programs designed for the agricultural activity and the alternative ones. Not long ago the activity in rural areas was mainly associated with agriculture, however, the examples presented in the paper indicate that an increasing number of enterprises which are successful in the production of food are set up there. Nevertheless, this requires efficient management and the coordination of activities inside logistics systems in enterprises.

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Chapter 7

HOLISTIC PARADIGM OF SMALL BUSINESS MARKETING AND ITS ROLE IN RURAL DEVELOPMENT

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Problem formulation

Ukraine ranks the second position by area among the countries in Europe, herewith agricultural lands make up 72.1% of the total area of the state [Сельскохозяйственные земли Украины; http://czu.org.ua/]. By the area of agricultural lands (42 m Ha) Ukraine belongs to the 12 largest world countries [Мірошниченко 2012, p. 392]. Rural areas in Ukraine, beside ensuring the society food security, that is one of the main conditions of stability and independence, also have significant natural, demographic, economic, historical and cultural potential, promote the employment of urban population in the area of logistical support of the agriculture and sales and agricultural processing, performs recreational function, play an important role in conservation of natural potential. Under current conditions the exacerbation of crisis at all spheres of social, economic and political life of Ukraine, one of the major problems requiring critical decision is prevention of the decline and rural development in Ukraine.

Review of recent research and publications

Many native scientists and economists tend the study of social and economic rural development in Ukraine, including Y. Hubeni, V. Geyets, T. Dudar, I. Irtyscheva A. Klyuchnik, M. Malik, A. Onishchenko, I. Cherven, V. Yurchishin, A. Shebanin. Efforts of development and implement of specific programs and projects oriented to rural development at the local government level have place. But the study and solution of this problem in Ukraine is left insufficient, unlike the European Union countries, where the programs oriented to rural development are effective.

Formulation of tasks

So we have to observe that the problem of support and development of rural areas should be elaborated further. In our opinion, the definition of development trends for such aspects of this problem as unemployment overcoming in rural areas claims close attention.

Results

As one of the possible directions for the development we see the stimulation of business activity, particularly by supporting the operation of small enterprises in rural areas.

The entrepreneurship problem, particularly in rural areas, is clearly widely regarded in economic literature, particularly by P. Berezivsky, G. Bilovus, V. Herasymchuk, Y. Hubeni, V. Lypchuk, M. Malik, V. Mesel-Veselyaka, P. Sabluk and other scientists and economists. However, barriers of its development and ways of their overcoming, taking into consideration the latest trends and structural changes of the domestic and global economy, receive little attention.

The formation of the social and economic conditions for rural development in Ukraine is blocked by the number of accumulated problems, including low quality of living conditions, limited employment opportunities, lower (compared to urban) income level.

According to the State Statistics Service of Ukraine, in recent decades the rural population steadily decreases both in absolute and relative terms. Herewith the unemployment rate in rural areas increases gradually, the number of employed workers in agricultural production reduces and occupational level in rural areas falls. Data on the rural population and its employment for 2012 - 2015 years is shown in Table 1.

The average monthly wage in agriculture for January – September of 2015 is amounted to 3039 UAH, that is only 75% of the average wage in Ukraine in general.

As a result the demographic situation in rural areas deteriorates, which, together with insufficient social and economic and environmental conditions lead to the extinction of entire settlements. Every year about 20 villages disappear from the map of Ukraine [Борисовский 2014, p. 198-200]. Economically active population migrates to larger settlements, as well as lookes for work outside their country.

Table 1. Data on the rural population and its employment for 2012-2015 years

Years	Rural population		The employment level of the rural population	The unemployment rate in rural areas*
	thsd. persons	% of the total population of Ukraine		
2012	14252,8	31,23	62,7	7,4
2013	14174,4	31,12	63,5	7,3
2014	14089,6	31,02	55,9	9,5
2015 (I-III quarters)	13256,2	30.9	53,7	10,8

* - by the methodology of International Labour Organization, on the average for the period, in % of the economically active population

Source: official website of the State Statistics Service of Ukraine (http://www.ukrstat.gov.ua)

Developed countries solve such problems through the elaboration and implementation of rural development programs, that provide diversification of rural population activities, the efficient use of human and natural resources, the development of business, local industry, rural tourism, creation of necessary conditions for a decent life for farmers, preservation of village cultural values and so on.

Thus, in the European Union countries the policy of rural development is carried out aimed to stop the migration and preservation of the environment. It is based on the following principles: equal opportunities for all market actors; equal living conditions in urban and rural areas, reducing the dependence of peripheral regions on the center; improvement of opportunities for regional entrepreneurs [Анисимова 2011, p. 209].

Observation and engaging the experience of countries that successfully solve the problem of depressed areas is very important for our country. Thus, in Eastern Europe and the Baltic with the assistance of European Union in villages the jobs were created, the development of small business and services was stimulated. Diversification programs for work in the countryside were implemented as a key measure for overcoming the depressed rural areas. Thanks to such measures, in the Republic of Lithuania for three years (from 2004 to 2007) the unemployment rate among rural youth felt thrice. The Polish government pursues the policy of state protectionism for small farms, creation and development of small businesses, the transition to non-agricultural activities, and creation new jobs in rural areas [Пошкус 2010, p. С. 7].

In Finland, Sweden the self-employment of the rural population and the development of small and medium family agribusiness was considered priority agricultural and social policies. The Government of Finnish provides subsidies for unprofitable farms reorientation to other activities [Газизов 2014, p. 417].

The family farm is the basis of agriculture in Denmark. In order to become a farmer you have to receive a five-year special education in the agricultural school. All farmers are members of agricultural cooperatives [Кулькова 2012, p. 89-90]. So, the development of small business is a universal mean for solving the problems of sustainable development of country-side in all developed countries.

In agriculture, Ukraine small and medium business is dominant. In 2014 for the share of medium and small enterprises of agriculture, forestry and fisheries were accounted for respectively 54.7 and 30.5% of sales (goods and services) of all industry. In 2014 the number of large companies of Agriculture, Forestry and Fisheries was only 0.1% of the total number of industry, they employed 7.4% of the total number of employees of this activity [Офіційний сайт Державної служби статистики України; http://www.ukrstat.gov.ua].

And, results from the analysis, conducted by the National Science Centre «Institute of Agrarian Economics» National Academy of Agrarian Sciences of Ukraine suggest that the formation of large enterprises are not able to solve the problem of unemployment. The concentration of large areas of agricultural land by agricultural holdings, incredible by a significant decrease in the number of employees in their

agricultural structures [Лупенко 2013, p. 5–21]. Average number of employees in holdings of agricultural enterprises per 100 hectares of farmland is 2.66, while in the traditional type farms is 3.16 workers. Thus wages at enterprises of the traditional type was 19.3% higher.

Therefore, the main area of employment and a means of survival in rural areas are private sector and small businesses.

The only comprehensive strategy of agriculture and rural development for 2015 - 2020 years is aimed to solve the problem of rural development in Ukraine. It's project was developed by the Ministry of Agrarian Policy and Food of Ukraine. It is assumed that The Strategy will outline the short-term and medium-term results, and will contain detailed implementation plan. One of the stages of work on the strategy was the approval of the Concept of rural development by Ukrainian government on Sept. 23, 2015 [*Про схвалення Концепції розвитку сільських територій*. Розпорядження Кабінету Міністрів України від 23 вересня 2015]. Concept of the ways of creating the conditions necessary for rural development, through the formation of a diversified rural economy, quality environment based on the growth of human and social capital and development partnership between the state, business and communities. According to developers, implementation of the Concept will promote the competitiveness of agriculture and rural development in a sustainable manner in accordance with EU standards and international standards and attract investment into the sector.

According to this concept, the development of rural areas - a process of sustainable and balanced coverage of rural settlement network and agricultural production through the implementation of a range of state and local economic, social and environmental measures to save and enrich human potential village - primordial Rural Development.

Implementation of the Concept will be in the following areas:

- improving the livelihoods of rural populations,
- protection and conservation of natural resources in rural areas,
- the development of the rural economy,
- improving management of rural areas,
- education and information and advisory support.

In the area of rural economies provides for the following measures:

- creation and support for increasing the production of labor-intensive agricultural production through the introduction of advanced technologies, attract investments;
- support and certification of geographical indications and names of origin protected traditional foods that have a binding to place of origin;
- provide support for the development of agricultural service cooperatives by encouraging the establishment of procurement, storage and marketing and processing infrastructure;
- to promote the market of agricultural products, handicrafts and folk under local brand names;

– development of credit cooperation;
– meet the needs of the rural population by creating a Agro companies from sharing logistical assets;
– support the development of rural entrepreneurship;
– development of tourist and recreational activities in rural areas.

Thus, at the national level was recognized that one of the main solution to the problem is the decline of rural development in these areas of small and medium enterprises, including in non-agricultural activities.

Thus, the development of small and medium enterprises in rural areas of Ukraine is an obvious necessity. Until now, small and medium enterprises in rural unduly paid little attention.

For rural areas the main motives of business are [Липчук 2013, p. 302]:

– increase revenue and provide a higher level of family life. The main incentive is the higher yield compared to non-agricultural activities agricultural. This opens up broad prospects for farmers and stimulates the development of entrepreneurship;
– the opportunity to become independent economically and gain recognition in the community;
– the independence of the factors that have a significant impact in agriculture (due to weather conditions, good farming, etc.);
– self-employment fpr all year, while farming requires a lot of resources seasonally.

Compared with the economically developed countries, small business development Ukraine is low. Thus, the share of small businesses in the number of employed workers in Ukraine is relatively small - 27.6%, while in the EU the number of employed in small business exceed 50% of the working age population in Japan - almost 80%. Production of small businesses for over 50% of GDP in countries such as Germany, France, and more than 30 - 40% of GDP in the Czech Republic, Slovakia and Hungary [Щодо ефективності підтримки та перспектив розвитку малого підприємництва у регіонах; http://www.niss.gov.ua/articles/90]. This demonstrates the vital role of small business and its high potential as a catalyst for economic development.

On the more effective functioning of small businesses compared with large say and the State Statistics Service of income to taxation in Ukraine, including in agriculture. Thus, despite the catastrophic deterioration in the financial performance of all types of enterprises, the share of large profitable companies decreased more (Table 2).

Thus, the development of small and medium enterprises, especially in rural areas, will enable to solve a number of problems which today threaten sustainable development of rural areas by creating jobs, raising incomes (which will increase prosperity and reduce social tensions) a competitive environment, improving the quality of goods and services; the revival of economic activity in rural areas; improving the environment; increased revenues to the state and local budgets; slowing the migration of the active working population abroad.

Table 2. Financial results before taxation in Ukraine 2012-2014

	2012 year		2013 year		2014 year	
	The financial result before tax, m. UAH	**Enterprises that profit, % of the total number of enterprises**	**The financial result before tax, m. UAH**	**Enterprises that profit, % of the total number of enterprises**	**The financial result before tax, m. UAH**	**Enterprises that profit, % of the total number of enterprises**
In all	75670,2	64,5	11335,7	65,9	-564376,8	66,3
for large enterprises	37182,2	70	28003,5	68,6	-189934,1	51,8
for medium-sized enterprises	47742	66,2	8390,1	65	-199180,3	62,6
for small enterprises	-9254	64,4	-25057,9	66	-175262,4	66,5
agriculture, forestry and fisheries	-12825,5	64,2	-25038,3	66,1	-100967	66,9
for large enterprises	26992,7	78,3	15147,3	79,9	21677,4	84,2
for medium-sized enterprises	5304,7	96,2	3836,6	85,2	5223	78,6
for small enterprises	13813,2	81	7049,6	76,9	9522,2	84,9

Source: official website of the State Statistics Service of Ukraine (http://www.ukrstat.gov.ua)

Instead, entrepreneurship in rural areas of Ukraine develops slowly. Insufficient develop and types of non-agricultural entrepreneurship in rural areas.

Undoubtedly, significant difficulties for SMEs cause efforts for the maintenance of the market. Compared with large enterprises, they have fewer opportunities for development due to less financial freedom. Moreover, this problem is not only to enterprises in Ukraine. For example, in Poland for the first year cease to exist about 33% of small businesses, and three years in the market are only 25% of them [Report on the Condition of the Small and Medium-Sized Enterprise Sector in Poland; http://en.parp.gov.pl/files/214/19494.pdf].

Surveys authors conclude entrepreneurs spread of opinion on the lack of legislative, public financial, administrative and other support for small businesses. Without denying the validity of such observations, analyzing the management system of these businesses can not fail to note a number of shortcomings common to their management practices. As a step towards survival in difficult economic conditions, small businesses use to reduce costs, primarily by reducing the already nebahatochyselnoho staff. Especially significant reduction, according to the study of the situation in a number of small enterprises of Kharkov and Poltava regions touched marketing departments and marketing activities based on «unproductive marketing costs,» delaying marketing activities in the future, «when the crisis will pass, and will be easier.»

Our research, however, forced to admit firstly, groundless conclusions of "unproductive marketing costs", as performance analysis had no place and, secondly, the presence of additional negative economic consequences of rejection of some components of marketing.

One reason for this situation - too narrow specialization as managers in marketing and in other areas of business management, and a number of phenomena that we perceive as traditionally co-operation of small businesses. The limited material and financial resources, the small size of the issue and sale of products (services), a small number of staff - all of which identifies a particular marketing activity in small business. Serious reflection on the development of small business marketing impose external factors, namely the lack of legal regulation of issues arising in the operation of small businesses, the lack of a suitable system for their loans, tax burden, etc.

Note that we are not alone in these conclusions about the causes of the difficult situation of domestic small businesses, similar to the view expressed by experts such as A. Kataev O. Shypovskyy, C. Balazs and D. Kryzabi.

Extremely wide range of publications on marketing concerns are more significant for the state and the volume of companies - pay attention to this Kotler, W. J. Cook, JJ Lambe, NI Horbal, TP Danko, I. Skorobohatyh and many others.

As for ways to improve the situation of small business marketing must state the lack of attention on all such companies and their marketing activities in particular. Most authors emphasizes features such small enterprises as a small budget and little staff, and then recommends ways to promote low-budget, cheap advertising, allows simplification of a number of components of marketing, such as planning, market research [Шиповський О.В.; www.volsu.ru], etc., with which we can not fully agree.

We'll try to formulate common approaches, use of which will organize marketing activities of small enterprises according to the requirements of today.

The first step should be awareness-owned management and personnel of the enterprise characteristics of a new phase of economic development and the role of marketing. The new post-industrial economy, which is characterized as a knowledge economy, information economy - a market extreme, unheard of brutality competition, rapid aging technology, ideas and jobs, the penetration of the Internet in all seasons of the economy. And, above all, the new economy is a spoiled and blase customer with a huge selection of goods and services and unlimited access to offers. The conquest of the customer requires the use of marketing and marketing thinking.

Now in most Western companies approached the limits of operation optimization, and fight to win in the market through transactions including defect-free production and punctual supply becomes increasingly difficult. Companies sells its production and other «operational» power, becoming a pure marketing company.

Thus, virtually all employees must have an understanding of marketing, and all decisions should be taken at the company, taking into account their possible impact on the market, that the consumer, the buyer client.

Therefore, it is necessary to study the basics of marketing management and employees of the firm. In this paper, we do not aim to develop recommendations for organizational forms and content of such training. Note, however, that these issues are important and need special attention and careful planning.

The second step is the perception of the so-called holistic paradigm, which, according to many, the economy has come to replace the traditional logic. Although the holistic approaches in marketing and management still talking fifteen years ago, only now they are beginning to be perceived seriously. Not long ago, Philip Kotler mentioned the holistic marketing that goes to replace traditional. According to him, holistic marketing will be more holistic, holistic examine the social space in which consumers are the owners and employees of companies. The success of the company - is an integral state, a special atmosphere that is found in each of his unit, no separate item of business can lead to success. The enterprise should be seen only as a conditional region unified system of enterprise-market. You can not oppose the company and the surrounding market. One can also distinguish the life of enterprise objects and processes that are important for marketing, and those that are not important. Everything has meaning and is part of one of the cognitive field that is perceived customers, employees and business owners. Holistic marketing - a special, holistic way of thinking, not a set of specific recipes and technologies. His powerful and yet little research capabilities will benefit any business, but it needs to learn to act without seeking to understand and control everything around.

Another important point is the need to take account of the high degree of variability of the economic system and needs quick enough response from the company. Economy - a complex system evolves. This evolutionary mechanism, said Beinhoker («Global Institute McKinsey»), is a major innovative force in the economy, «the evolution of smarter and more creative than us». Instead of trying to predict the development of the market situation, leaders must develop a «portfolio of strategic experiments» (set business plans, strategies, development plans) that cover a range of possible scenarios [Beinhocker 2006, p. 528].

Leading companies already now change the organizational structure, focusing on its key processes, and not on the departments, creating a mixed team of specialists, who are actively involved in marketing and sales officers. The highest efficiency of inherent to such companies, based on the processes and results, in which the activities generally focused on marketing as the concept of market control that causes a change of the entire management philosophy allowing for the new phase of the global economic system and its variability, the need for a holistic perception of the market environment.

Small business has, in our view, significant advantages in implementing a comprehensive approach, holistic model thanks to its small size and, as a result – a higher degree of flexibility.

The implementation in practice of the daily work of the above fundamental approaches in many cases, face the problem of inertia of thinking, psychological and other individual characteristics of staff.

As experience shows, qualified managers and marketers are not always able to solve practical problems. Often generators interesting ideas in marketing and business people are other professions that have marketing thinking. The selection of such workers for small businesses is an important aspect of the human resources manager-owner.

The main tool of marketing thinking is emotional analysis - the ability to «think for the customer», «experience for the customer». Marketing thinking characterize creative solutions to use all available resources to maximize customer satisfaction and, consequently, to maximize profits. To desirable qualities of an employee at any level include analytical skills, imagination, curiosity, lack of fear of change is a constant desire to improve, initiative, ability to perceive all losses and successes of companies like your own. What is important is the ability to talk to people, make literate and intelligible documents.

Particular attention should stimulate and evaluation results. Employees need to know that their remuneration is not determined by education, erudition, ability to create impressive Talmud with numbers and charts, and their contribution to the business, their ability to earn money with their ideas. Remember that achievement usually requires quite a long time.

Conclusions

As a result of an awareness of the need for all of the marketing company of any size, introducing of holistic approach and rapid response to changes in the environment maximizes the efficiency of administrative functions. Material security function is implemented on the basis of the widest possible product market information that is the raw material for the enterprise, and of the working methods in the market to minimize the associated costs and quality and timely logistics of production. Cost management considers the counterparts prices, competitors, customers opportunities in the marketplace. Considering market realities staffing optimizes costs and the effect of the enterprise through the provision and use of its human resources. Finance cares optimal and the most profitable situation for the company on the market, and structure and cost of capital attracting and placement directions and its appropriate distribution. Similarly, given the maximum and anticipating market needs for high-quality, consumer and other characteristics of goods, the technology and industry have to be built. Marketing function the most fully takes into account the needs of customers in the process of purchase and after-sales service and so on.

The holistic approach introducing can admit the organization of marketing activities of small businesses according to current requirements, while taking into account the

peculiarities of small businesses operation. The development of small business in rural areas will contribute the infrastructure development, will provide employment and increase income of rural working population, increasing profitability, leading to sustainable rural development.

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Chapter 8

MANAGEMENT OF ADDED VALUE FOR THE CUSTOMER IN AN ORGANIC AGRICULTURAL HOLDING

Ziółkowska Bogusława

Introduction

Added value for the customer is defined in different ways. Its meaning is usually expressed by integration of customer expected benefits with costs he/she has to incur to obtain the offered benefit. One can thus agree that added value for the customer is essentially the surplus he/she can gain, deriving satisfaction from consumption of goods and services, above investments, financial ones and other, including those related with effort and passage of time, connected with the acquisition of the product he/she is looking for. Also customers, declaring demand for organic food, expect that the advantage offered by producers, the benefit of consuming healthy food, will exceed the costs of its purchase. The aim of the chapter is to present the scope of the activity of an organic agricultural holding, conditions that an agricultural holding has to meet to be regarded as organic, and in particular the values of organic food for an individual customer, a consumer of healthy food, as well as the potential of organic market in Poland.

An organic agricultural holding and its market offer

Organic food is food that was produced on farms with a legal certificate, is processed in ways that preserve the most nutritional values, is produced and stored without preservatives, artificial colourings or other additives, and sold in biodegradable packaging (e.g. drinks, milk and milk products can be sold only in glass packaging) [Siebenneicher 1997]. "Organic food is not food that has certain chemical parameters falling within defined limits. It is food that comes from an organic farm, i.e. produced in uncontaminated environment using the methods of organic farming" [Tyburski 1995, pp. 88-98]. According to the Act [Act of 16 March 2001 on organic farming, Journal of Laws, 2000], organic food is food that contains at least 95% of ingredients that are produced using organic methods or are fully pure (i.e. organic raw materials) or contains at least 70% of these ingredients and the other ingredients of agricultural origin are admitted for processing using organic methods.

Organic farming is defined as a farming system with sustainable plant and animal production. Organic production should combine environment-friendly farming practices, support high degree of biodiversity, use natural processes and ensure appropriate animal welfare.

Organic farming is a specific farming system which assumes balance of plant and animal production using natural products. The basic aims of organic farming include:

- preservation of a high level of humus, which determines soil productivity,
- maintenance of biological balance in the environment of agricultural production,
- closing the materials cycle on a farm through balancing plant production with animal production.

In Poland, detailed requirements in the area of organic farming are regulated by the Act of 20 April 2004 on organic farming, whereas the EU legal act that also applies to Polish farmers is the Council Regulation 2092/91/EEC of 24 June 1991 on organic production of agricultural products and labelling of agricultural products and foodstuffs, Council Regulation no 834/2007 of 28 June 2007 on organic production and labelling of organic products (Journal of Laws 189 of 20 July 2007, p.1), Council Regulation (EC) no 889/2008 of 5 September 2008 establishing detailed principles for implementation of Council Regulation (EC) no 834/2007 on organic production and labelling of organic products with reference to organic production, labelling and control.

Organic farming is based on observance of specified principles. In the area of cultivation of crops, they include:

- fertilisation using organic or natural fertilisers, produced on own farm or, if no animals are possessed, obtained from other organic farms, as well as fertiliser and soil conditioners qualified to be used in organic farming;
- use of organic seeds;
- appropriate crop rotation including under-sowing and catch crop, which enable the longest possible coverage of the soil with plants;
- mechanical weeding without chemical plant protection products or using plant protection products qualified for use in organic farming;
- use of biological products and plant extracts.

Livestock farming on an organic farm should also follow the principles of organic farming, which include in particular:

- proper maintenance of animals - ensuring appropriate area and access to runs and pastures;
- preservation of welfare;
- maximum number of animals per 1 ha - not more than 1.5 DJP;
- food based on pasture from own farm or other farms, but produced using organic methods;
- treatment using natural methods, use of allopathic veterinary medicinal products and antibiotics only against permission of a certification body under the responsibility of a veterinarian.

In an organic agricultural holding, the following cannot be used:

- industrial pastures,

– GMO - genetically modified organisms,
– dressing agents, synthetic plant protection products,
– artificial fertilisers,
– artificial concentrates,
– ionising rays.

On the other hand, the following are permitted:

– plant protection products qualified for use in organic farming in Poland,
– fertilisers and soil conditioners in organic farming.

Organic farming is based on production that relies on agents of natural origin without using chemicals. However, for an agricultural holding to be qualified as an organic one and obtain a certificate of conformity confirming that the farm runs production using organic methods, it has to:

1. chose a certification body (from among 11 bodes authorised by the Ministry of Agriculture and Rural Development).
2. declare willingness to convert production to organic farming with Provincial Inspector of Commercial Quality of Agricultural and Food Products.
3. make appropriate payment for control of the farm (every year in advance).

Conversion to organic production requires that a farm undergoes an annual obligatory control during which authorised inspectors, after prior notification about the control, check whether it follows principles of organic farming.

Obtaining a certificate of conformity with production using organic farming is connected with a switching period. Switching from the conventional production to organic one involves gradual changes, during which a farm uses appropriate crop rotation, scrupulous agro-technics, rational organic fertilisers, catch crop and in the case of animal production - pastures and natural additives. The length of the switching period is defined by the certification body after the first control of an agricultural holding. It is usually 2 years, but it may also be 3 years (in the case of fruit and vegetable growing) or, in exceptional situations, it can be shortened to 1 year. During the switching period, a farm incurs higher expenses.

The double nature of the system of organic agriculture is often stressed. On the one hand, this is a system that has a positive impact on the environment, which contributes to achievement of broadly understood agricultural and environmental benefits. On the other hand, however, organic farming is an answer to the changing structure of the demand on the market. Consumers prefer organic products, want to buy them and usually pay for them more than for products that have not been produced using organic methods. From this perspective, the system of organic farming is a market system.

The market of organic food is subject to transformations caused by an increase in the supply of organic food and changing expectations of modern consumers regarding food. Organic food is offered both in direct sales channels, including directly from the producer, at market places and occasional fairs as well as in stores specialising in the

sale of organic food and in large shopping centres (at designated stalls or shelves) [Rolnictwo i gospodarka żywnościowa w Polsce, 2015, p. 63]. The most varied range of organic food is offered by specialist stores, which at the same time are preferred places to buy organic food among Polish consumers [http://www.minrol.gov.pl].

Organic farming in Poland [http://www.minrol.gov.pl]

Organic farming is one of the fastest growing agricultural sections worldwide, including in the European Union [Brzozowska 2013]. The recent years in Poland saw constant growth dynamics of area in agricultural use and the number of organic farms. The development of the sector of organic farming is also reflected in the number of processing plants and the offer of organic products available on the market. According to data from 30 November 2014, 26 251 organic producers, including 25 613 farms, were under control of certification bodies in Poland. Between 2003 and 2013, the number of organic farms in Poland grew over 11 times, from 2 286 in 2003 to almost 26.6 thousand in 2013. In 2013, the number of organic farms was 26 598, with the most organic farms being located in Varmian-Masurian Voivodeship (4235), West Pomeranian (3640) and Podlaskie Voivodeship (3407).

According to data available as part of EUROSTAT, in 2012 Poland was in third place in the European Union in terms of the number of organic farms. First place was occupied by Italy with 43,852 farms in the organic farming system, and the second - by Spain with 30,462 farms. Poland was followed by France with 24,425 farms, Greece with 23,433 farms, Germany with 23,032 farms and Austria with 21,843 farms.

Between 2003 and 2013, the average size of an organic farm did not change significantly - it was between 20.71 ha and 25.19 ha. Between 2010 and 2013, the average size of an organic farm was around 25 ha, with the national average for conventional farms being around 10 ha. In 2012, the average size of an organic farm in Poland varied by regions, from 10.01 ha in Lesser Poland to 42.59 ha in Greater Poland Voivodeship. In 2013, the average size of an organic farm was 25.19 ha.

Between 2003 and 2013, the area of organic arable land grew 11 times, from 61 thousand ha in 2003 to almost 670 thousand ha in 2013. The biggest area under organic use in 2013 was in West Pomeranian Voivodeship (143 648.2 ha), Varmian-Masurian (140 845.3 ha) and Podlaskie Voivodeship (63 599.4 ha).

Strengths and weaknesses of organic farming

Organic farming is an ecologically, economically and socially sustainable system, as it does not put pressure on the environment, is largely independent from external outlays, as well as allows rural areas to survive and agriculture to function in new conditions of farming. The advantage of food products produced in organic agricultural holdings over those originating from conventional farms lies, among other things, in the fact that the former have a lower composition of nitrates and nitrites in plant

products and organic farming is characterised by pesticide-free crops and soil. Moreover, animal products do not contain residues of hormones or antibiotics.

Organically processed food contains much fewer synthetic additives (perfume, sweeteners, colouring agents). Products from organic farming also have a higher level of desirable ingredients: higher content of vitamin C, vitamins from group B, minerals (Fe, Mg, P), higher content of sugars and better quality of proteins. This impacts better sensory quality of these products, as well as their processing value. Due to these exceptional properties, organic food is especially recommended to pregnant women, babies, and people with chronic diseases (they are significant in cancer prevention).

Environmental advantages of organic farming lie in the fact that it does not cause reduction of biodiversity of the area, eutrophication of surface waters, risk of groundwater contamination connected with artificial fertilisers, or soil fatigue or salinisation. Organic farming also cares for mid-field afforesting, balks, natural ponds and other elements diversifying the landscape [Żelezik 2009, pp. 155-166].

This system of farming, due to high labour intensity, especially at the stage of production, has also a positive role in reducing unemployment in rural areas. By using labour force surpluses, it allows small farms to survive and even be profitable, especially in the case of vegetable and fruit production and combination of organic production and agritourism.

Weaknesses of organic farming include: lower yields - on average by 20% in the case of plant crops compared with those produced using conventional methods. This also refers to animal, milk and meat production. Lower yields obtained at higher production costs and higher labour intensity cause lower economic effectiveness of such farms, resulting in higher prices of organic products.

A significant limitation to the development of the Polish organic farming is the general economic situation of the country and consequently the number of consumers willing to pay more for better food. Interest in products from organic farms in our country may not reach the same scale as in Western Europe, also due to quite good values of traditional crops from conventional Polish farms [http://www.minrol.gov.pl].

Creation of added value in organic farming

Eurobarometer[3] survey from 2010 shows that almost half the inhabitants of EU countries - 48% (in Poland – 53%) are concerned about health deterioration as a result of the food they consume. This concern is connected with the following issues, among other things [European Commission, 2010]:

- residues of pesticides in fruit, vegetables or grains
- residues of antibiotics or hormones in meat

[3] Eurobarometer is an international project of regular public opinion survey commissioned by the European Commission. The survey results and reports are publicly available.

– quality and freshness of food
– use of food additives (colouring agents, preservatives),
– use of genetically modified organisms,
– welfare of breeding animals.

Added value for the customer is a construct created individually by an enterprise and has to take into account the specificity of the industry in the category of needs and in terms of the characterisation of segments and customers [Szczepańska 2010, p. 274]. Customers of organic food products have their specific needs and expect organic farms and organic food producers to supply them with goods that will meet these needs [Nitkiewicz 2013]. Thus, organic food should provide real values that are searched for and highly valued by consumers of healthy food. Analysis and description of values for the customer should take into account the basic spheres of value creation: the extent to which the offer is adjusted to the customer's objectives, varied proposals for solving customers' problems, how long it takes to deliver the offer to the customer and how long it takes for the customer to look for goods he/she is interested in, availability in terms of the place, costs, knowledge, experience, prices etc. All these aspects should be taken into account when creating benefit for the customer.

The sources of added value in the case of organic food include [Sikora 2010]:
– health-related values (product safety and its nutritional value);
– sensory attractiveness (external appearance, taste, smell, consistency, structure picture, deliciousness);
– availability (recognition of the species, unit size, durability, easiness of preparation).

Benefit of organic food for the customer comprises characteristic features determining its value or acceptability, defined by the consumer who, relying on own experiences and subjective opinion, specifies own criteria for food attractiveness and preferences when choosing products. Consumer requirements and acceptance of food quality are determined by various cultural, social, economic, psychological and physiological factors. Many of these factors have an impact on each other, and expectations related with them may be conflicting [Obiedzińska 2012, p. 46-82]. Consumers are guided by various criteria when choosing food. Their significance has been presented in the table below.

Management of added value for the customer of organic agricultural holdings takes place at the stage of planning and production of organic food. Moreover, it involves the whole process of building the customer's experience, developing the climate of trust which comprises time, place and manner of delivering information on values of organic food (communication of added value for the customer), defining terms of purchase, delivery, guarantee of freshness and expected nutritional value, lack of contamination and safety of the consumption of uncontaminated food. The creation of the value for customers is the work of many entities participating in the process of

creating this value and the manner in which this value is divided among the participants of the chain of added value.

Table 1. Criteria for consumers' behaviour when selecting food

Criterion	Very important	Rather important	Minimally important	Not important	No answer
Freshness	79	18	1	0	3
Taste	75	22	1	0	2
No use of genetically modified organisms	63	22	8	4	4
No substances harmful to health	61	23	10	1	5
Expiry date	54	39	4	0	3
The lowest quantity of food additives	46	37	12	2	3
Nutrients	36	47	11	2	4
Possibly least processed food	28	38	24	5	5
Production safe for the environment	26	47	19	2	6
Animal welfare	26	35	23	8	8
convenient preparation	22	42	28	5	4
Aesthetic and political considerations	18	35	27	9	12
visible qualitative attributes	16	43	28	6	7

Source: *Z badań nad rolnictwem zrównoważonym (21) Żywność ekologiczne – regulacje prawne, system kontroli i certyfikacji*, series „Program Wieloletni 2011-2014", scientific editor M. Kwasek, IERiGŻ-PIB, Warszawa 2013, p. 43

Organic food allows for saving production costs (savings due to the lack of use of chemical production means and costs of a veterinarian and medicines, use of light mechanical equipment instead of heavy machines destroying the structure of the soil). Moreover, organic food is characterised by better storing capability (there are less losses), high taste quality, lack of deposits in the form of nitrates, nitrites, nitrosamines and heavy metals. Crops from organic farms are usually lower by 20-40% compared with conventional farming, but the price of organic products is higher on average by around 30% in the case of regular quality and by up to 130% in the case of the highest quality products [Szymańska 2010, pp. 302-308]. Table 2 presents economic aspects of switching into organic production of plants.

Table 2 Economic aspects of switching into organic production of plants

Savings/Additional profit	Additional costs/Additional investment
– no use of nitrogenous mineral fertilisers; – no use of chemical plant protection products; – possible higher market prices (by 30-130% on average); – financial and legal support for organic farming; – no costs connected with the use of machines during mineral fertilisation and use of plant protection products; – higher prices of purchase of breeding animals;	– more expensive seed; – decrease of efficiency (30-40 %); – use of crop rotation and catch crops (costs of purchasing materials and machines for mechanical plant cultivation) – possible investment into warehouses and machines for crop processing; – membership fee for an organisation for organic farmers; – costs of certification and control; – high requirements connected with breeding (bedding, run); – higher costs of pasture.

Source: [Szymańska 2010, pp. 302-308].

The economic value of an organic farm grows, if it receives proceeds exceeding costs connected with creation of added value. It depends on offering customers new values, specific food properties expected by customers who will pay for them more than the costs of their production (it is the value in the perception of customers that will determine the price they want to pay and what added value a given value innovation will bring an enterprise), costs that will be incurred in each of the links (without partners) of value creation and distribution of the surplus among these links: suppliers, producers, buyers, customers.

Summary

Establishing and running an organic agricultural holding involves incurring higher expenses than in an agricultural holding that produces food using conventional methods. The source of return of higher expenses are proceeds from the sale of produced goods, organic food, to customers who look for the so-called healthy food. In order to gain customers of organic food, it is necessary to properly identify their preferences and expectations and needs which they want to satisfy through healthy food. This underlies preparation and creation, and consequently, offering added value on the market for customers of organic food meeting their real needs for which they will be willing to pay a higher price.

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Chapter 9

INNOVATION BUSINESS ACTIVITY OF COMPANIES

Beta Skowron-Grabowska

Introduction

Innovation business activity of companies constitutes a dominating area of development strategy of every company. This fact is connected with multiple various premises. The basic meaning of innovation is the result of mostly progressing economic globalization, as well as dynamically developing competitiveness of companies. The continuously shortening time of goods deliveries from the furthest locations on earth, forces the companies to take up challenges and respond rapidly to market demands. The response of companies is performed in different forms and scopes. At its root there are coordinated innovation activities of particular countries or international organizations. A particular importance of such processes can be observed within the European Union, which implements multiple projects of innovative nature. The beneficiaries of such projects are, above all, the countries of Central and Eastern Europe.

Basic determinants of innovation activities in companies

The functioning of companies in conditions of global economy, with growing competitiveness requires searching for new spheres of development and establishing cooperation with other subjects. Currently the innovation processes are becoming the subject of such diverse activity. Every companies, aiming at development, and after performing an analysis of possibilities and risks, concludes that it owns a certain capital, which should enable implementation of innovation.

Intellectual capital is of crucial importance in company innovation processes. It constitutes a basis for knowledge transfer and creation of value chain. The economy demands, especially the demand for company innovation, inspire scientific research which effects are verified by experiments. There is also compiled documentation for the purpose of implementation of product and process-oriented innovation.

The potential of intellectual capital may be used on microeconomic and macroeconomic scale. On macroeconomic scale, the conditions of application of intellectual capital within the scope of innovation are made up by European Union, using multiple different programs. Given the large scope of issues, only selected EU problems of programs and projects within the scope of innovation activities have been touched upon. The strategic meaning of innovation in EU has been stressed by, among others, appointing of the European Institute of Innovation and Technology (EIT) in

2005, which concentrates on the concept of public-private cross-border partnerships – Knowledge and Innovations Communities (KIC). As a result of cooperation of scientists, entrepreneurs and managers, there are established innovation-based companies, new technologies and innovation projects for industry.

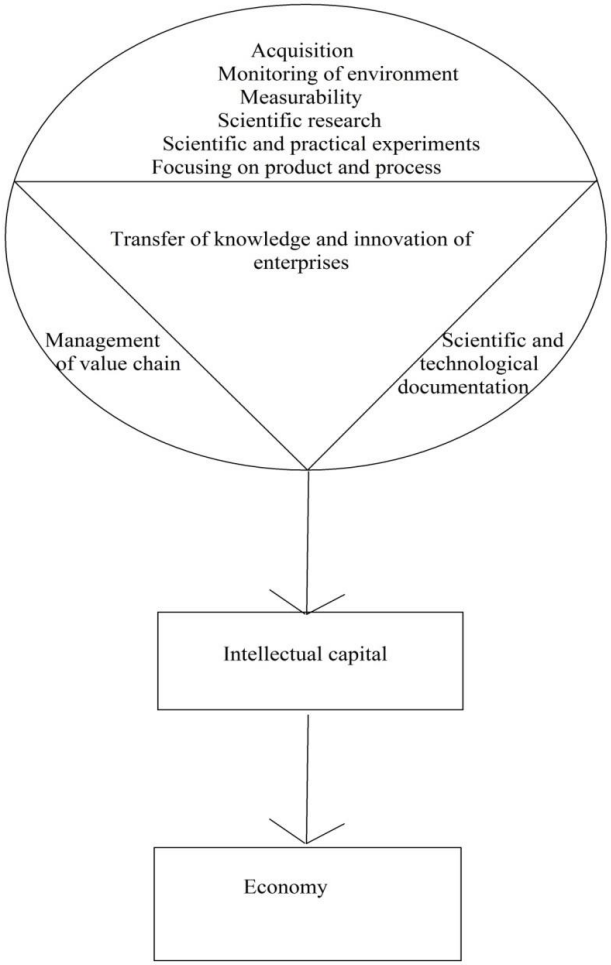

Figure 1. Basic relations of innovation process of companies.

Source: Individual work basing on: [Rzemieniak 2013, p. 84]

Among the most important ones are [Wiśniewska 2013, p. 15, 16]:

– Climate KJC – against climate change. Partnership unit are located in London, Zurich, Berlin, Paris and Randstad. Six regional implementation centers are located in other countries.

– KJC InnoEnergy has been established for the purpose of commercialization of new solutions in the scope of production and distribution of balanced energy. The partnership units are located in Karlsruhe, Grenoble, Eindhoven/Leuren, Barcelona, Stockholm and Krakow.
– EJT JCT Labs – concerned with commercialization of opportunities coming from development of information-communication society. Partnering subjects are located in the following cities: Berlin, Eindhoven, Helsinki, Paris and Stockholm.

In modern approach to the meaning of region in EU, it is crucial to expose its creative character within the scope of innovation and knowledge incubator. If we assume that innovation consists of territory-oriented processes, we need to point to basic problems and determining factors crucial for their execution. Among them are [Nowakowska 2007, p. 141, 142]:

– establishing of network relations, enabling the creation of innovation environment;
– spatial location in gathering knowledge and innovation resources. Concentration of assets of a company from a given region on such activities creates synergy mechanisms enabling achievement of better results, rather than in case of particular business entity's individual activities;
– application of resources unique for a given region, in the process of absorption and diffusion of innovation. The innovation potential of companies is mostly determined by the specifics of regional resources. Among them we can distinguish skilled employees and local resourcefulness;
– cultural-social determining factors of innovation, displaying the canons of value procedures and exchange of knowledge, creating a unique form of relational capital.

In such activities it is also crucial to refer to knowledge. Concepts based on knowledge are considered the source of innovation. Application of such resources leads to drawing up new working methods, and, in consequence, implementing modern technologies (e.g. the Internet, global positioning system) [Sałek 2013, p. 99].

Special importance of knowledge management in innovation process is given to science and technology processes. Changes in economy processes in Central and Eastern European countries, led to dynamic interest of entrepreneurs in various innovation centers. Science and technology parks have become one of the most important places of this sort, using multiple various EU structural funds.

An important function of science and technology park is mediation in the transfer of innovation and creation of market of research and development services [Guliński 2007, p. 245-247.

Compared to the above mentioned determinants, it is possible to refer to the directions leading to enhancement of innovation in Polish economy (Table 1). The given directions show that the aim of economic activities in years 2007-2013 in Poland, as well as other Central and Eastern European countries, was transformation of social awareness to the idea that innovation activities are the most important

development opportunity for these countries. It would serve as a foundation for creation of competitive economy on local, regional and international markets.

Table 1. Areas of innovations

Directions of actions	Aim of actions	Area of actions
Personnel in modern economy	Transformation of social awareness towards the idea that innovation is Poland's most important development opportunity and foundation for building competitive advantage on local, regional and international markets	- development of continuing education - -transfer of knowledge between R&D and companies by replacement of personnel - innovation as an element of education adapted to modern economy demands - the promotion of enterprise and innovation
Research for economy	Increasing the application of R&D work results in companies and adjustment of potential of scientific units, for fulfilling the needs of modernizing economy; creating supply of new innovative solutions for economy	- financing of scientific and development research of companies - concentration of public finances on research in strategic areas - restructuring of public sphere of scientific units - internationalization of scientific and innovation-based activities
Intellectual property for innovation	Improving effectiveness of functioning of innovation market, increasing the flow of innovation solutions, application of industrial property laws, copyright law and related rights	- support for intellectual property management - support for subjects applying for patents outside Poland - facilitating the process of obtaining protection in the area of industrial property - - industrial design as a source of competitive advantage
Capital for innovation	Activation of private capital for development of innovative companies	- facilitating access to capital for innovation-based companies - supporting establishment of companies based on modern technologies - - application of tax instruments motivating to increase outlay of innovation business activity
Infrastructure for innovation	Improving the conditions of functioning of innovative companies	- development of institutions providing advisory and technical services for innovative companies - supporting cooperative actions of entrepreneurs, of network nature, directed towards innovation business activities - enhancement of cooperation between R&D and economy - - popularizing the idea of application of information and communication technologies

Source: [Krawczyk-Sokołowska 2012, p.120-121].

Analysis of innovation business activities, basing on survey results.

The presented determinants of innovation activities and model solutions require verification in practice of company functioning. Every company, within the scope of its worked out strategy, takes various actions in the area of innovation, aiming at improvement of competitive position. The innovation potential of companies is, however, considerably diverse, especially in relation to their size or business structure. The above criteria of company division mark the foundation for surveys in the area of innovation. For the purposes of the present paper, there have been presented selected survey results as part of EU projects. As part of one of the projects, surveys were sent to 307 companies. 45% of small businesses, 30% of medium businesses and 25% of micro-businesses took part in the survey. These businesses were put in the following groups, according to PCA (Polish Classification of Activity):

- manufacturing of medical, precision and optical instruments, and clocks – 36%,
- manufacturing of machines and devices – 27%,
- manufacturing of machines and electrical equipment – 16%,
- manufacturing of motor vehicles, trailers and semitrailers – 4%,
- manufacturing of radio, TV and communication equipment and devices – 2%.

The image of innovation activity is determined by the number of implemented new technological processes. Among the analyzed businesses, 73% implemented at least one new technological process. The measure of innovation activity is also participation in income from selling new products (Table 2). The presented data shows that participation in product innovation is crucial in considerable majority of companies. An important area of innovation activity is also time analysis of such processes (Table 3).

Table 2. Enterprises of high technology, basing on the participation of new products in sales income

Participation of new products in business income	**Analyzed businesses**	
	Number	**%**
Below 20%	11	25,0
20 – 40%	19	43,2
Above 40%	14	31,8

Source: own calculations

The presented data shows that the percentage of innovative businesses increased from 86% to 94% in the years 1994-2007. Simultaneously, there was a decrease in participation of businesses not based on innovation. In the analyzed period of time the percentage decreased, respectively, from 14% to 6%. It needs to be underlined that the competitive determinants and access to EU funds, significantly influenced the

innovation in companies[4].

Table 3. Changes of innovation activity of enterprises of traditional business areas in years 1994-2007

Years	Innovative businesses		Businesses not based on innovation	
	Number of companies	%	Number of companies	%
1994-1997	298	86	48	14
1996-2000	115	97	4	3
1998-2001	103	97	3	3
2001-2004	144	88	19	12
2004-2006	24	89	3	11
2005-2007	69	94	4	6

Source: own calculations.

Implementation of innovation processes is a particularly complex activity in small and medium businesses. Small companies, having small capital, are interested in innovation also in a restricted scope [Skowron-Grabowska 2008, p. 57]. Considering the medium companies, this situation is a lot more beneficial in the area of innovation. What needs underlining is the notion of help directed towards small and medium businesses in the area of innovation as part of multiple EU programs [Jasiński 2013, p. 4-6].

The necessity of implementing innovation processes in businesses requires new approach to managers in the area of organization, product or technological solutions. The key problem is the pace of change taking place in global economy [Otola 2013, p. 24, 25]. Innovation is this special area of business activity, that are subjected to pressure of time, due to competitiveness.

In the processes of innovation management in businesses it is necessary to underline the importance of control, which determines the decisive processes in the future. Product, process (e.g. stock control) innovation is an important decisive parameter in innovation processes of businesses [Łęgowik-Świącik 2012, p. 187].

In innovation business processes, formal and informal relations between science and business may be singled out. Formal relations of high technology businesses with science and research institutions were concerned with different areas (Table 4).

The presented data shows that this area contains, in the following order: expert opinion and certificates (36% of businesses), technical advisory services (32% of businesses), exchange of science and research information and commissioning of R&D work (23%), as well as training (15%).

[4] Multiaspect research in the area of innovation was conducted by the Institute of Research on Democracy and Private Enterprise ad well as National Foundation of culture of Resourcefulness(Gdynia) [Mizgajska, Wściubiak 2009, p. 142-145].

Informal business relations are of different nature (Table 5). Informal relations are concerned with mostly: consultation and technical advisory services (41%), exchange of information (39%). Low interest of companies is demonstrated towards directing help requests in the area of development of relations and conducting R&D activities.

Table 4. Formal business relations with science and research institutions according to the subject of cooperation

Subject of cooperation with R&D institutions	High technology businesses		Businesses of traditional industries	
	Number	%	Number	%
Expert opinions and certificates	16	36,4	9	12,3
Technical advisory services	14	31,8	8	10,9
Exchange of information on science and research	10	22,7	4	5,4
Commissioning of R&D work, impossible for implementation in companies	10	22,7	2	2,7
Staff training	9	20,4	10	13,6
Joint research undertakings	7	15,9	1	1,4
Making research equipment available	3	6,8	-	-
Purchasing licences and R&D results	-	-	1	1,4

Source: Conditions of efficient cooperation between science and enterprises.

Table 5. Informal business relations with representatives of the world of science, according to the subject of cooperation

Subject of cooperation with representatives of the world of science	High technology businesses		Businesses of traditional industries	
	Number	%	Number	%
Consultation and technical advisory services	18	40,9	28	38,4
Exchange of science and research information	17	38,6	11	15,1
Help in business relationships development	6	13,6	9	12,3
Assistance in R&D work	4	9,1	5	6,8
Other	4	91	3	4,1

Source: Conditions of efficient cooperation between science and enterprises.

The conducted research shows that businesses do innovation-based work. The biggest area of innovation covers big businesses and then medium businesses. Small companies, as well as micro-businesses, do innovation-based work to relatively smaller

extent. In general, the innovation activity resulted in increase of participation of income from sales of new products, as well as positive results in the area of innovation activity. For achieving the above results, formal and informal business relationships with science and research institutions have been used. In formal relationships of high technology businesses with science and research units, the dominating were: technical advisory services, expert opinions and certificates and staff training. Informal relationships were used mainly in traditional businesses. The results of surveys confirmed the innovation activities of businesses.

Conclusion

The functioning of businesses in conditions of growing globalization and with increase of competitiveness, requires adjustment processes and new ventures in the constantly changing environment. The innovation activities in businesses are definitely considered to be new ventures. Every business, for the improvement of competitive position, is forced to implement innovation processes. Such opportunities come from EU programs and projects. EU allots substantial financial resources for innovation activities. Such activities are created by intellectual capital of businesses, which enables the development of the businesses alone, as well as regions of Eastern and Central European countries. The complexity of relations in the area of innovation processes constitutes the foundation for building mathematical models, which describe the concept of business development and strategies. Parallel with theory, it is crucial to do research in economy practice, in order to improve the condition of innovation development in businesses. Research conducted in this area confirm the importance of the problem and point to the opportunities and threats for companies in the area of innovation activities.

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Chapter 10

ECONOMIC INNOVATIONS OF LOCAL SELF-GOVERMENT ON THE TERRITORY OF UKRAINE IN THE LATE XIX - EARLY XX CENTURIES: HISTORICAL PERSPECTIVE

Lyfar Alla, Sharavara Tamara

Problem statement

Because major reforms in Ukraine were initiated in 1860–1870 years, the work of elected local government – zemstvos began. At that time Ukraine had not autonomy and its territory was occupied by the Russian Empire, that's why saying about the absolute success of rural reform, especially at the initial stage of its implementation is difficult. «Regulation on local self-government (zemstvos)» determines the composition, structure and manner of their formation and terms of reference [Высочайше утвержденное Положение о губернских и уездных учреждениях от 1 января 1864 года, 1867].

In fact, in Ukraine local governments started their activities beginning from 1865 in 9 provinces: Volyn, Yekaterynoslav, Kyiv, Podillya, Poltava, Tavria, Kharkiv, Kherson, Chernihiv, and dozens of counties in these provinces. Local people elected only deputies to the provincial and district zemstvos, and the lowest level did not exist at the parish. The executive bodies of zemstvos were local councils which for implemention of the decisions in life employed professional doctors, teachers, agronomists, statisticians etc. Despite significant obstacles from the bureaucracy zemstvos tried to establish a chore. The real problem for them in the field of management was the question of filling their own budgets. The state did not provide funding, while introducing a «tax for district council (zemstvo)» for local people. So at first, when great economic results had not been observed, the population perceived new tax painfully.Only in ten years of hard work zemstvo workers were able to break stereotypes in the minds of extremely impoverished and socially unprotected population of the state in those years.

Considering that in modern Ukraine local governments always raise the question of granting them more authority and actively compete for economic independence in the state, economic analysis of the experience of our ancestors is very important. The gained experience in economic planning, in the field of agronomy, in statistics, establishment of cooperatives is useful and requires generalization.

Analysis of recent research and publications

At the turn of XX–XXI centuries in Ukraine and abroad, scientists unveiled a number of major studies on the economic achievements of zemstvos in general and specific provincial zemstvos, in particular. Conventionally, scientific works can be divided into three groups.The first group is general research works, devoted to the Great Reforms during1860–1870s in general and those that commonly characterize the socio-economic activities of zemstvos and determine their components. This group includes a number of works by Prof: T.O. Sharavara «Reforms and counter-reforms of the late XIX – early XX centuries…» [Шаравара 2011, p. 541], O.M. Obmetko «Socio-economic activities of zemstvos in Ukraine (mid.60's – 90's of the XIX century)» [Обметко 2002 , p. 17], T.L. Lobas «Economic activities of zemstvo (1864-1914) according to the materials about zemstvos in Poltava, Kharkiv, Chernihiv provinces» [Лобас 1997, p. 18] etc.

The second group of research is devoted to individual provincial zemstvos. The content of these studies highlights the diverse work of local governments. This group includes the works: by A.S. Maskyna «Tavria district council in 1966 – 1890» [Маскина 1982, p. 17], O.A. Redkina «Zemstvos of Left Bank and Southern Ukraine as local authorities and centers of liberal movements (the second half of the XIX – beg. XX centuries)» [Редькіна 2002, p. 19], O.O. Petrova «The activities of rural statistical institutions in the Southern Ukrainian provinces in the second half of the XIX – early XX centuries» [Петров 2003, p. 19] etc.

The third group consists of the study of various types of economic activities of zemstvos devoted to zemstvo's medicine, statistics, establishment of peasant crafts, prevention of fire etc. The territorial scope of work, despite the narrowness and specificity of the topic, is quite broad and cover mostly large regions of the Russian Empire, necessarily focusing on the district council in Ukraine. As an example, the work by T.L. Moiseenko «Zemstvo statistics as a source of studying peasant rent in Russia in late XIX century» [Моисеенко 1981, p. 25] should be mentioned, A.N. Zubko «Materials of zemstvo statistics as a historical source for studying history of Ukraine in the period of capitalism» [Зубко 1988, p. 20], M.P. Maslov «The development of industrial peasant enterprise in Kharkiv province (1861-1914)» [Маслов 1998, p. 230], O.O. Zavalnyuk «Formation of network activities and agricultural research institutions in Kyiv region (late XIX – early XX centuries)» [Завальнюк 2003, p. 228], N.M. Ruban «Development of rural medicine in Ukraine (1865–1914)» [Рубан 2004. p. 20], S.I. Stashenko «Fire prevention activities of zemstvos in the Left Bank Ukraine» [Сташенко 2004, p. 20].

The list of the above-mentioned works is not exhaustive and researches are actively continuing investigating in the three areas outlined by us. In particular, scientists continue to work on extensively substantive topics of research on the level of regions of Ukraine and on specific sectors of economic activities of zemstvos.

Considering the significant part of professional studies published on named topic, our aim is to summarize the economic components of economic activities of zemstvos, to determine the most popular innovations introduced by them in the second half of XIX – early XX centuries.

The main material research

Despite the fact that is not desirable to take apart and examine the social and economic activities, because they are linked, in the early XX century rural workers still distinguished the actions aimed at establishing social standards and actions in financing various sectors of the economy. The experts in economics dared to classify all kinds of activities and divided zemstvos' achievements in social and economic spheres. In particular, A. Brod in his work «On the fiftieth anniversary of zemstvos of 1864-1914» [Бpод, p. 34] emphasized that the economic activities of zemstvos in his view include: traffic, insurance, credit, veterinary medicine, and agronomy.

First of all, it should be noted that the reform of 1865 did not provide close information connection between local bodies of various provinces of Ukraine, so the economic plans of economic activities of each district council were composed by itself, given the needs of their local communities.

To support new initiatives in the economic sphere imperial government managed to provide funds for zemstvos in 1900 – not at the beginning of their work. However, as V. Kuzmin-Karavaev analyzed, the Law of 06.12.1900 was not working. It is this normative act that allocated 500 thousand rubles for the Minister of Internal Affairs to support economic activities of zemstvos. However, as the researcher noted, Ukrainian zemstvos as well as Russian ones, never used this loan, although there were enough current problems. In practice, the causes of confusion between zemstvos and Ministry of Internal Affairs were in the state's attitude: «can not increase spending on the needs of the population – do not increase» [Кузьмин-Караваев 1904, p. 429]. So, applying for cash assistance to the state would open zemstvos' insolvency to cope with the tasks on their own, and therefore they could be easily accused of incompetence. Therefore, solving the social and economic problems, zemstvos had to rely on their own strength.

Actually, considering the content of the researches of the late XIX century we can conclude that serious plans for their own economic activities at the beginning of the formation of zemstvos were not developed. This happened much later, after 15-20 years of their practice.

The public began to summarize the results of economic activities of zemstvos in the late 90s of XIX – early XX centuries, because in the first decade zemstvos only gained experience and often acted «by try and error».

In particular, the establishment of insurance of the local population, including fires, passed the most difficult. In 1916, in the war time, it was the tenth anniversary of rural insurance in the Kyiv province. The problem was the next: zemstvos in different

provinces got permition of insurance against fires in different time. Rural leaders emphasized that the issue at the legislative level to resolve insurance state was considered only at the beginning of XX century. Thus, the Law of 31 January 1906 in Kyiv province extended the Regulations on zemstvo insurance. From 1907 zemstvo began to act in that direction and began to enumerate agricultural buildings and started reforms to improve the fire-prevention measures. In reality, the number of fires was reduced up to 1910, and by 1916 could mark these area of rural work as important in the economy of the country [Киевская земская газета 1916, p. 17-18.; Земское дело 1916].

It should be noted that public figures during the First World War published literature on insurance business and introduced readers to the work of agents and insurance premiums were proposed to zemstvos. Typically, these publications had enough cognitive nature and were deeply methodically thought out. Well-known public figure K. Hlitsynska [Гліцинська 1914, p. 32] made many efforts for their publication. Finally, in the end, a well-known researcher of zemstvos G. Dzhanshyyev, after analyzing scientific papers of significant number of insurers, said that not only rural statistics, but zemstvo insurance was a state pride to Europe [Джаншиев 1896, p. 279-314].

The next economic direction of zemstvos was the support of rural agriculture. In the «brief outline of economic measures of zemstvos in 23 Russian provinces» [Краткий очерк экономических мероприятий земств 23 губерний России (1865–1892), 1894, p. 246] agricultural activities are defined as the most successful element of their work. In particular, zemstvos actively took up three items: organized research fields, distributed new models of seeds and agricultural machinery.

With the accumulation of both positive and negative experience in economic activities zemstvos began to publish reviews of their own activities in the field of agriculture in certain years: 1892–1893, 1894–1895, and so on. A well-known editor of main selections was V.A. Krandiyevskyy [Обзор земских мероприятий в области сельского хозяйства за 1892 – 1893 гг., 1894, p. 251]. A well-known analyst of economic benefits of zemstvos was H.P. Sazonov, he stressed that the issue of establishing food supply and developing innovative technologies in agriculture was established by zemstos almost exemplary [Сазонов 1893].

However, solving the diverse issues of rural agricultural development, workers took up the issue of a large part of the literature of scientific and methodological contents. We can only emphasize a competent scientific methodical approach of zemstvos concerning the case. The most famous specialists at that time responded to the invitation of zemstvo workers to assist educational work for local people. First of all, A.P. Levytsky and A.V. Teytel issued a series of powerful researches both for the rural workers and for the general public [Левицкий 1914, p. 64-78; Тейтель 1909, p.51]. Thus, as D. Shoryhin stressed, zemstvo workers for decades consulted the public about

proper selection of seeds, cultivation, rational usage of fields, pest control, etc. [Шорыгин 1914, p. 54-63].

From 1880 Poltava provincial district council and its county zemstvos among the first put on the agenda the question of drying wetlands. In the early XX century, this district council embarked on active dissemination of agricultural machinery and tools. Lubny and Zolotonosha zemstvo counties of Poltava province actively provided financial assistance in the form of money and building materials for various agricultural associations that undertook to build houses in which «agronomic readings» were held: lectures were organized for professionals and farmers, scientific literature was distributed [Шаравара 2005, p. 247]. Thus, in addition to publishing professional literature on educational purposes, organizing public lectures became the second correctly chosen direction of activities of zemstvos.

At the beginning of 1890, experts summed up the economic activities of the Poltava province zemstvo and indicated that the leading trends in this area were: tobacco growing, horse breeding, the development of forest plantations. But the main obstacles of final solving of all issues in agriculture remained the poverty and lack of land for peasants [Економічна та сільськогосподарська діяльність Полтавського земства. – Полтава, 1911, p. 412].

In the scientific literature of the late XIX century, it was clearly indicated that the Kharkiv provincial district council formed own agronomic budget among the first to help the rural population. This is an instantaneous reaction of Kharkiv zemstvos on ministerial draft of food reform of 1909, called to life by periodic crop failures. The press noted that during that year, the district council intensified selling selected seeds and machinery for farmers, including seeders [Дятлов 1879, p. 43]. Thus, following the modern terminology, the formation of reserve funds was the third,from the methodological point of view, right step in the work of zemstvos with the public.

Yekaterynoslav provincial council differed according to certain features of economic activities, publicists called it an active lender of peasants and initiator of arranging elevators. Yekaterynoslav district council acted with broad promotion of their methods of management and urged others to follow their experience. According to economic estimates, as of 1916 this district council was the richest in the whole Russian Empire, because its economic costs amounted to 5, 172, 345 rubles [Пятидесятилетие Екатеринославского губернского земства (1866–1916 гг.), Киевская земская газета 1916].

Chernihiv zemstvo manifested itself most actively in the field of horticulture, apiculture and sericulture. Most counties of Chernihiv province had just such agricultural specialization [Земский сборник Черниговской губернии, 1901, p. 71-102]. District councils cared about the reconstruction and repair of roads. Even considering the lack of financing, on which the council complained, Chernihiv zemstvo could not comply with the provisions of the administrative and economic management of zemstvos roads. This regulation, according to the decisions of the State Council of

April 5, 1883 contained 38 items. However, the question of roads arrangement had not been solved enough in other zemstvos.

Similarly to Poltava Provincial zemstvo, Chernihiv zemstvo also spent on drying of wetlands, and in 1895 even developed a clear action plan for this [Земское дело, 1915, p. 590.; Коновал 1903 p. 31].

We cannot ignore the contribution of Kyiv zemstvo in the modernization of agriculture. On 27 January, 1914 in Kyiv the provincial congress of south-western zemstvos was held that organized the company for purchasing agricultural machinery and tools. The initiative of the organization of the congress belonged to Kyiv provincial zemstvo [Шарвара 2008, p. 49].

A separate element of the economic activities of local governments was the support of cooperation development. Often, during 1864–1917 Poltava, Yekaterynoslav, Kyiv, Chernihiv, Kherson, Volyn and Podilliya zemstvos were mentioned in the press as organizers of cooperatives. Each zemstvo had its own specialization. And leading figures did not leave rural colleagues without the advice and explanations as to organize various kinds of cooperatives [Хижняков 1914, p. 476; Подольский 1916, p. 35; Соколовский 1890, p. 215]. Everything was reflected in professional literature and on the pages of contemporary newspapers.

Despite the fact that only in the early XX century zemstvos set about organizing different kinds of cooperatives, they began to act methodically correctly. We can only learn such logical and balanced approach to the case. So they organized the first courses for credit cooperatives, that taught people how to form cooperatives and how they should act. Earlier Chernihiv zemstvo started to care, later Volyn, Podillya and Kiev provincial zemstvos did the same. Agricultural cooperatives were first created by Poltava and Kherson zemstvo, then Kyiv zemstvo. The second right step in this direction was the creation of funds for the issuance of loans to cooperatives on various activities and formation of loan companies.

Poltava zemstvo is considered among the most active, it was able to arrange funds for those who want to get small and big loans. Chernihiv was sharply criticized in the press for the fact that the population mainly addressed for small loans, because zemstvo did not expect payments from debtors and the facts were known, when some business executives lost property.

About zemstvos' contribution to the development of cooperation was continuously reported in the journal «Cooperative Life», editors opened a special rubric «Zemstvo and cooperation». It characterized in detail the activities of Lubny county district council, which gave loans to build cooperative houses and educational workshops.

Finally, we emphasize that the most successful is considered the organization of rural statistics. The development of statistics in the Russian empire was called to life because of great social and economic changes in the country, which must be examined, but the statistics data in the empire were obsolete in the middle of the XIX century. With the introduction of zemstvos, the problem arose concerning taxation and without

public review and analysis of the financial situation of the population this case it was impossible to start. It should also be emphasized that with development of certain areas zemstvos faced the need to analyze and summarize. Thus, rural statistics was the result of government reforms, as well as the direct result of the activities of these institutions.

There are quite big works of rural statisticians concerning the assessment of financial position of farms and methodical work in statistics, in which, thanks to their experience, statisticians revealed the techniques, methods of statistical work in various areas of public life. Zemstvo statisticians developed a clear system of data collection. It was much clearer than the one used in Russian Empire before the appearance of zemstvos. An example of manuals and work instructions are composed by N.M. Tytovych that was published under the title «The statistics course» [Титович 1909, p. 103] and was the publication of reference for practicing statisticians.

In the late 1880s – early 1890s there was the formation of certain areas of statistical work. As a result there were veterinary, sanitary, agricultural statistics, etc. It should be noted that statistics immediately began to develop in the areas requiring intervention and emergent help of zemstvos and therefore required the fundamental analysis. Subsequently, there were statistical work of certain provincial zemstvos. There are the works by famous statisticians A.F. Fortunatov, P.P. Firsov, M.F. Annenskyi; O.A. Kaufman where all data on agriculture were collected in 34 provinces of the Empire, methods of work in land cadastre published etc. [Фортунатов 1892, p. 600; Фортунатов 1889, p. 80; Фирсов 1896, p. 291; Анненский 1894, pp. 76-82.; Кауфман 1912, p. 632; Хворостанский 1917, p. 53]. The contribution of the scientists in the study of statistics which Ukrainian zemstvo led is priceless.

It must be emphasized that attempts of zemstvos to establish economic activities were in different historical periods such as Counter-reforms period in 1870–1890, the revolutionary events of 1905–1907, Stolypin agrarian reforms 1909–1911, the First World War.

In the early XX century the attempt to reform agriculture were made by Prime Minister P.A. Stolypin. He initiated small village economic system, which can be called the prototype of modern farms. He also initiated mass migration to Siberia of small holders of land and landless peasants. Local governments were also involved in this process. Chernihiv province zemstvo publicly emphasized that «the authorities obliged, and funds for migrants are not issued».On November 9, 1909 Stolypin circular «On assistance of the small village farms» was brought to the attention of the provincial zemstvos. Although zemstvo would take care of the welfare of the population, but they did not argue with the government. Everything helped zemstvo organizations to develop projects of economic assistance for farms.

The Government did not oblige zemstvos in Ukraine to operate according to some samples, so the local government could choose a form of existence. Afterward, Chernihiv, Kharkiv and Hlukhiv zemstvos took the trouble of arranging demonstrative farms for farmers, whose composition would include at least three small villages.

These zemstvos were the most active in organizing lectures for farmers from small villages and plots of land. It was a feasible matter for zemstvos because, as researchers note, 1905 was the turning point for them in distribution of agricultural literature.

Thus, based on the study of all innovations proposed by zemstvos in the field of management the need arises to pay attention to the periodization of economic activities of zemstvos composed by historian V. Doroshenko in the early XX century, because it did not lose its relevance. This proposed periodization of economic activities of zemstvos in Ukraine is the most substantiated and successful.

The scientist determined that the first period of economic activities took place from 1866 to 1875. This is a period of formation and development of economic activities of zemstvos, at that time:

- zemstvos actively founded local banks. In these steps, they saw a means of overcoming the crisis of 1860s, which landlords experienced a lot after the reform of 1861;
- credit unions were formed by zemstvos and, later, savings and loan associations in 1871–1874;
- zemstvos developed handicraft cooperatives, supported local crafts (due to the development of machine production, this idea was, as noted by V. Doroshenko, not successful).

The second period of the development of economic activities, according to the scientist, was held at the end of the1880s – the first half of the1890s:

- zemstvos organized small land loans in the result of recognition of a lack of land for peasants;
- financed Ukrainian migration to other regions, solving the problems of landlessness.

The third period of economic activities continued from the second half of the 1890s of XIX century to 1920 including:

- zemstvos invested in agronomy and began to organize agronomic congresses regularly;
- organized training courses for agronomists;
- were engaged in sales of agricultural products;
- opened warehouses of agricultural machinery, although initially cared little about arranging workshops with its repair;
- in 1890, zemstvos were engaged in animals insurance and insurance against fires;
- in 1900, material mortgage increased;
- in 1916, their economic activities reached the peak and was distinguished in opening economic department of Russia Zemstvo Union, in order to raise the national economy, because the exhausting First World War was lasting [Дорошенко 1910, p. 14].

Summarizing, we cn anote that zemstvos raised huge layer of work, which no one had previously performed. In particular, they equipped research fields and grain elevators, imported new varieties of seeds and new models of agricultural machinery, began to dry wetlands, made effords to the development of tobacco growing, horse breeding, horticulture, apiculture and sericulture.

Zemstvos were acting based on innovative methods in the field of economy, which could be adopted by the local authorities. In particular, zemstvos organized lectures (about pest control, new ways of cultivating fields, emerging of the latest techniques and technologies), as a particular industry professionals, as for the local population; actively spread scientific literature; advised those who wanted to organize cooperatives; formed reserve funds in agronomic assistance to the population; organized rural public meetings to discuss the most problematic issues in the field of economic activity and coordinate actions between different zemstvos and shared experience. Therefore, taking into account the efficiency of zemstvos' work, their experience can be successfully used today.

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Chapter 11

MANAGEMENT DECENTRALIZATION AND REFORM OF LOCAL SELF-GOVERNMENT OF RURAL AREAS IN UKRAINE: PROBLEMS AND PERSPECTIVES

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Problem statement

Redistribution of management functions between state institutions and local self-government used in any democratic state is the evidence of management decentralization. Ukraine is not an exception to the rule in this regard. However, the quality and character of local government in Ukraine, especially in rural areas, bring most scientists to talk about real centralization of authority, formalization of local self-government and necessity of its further reformation.

It should be assumed that the realization of local self-government as it functions now doesn't have possibilities to carry out its functions. At the same time, ignoring living standard of population, unsystematic reorganization of local self-government institute are useless. It is necessary to analyze the problem of local self-government in Ukraine and find the reasons of its appearance for the development of an adequate policy of management decentralization.

Analysis of recent research and publications

Theoretical and applied aspects of local government are quite completely presented in the works by native scientists such as A. Ishchenko, V. Kuybida, O. Lazor, Mamonova, A. Melnyk, and others. The aggravation of the problems of rural development has given the impetus to research associated with the change of social relations in the countryside, local self-government, the functioning of the rural communities (O. Borodina, Yu. Ganushak, A. Pavlov, I. Prokopa, P. Sabluk, V. Yurchishin). Unsatisfactory consequences of centralized decision-making in economic and social life of the country have caused scientific research with respect of the decentralization of power in the public sphere (O. Borislavskaya, O. Garnets, A. Goncharuk, A. Tkachuk and others). Works by foreign scientists, especially Polish researchers, who provided systematic information that requires understanding and verification of certain conditions in Ukraine are of interest for the Ukrainian scientists and experts (J. Blanc, Z. Leonski, S. Oswiak, A. Wiktorowska and others).

Thus, significant knowledge has been accumulated regarding the changes and problems of public administration. The process of social division of labor continues, social relations become more complicated, which becomes an objective basis for

further decentralization of management and the necessity of studying the causes of this process.

The purpose of the article is to justify the problems and prospects of reforming the rural local self-government in the context of the decentralization of government in Ukraine.

Presentation of the main material

In today's understanding the decentralization of management is a more complicated process. Unlike the creation of management system, the functions of public administration and local government are separated into independent groups that belong to different levels of administrative and territorial structure of the state. The presence of local self-government formally demonstrates the decentralization of power, but still cannot be a reliable indicator of decentralization in the broadest sense of the term. It is more correct to associate the decentralization with community self-sufficiency. Many scientists write about it, for example E. Borislavskaya [Борославська, Заверуха, Захарченко 2012, p. 10], A. Wictorowska [2002, p. 49-50], I. Zaverukha, E. Zakharchenko, and others.

Considering the desire of the authorities of Ukraine to strengthen the role of local self-government in line with the democratic reforms and the degree of self-sufficiency of local communities, we can assume that the present stage of decentralization of administration in the country is a reciprocal process: public authorities provide organizational, legal and financial bases of decentralization and local communities demonstrate the growth of activity and autonomy. An important condition of decentralization is also the consolidation of efforts and reaching consensus in the community itself.

It can be noted that local communities in Ukraine in terms of self-sufficiency are very heterogeneous. At the same time it should be explained that the term "self-sufficiency" is understood as a state which allows to improve the living standards of the local population using its own resources and finance. Such an understanding of self-sufficiency does not deny the possibility of attracting external resources. These may be grants, public-private partnership, non-state funds, and the state budget. These funds as a rule are involved for specific projects [Чемерис 2012, p. 12-13], the development of which is a function of local self-government. Thus, the self-sufficiency of local communities depends on their internal development and the quality of human resources: education, professionalism, enterprise, civic activities, etc.

In Ukraine, a lot of rural communities are not self-sufficient, and their ability to self-government is doubtful. Investigations of Ukrainian scientists give the reason to conclude that the population of more than 65% local councils numbers from .5 to 2.0 thousand people [Ганущак 2013, p. 15].

A small number of rural councils should not be considered as a deterrent for their development. However, with the deterioration of the quality of human capital, it is a considerable threat to the social and economic potential of rural settlements. Y. Ganushchak argues that only the local communities, numbering more than 5,000 people are able to use budget funds effectively [Ганущак 2013, p. 22]. The link between quantitative and qualitative indicators of community development has led to the adoption of the Law of Ukraine «About voluntary association of local communities», which is aimed at the formation of self-sufficient local communities [Про добровільне об'єднання територіальних громад: Закон України від 5.02.2015, № 157-VIII; http://zakon.rada.gov.ua/laws/show/157-19].

The ongoing reform of local self-government at the present stage suggests that the development of rural communities will be based on the interaction of two of their components: a) qualitative change in the social infrastructure, services and business opportunities; b) the growth of human assets, self-development of the community. In rural communities with a small population the implementation of the second component becomes much worse or impossible because of the dominance of demographic factors such as aging population, declining birth rates, internal and external emigration. Physical, economic and social powerlessness of older people is known to all. This is a serious obstacle to decentralization. In aging rural communities the economic activities of the population are significantly slowing down, and there are problems with finding qualified personnel management (the so called "personnel hunger"). Sometimes, the problems of local councils lead to increasing the absolute number of their employees. This defines the different indicators of management loading (Table 1).

In Poltava district the area of the rural council, which falls on one of his employee, ranges from 33.7 hectares (Runivschyna Council) to 197.2 hectares (Kirove Council) that is 5 times more. Similar situation is noted concerning the number of population per one employee of the council: from 43 people (Nesterenky Council) to 1,1371 people (Sherbani Council). The difference is 25 times! It should be mentioned that more than 45% of the settlements, which are part of Poltava district, have the population of less than 100 people.

For many settlements a pronounced process of depopulation is a characteristic feature. For example, Runivschyna rural council unites seven villages, four of which have from 2 to 8 people.

In Poltava district there are more than 15% of settlements with a population of less than 20 people. At the same time the settlements with the number of inhabitants more than 1,000 people make up only 9% of their total number.

These objective conditions are unfavorable not only for the success of decentralization, but the feasibility of its implementation under the unchanging circumstances.

Table 1. The administrative loading of employees of local councils in rural communities of Poltava region by 01.01.2013.

№	Rural councils	the number of settlements included in the Council	the number of employees of the Council	area of service with one employee, hectares	population served by one worker	the proportion of employed people of the total population,%	the proportion of employees of the Council in comparison with the total number of employed people,%
1	Abazivka	5	7	91.0	266.8	18.6	2.1
2	Brychkivka	3	5	88.0	214.4	43.8	1.1
3	Valky	4	5	70.2	136.2	58.0	1.3
4	Vasylivka	2	4	135.5	190.5	11.5	4.5
5	Gozhuly	4	8	114.0	488.1	19.1	1.1
6	Zavorskla	6	7	176.5	363.4	27.4	1.0
7	Kalalynyky	9	5	129.0	232.4	47.6	.9
8	Kirovske	9	7	197.2	233.0	31.9	1.3
9	Kovalivka	11	9	111.4	568.2	30.3	.6
10	Krotenky	5	7	120.0	191.8	28.7	1.8
11	Kulikivka	3	6	156.2	197.7	25.1	2.0
12	Machukhy	8	9	151.2	388.9	18.5	1.4
13	Mykilske	11	9	118.6	368.8	34.7	.8
14	Naderzhyne	5	6	71.5	263.5	46.9	.8
15	Nesterenky	8	15	35.0	43.0	10.1	23.1
16	Novoselivka	6	6	97.3	297.5	45.5	.7
17	Runivshchyna	7	15	33.7	66.0	38.4	3.9
18	Stepne	1	7	66.5	256.8	30.2	1.3
19	Sudiivka	2	7	57.9	193.7	43.7	1.2
20	Suprunivka	5	13	80.2	423.4	38.9	.6
21	Takhtaulove	2	10	47.8	339.7	44.4	.7
22	Tereshky	2	14	36.1	333.4	51.3	.6
23	Trostyanets	8	4	170.1	455.8	29.0	.8
24	Cherkasivka	8	5	174.9	131.4	24.4	3.1
25	Chernoglazivka	7	5	143.8	147.8	19.6	3.4
26	Shcherbani	7	10	67.3	1,137.1	45.6	.2

Source: calculated by the author on the results of certification of rural settlements.

The reform of local self-government, which is based on the unification of local communities (the majority of which are rural) only partially affects the improvement of staffing, manageability, and quality of public services. The set of problems, which requires the adoption of other decisions and the formation of the new rules is still unsolved. The main problems are:

- the weakening of the economic foundation of local self-government (the destruction of the industrial enterprises, the absence of non-agricultural employment, insufficient demand for the development of the services market, changing the structure of agricultural production);
- segregation of social unity in rural communities because of the economic stratification, marginalization of the population that have arisen together with the formation of the institution of private property;
- state rural development policy is reduced to the questions of infrastructural provision of rural areas, local self-government reform and agricultural support;
- inadequate ongoing financial decentralization with respect to functional decentralization, which leads to ungrounded increasing the powers of local councils without adequate funding;
- the absence of clearly regulated rules of public-private partnership without which it is impossible to solve the problems of local development, involving the business and the local population.

Since 2000, releasing of agricultural enterprises from social functions [Бородіна 2009, p. 80-81] has weakened the link between business, government and local communities.

The existing centralized system of social security was destroyed, and a new will be created. This system should provide citizens with not just social services (education, health care, assistance to low-income people, etc.), it must create favorable conditions for working and living in rural areas. The Government of Ukraine for almost 10 years has tried to achieve positive results in rural development by supporting agricultural production.

Most of the normative acts, which were adopted in 2000-2013, focused on the stimulation of agricultural production and increase of its efficiency: these include Laws of Ukraine: “About stimulating the development of agriculture in the period from 2001 to 2004” (2001), “About the State Support of Agriculture of Ukraine” (2004), “About the fundamentals of state agrarian policy for the period to 2015” (2005). The titles of these laws reflect the government concept of rural development which is aimed at qualitative improvement of the living space in rural areas with the help of the economic recovery of agricultural enterprises. On this basis, the rural community had a passive role in managing their own life. This factor had a negative impact on the activities of the local communities. State policy of supporting the agricultural sector had a positive impact on the modernization of production. However, for the government a rapid increase in labor productivity in agriculture was a surprise. It caused the reduction of labor requirements against the background of structural changes in the industry. For the last 10 years, the need for workers in agriculture has fallen by more than 2 times. At the end of 2014 the share of employees at the Ukrainian agricultural enterprises was less than 5% (excluding the Autonomous Republic of Crimea and parts of Donetsk and Luhansk regions). The lack of attention

from the government to the development of non-agricultural employment in rural areas cannot be considered the drawback of agricultural policy. Many questions concerning the creation of non-agricultural activities are outside the scope of agricultural policy. They concern investments in industrial projects, road construction, the formation of logistics, training of new specialists, etc. Such a large decrease in employment in agriculture (the diagram 1) is not compensated by its increase in other spheres, it increases the level of poverty and reduces the possibility of the population to adapt to changing conditions.

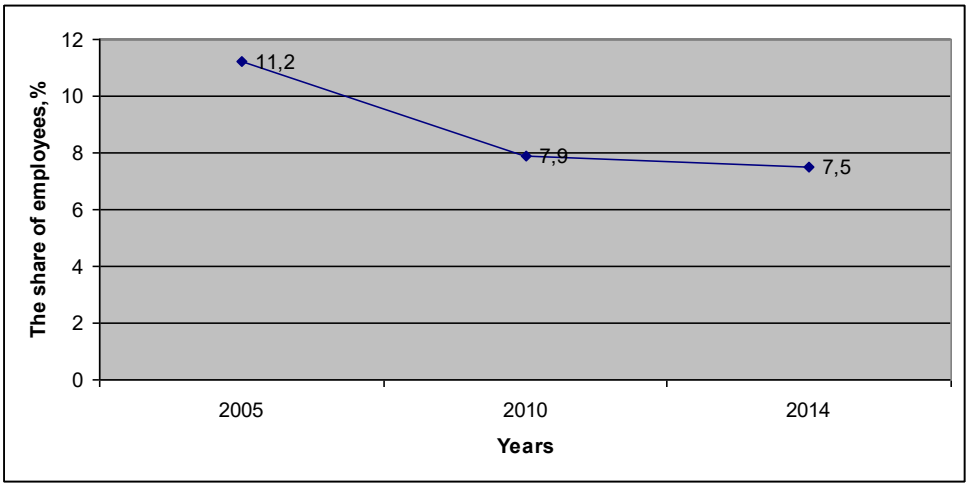

Diagram 1. The share of employees in agriculture of the total resident population of Poltava region, 2005-2014, %

Source: data of State Statistics Service of Ukraine.

Skilled agricultural personnel (engineers, agronomists, zoo-technicians, veterinary doctors, economists), who could not find the use of their abilities in large commodity production, are forced to work on individual peasant farms, which are oriented on self-provision of rural households. Statistics regards the owners of these farms as belonging to the category of employed, that is why the data concerning total agricultural employment conceal the scale of unemployment. So, if in 2014 the total number of people employed in agriculture of Poltava region was 120,600 people, the number of employed at agricultural enterprises (staff) on the annual average basis was 42.1 thousand [Сільське господарство області у 2014 р.: 2015, pp. 24-25]. At the same time, there are negative tendencies in functioning of personal peasant farms. This fact points out the deterioration in the conditions of formation of incomes of the rural population through self-employment. Let us consider the statistics of Poltava region, which is one of the most favorable regions of Ukraine for the development of private

farming (Table 2). The total number of these farms has decreased by almost 20% from 2005 to 2014, while the reduction of farms that grew poultry and livestock amounted to 30%. Technical equipment of private households is extremely unsatisfactory. In 2005 only 2.6% of farms had farm machinery, and in 2014 the proportion of such households was 4.6%. These figures testify to the dominance of manual labor, which pushes farmers back to the last century.

Table 2. Dynamics of development of personal peasant farms of Poltava region, 2005-2014

Indices	Years						2014г in comparison with 2005, %
	2005	2010	2011	2012	2013	2014	
Total number of farms, thousands.	249.5	226.3	211.7	207.9	202.8	199.9	80.1
including farms keeping livestock and poultry	190.2	157.8	151.3	145.3	139.5	133.3	70.1
The share of households that own farm machinery, %	2.6	3.5	3.9	4.1	4.4	4.6	-
Area of land plots, thousand hectares	293.4	305.3	286.9	277.3	276.6	279.4	95.2
including those for conducting commodity agricultural production	81.9	106.3	101.4	93.8	96.8	99.7	121.7
The number of cattle, thousand heads	141.2	96.3	90.2	99.3	95.4	83.8	59.3
including cows	101.9	67	62	59.4	57.7	54.6	53.6
The number of pigs, thousand heads	170.3	145.1	115.4	108.9	104.9	95.5	56.1

Source: Data of the Main Statistical Office in Poltava region.

It should be noted that the current policy during the above mentioned years did not include the measures that assist in transforming personal peasant farms into fully fledged commodity enterprises. The vast majority of the rural population (including employed) is engaged in hard physical labor on individual farms in order to survive. The social consequences of spreading petty bourgeois property and petty commodity production have been the loss of the labor community uniting rural population in organized groups. In fact, rural communities have ceased to be organizations; they have become a cluster of individual property owners who are concerned with the problem of personal survival. Social disintegration enhances as a result of economic stratification and the difference of outlook positions.

In recent years, the rural population has been extremely interested in politics and radical ideas which have been caused by the transition to proportional electoral system. The formation of rural councils by a party principle for rural communities that are deprived of the connective component may have a negative influence on their consolidation.

According to our observations there are more profound disagreements in rural communities than the disagreements that appeared as a result of remoteness from the power or business. They occur inside of individual communities or among different communities for political, religious, cultural, and other reasons. It forms a kind of discontinuity line of public relations.

This break in the relationship can be eliminated only through the consolidation of local communities. It is necessary to establish organizational and legal bases for cooperation, to create centers of business activities involving scientists, experts, community activists, and others.

Some steps in this direction have already been made. In legal terms, it concerns the two basic laws of Ukraine "About the cooperation of local communities" from 17.06.2015 №1508-VII and "About voluntary association of local communities" from 05.02.2015 №157-VIII, Cabinet of Ministers' Decision "About the approval of methods on the formation of wealthy local communities" from 08.04.2015 №214 and Resolution of the Verkhovna Rada of Ukraine "About the preliminary approval of the draft law on amendments to the Constitution of Ukraine on the decentralization of power" from 31.08.2015 №656-VIII. These normative documents make it possible to start practical activities to strengthen the viability of local communities. The absence of the necessary staff may be offset by cooperation with university teachers, project managers of enterprises, people who studied abroad. This can be done on the basis of a permanent Internet platform or other forms of communication, such as training sessions, which are held in the places of specific projects. In our opinion, the provision of scientific advice and technical assistance to local councils at this stage is more important than funding. Increasing the size of local budgets at the cost of financial decentralization showed problems of the project management. For the first time, the heads of local councils are faced with the fact that the access to certain sources of funding can be obtained by them only through the development of projects and presentation of them at open competitions. The transition to financing of local self-development on the principles of project management requires a transitional period, which is associated with learning. It is necessary that employees of local councils were closely involved in the development of projects. We have to change the staff of the executive committees of local councils and create the atmosphere of trust between the local population and local authorities. The process of involving employees of local councils into training stimulates their social activity. It significantly increases the willingness of local councils to decentralize management. At the same time, the decentralization of management should be developed not as a final target in itself, but as an opportunity to improve the quality of life of local communities.

The development of rural communities based on their cooperation or association requires compliance of several important principles:

- partnership (activities on the basis of mutual benefit);
- equality (duties, responsibilities, the distribution of benefits);

– clarity (providing information to all interested parties);
– subsidiarity (an approximation of services to consumers);
- responsiveness (responsiveness to the needs of the population).

The state should form the rural development policy, which includes measures to attract investment in the creation of non-agricultural enterprises; to support young professionals who work in the countryside; solve the problems with land ownership, which is located outside the settlements; further distribute taxes between the budgets of different levels in order to increase the self-sufficiency of communities.

Conclusion

Decentralization of management in the modern sense is not only the transfer of administrative functions from the central government to local self-government. It means the distribution of functions within the system of local self-government and even within a single local community. The real state of local councils in Ukraine demonstrates the willingness of many of them to effectively perform the functions of management of local affairs. A number of legislative acts that have taken in 2014-2015 support increasing the self-sufficiency of local communities. This does not completely solve the problem of self-government in rural areas. Further reform of self-government in rural areas is necessary due to the cooperation and unification of communities and the implementation of the project approach to management, which leads to a fundamentally different financing of activities. It is therefore necessary to provide scientific advice and technical assistance to local councils, which involves the creation of centers of business or permanent platforms for dialogue.

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Chapter 12

METHODS OF SIMULATION MODELING APPLICATION IN THE MANAGEMENT DISTRIBUTION OF INVESTMENTS BETWEEN COMPANIES

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Introduction

Economic modeling is an effective tool for the analysis and study of both production and financial-economic processes and phenomena in the economy. One of the most important consequences of economic growth modeling of enterprise is the choice of its future strategy through the development of alternative management decisions. The most optimal of them should lead to the effective implementation.

Most methods of operations research have been sufficiently studied, a number of recommendations on their effectiveness and feasibility of application have been developed. However, under the construction and study of a particular model, primarily economic, the issue of choosing the most effective and most convenient method of solving the problem, which would take into account the available software and machine resources, is always relevant. In this connection it is necessary to pay attention to the organization and application of economic and mathematical model based on general-purpose software which does not require long-term special education. The choice between the use of specialized computers of high power (speed) and PCs has been made in favor of the latter which do not require additional specialized software, but have sufficient computing resource.

The methods of simulation modeling using random number generators have several advantages over other methods of economic-mathematical modeling in solving optimization problems. Nevertheless, many authors claim, that the process of building a simulation model is an “intuitive art” [Savory, Mackulak 1994, p. 115]. The use of Monte Carlo method is often associated only with stochastic behavior of systems and rarely used in optimization models [Taha, Hamdy 2007, p. 528]. That is why, this study is unique and important for practical results.

Analysis of recent studies and publications, which discuss the problem

The widespread use of mathematical methods is an important area of improvement of the economic analysis, which increases the management effectiveness of enterprises of various fields in general. The main reasons for the use of active methods of economic-mathematical modeling to support decision-making are the complexity of modern economic and management practices caused by a high rate of automation, the

increase in the number of processes and utility tasks that accompany them [Taha, Hamdy 2007, p. 21].

According to the types of problems that are solved at the enterprises with the aim of making management decisions, the following main directions of economic-mathematical modeling include:

- quantitative analysis of the implementation of its own production and capacity utilization on the basis of the balance sheet matrix mathematical models;
- the selection of promising areas of production and financial strategy of using mathematical forecasting models;
- optimization of technical and economic planning with different granularity of time;
- prediction of optimal parameters of credit mechanism and behavior in the markets of inputs and finished products [Райзберг 2003, p. 210].

Simulation modeling has its roots in computer science, mathematics, and statistics. In a broad sense, simulation is the process of constructing a model of the real system and experimenting on this model to determine or evaluate the system of behavior (within the limitations due to some criterion or set of criteria), different strategies for the operation of the system. In the narrow sense simulation is a reflection on the computer of a real production organizational system. Thus, the term "simulation" has the same meaning as "machine simulation" or "machine modeling" [Shannon, 1975, p. 19].

Simulation models are special among other classes of models. There is a possibility to use different machine methods for the construction and research of their behavior. Simulation allows the user to experiment with the existing and created systems which is impossible to do with the real object because it requires considerable expenditures. Machine simulation has been widely used in the world for investigating complex systems thanks to important benefits suggested to the users of this method [Shannon, 1975, p.35]. A primary problem of simulation modeling is that modelers view models as unique and tend to recreate topologically similar models when only the parameters are different.

Today machine imitation can be used thanks to the wide range of software: programs composed in common programming languages and special algorithmic language to create simulation models (SIMAN, GPSS), MATLAB package, and other software [Shannon, Sadowski 1995, p. 32]. Implementation of complex simulation models using a vast majority of applications requires considerable time and money. Therefore, comparing the cost of using the models, it is necessary to look for alternative means of imitation. First of all, we should involve electronic tools Microsoft Excel spreadsheets.

The Solver such as MS Excel spreadsheet tool is the most popular and proven means of data analysis, which is used in a wide range of solving the mathematical programming problems. For the simulation modeling in Excel RAND() and RANDBETWEEN () functions are traditionally used and also packet analysis tool

"Random number generation", which allows to receive the majority of types of random numbers distribution and carry out research of models by Monte Carlo method [Райзберг 2003, p. 21].

However, these methods have a number of drawbacks and limitations in modeling, especially when the need for a large number of testing reflecting the results of various events, visualizing repeated actions arises because of the limited size of the electronic sheet and others. Therefore, a more correct and effective approach to modeling and visualization of the results in MS Excel environment is creating special macro-programs written in Visual Basic for Applications (VBA). Macros are compact and they allow a much greater number of the models repetition which are possible at the enterprise; they enable the organization of cycles and sub-programs, and also provide interface elements for each task.

Problem statement

The objective of this paper is to prove the efficiency of simulation modeling techniques along with traditional methods of economic-mathematical modeling and compare the results on the example of solving problems of distribution of investment funds among potential objects. To solve this type of optimization problems we suggest considering the use of Monte Carlo and evaluating its advantages, using software tools for general use.

Results

Rational decision-making includes two types of intellectual activities: knowing and evaluating. The formation of investment strategy of the company is in the field of crossing the mutual interests of both the company and its potential strategic investor, and investment acts as a special product which has circulation in the market. Therefore, the possibility of its obtaining often depends on understanding and taking into account the mutual interests of partners, the ability to see the object of investment by a strategic investor and evaluate its investment attractiveness. At the initial stage of the investment activities the preliminary analysis is particularly important which is conducted at the stage of development of investment projects, with the aim of counting all the options and choosing the best for the investor that promotes the adoption of rational and reasonable management decisions [Вітлінський 2003, p.346]. The main task is to take into account as much as possible the impact of uncontrolled random factors and under such circumstances make a reasonable decision concerning possible directions of the system development and choose optimal management strategy.

Being mathematically formulated the task of economic analysis is usually solved by one of the famous mathematical methods, mathematical programming and mathematical statistics, and so on. But most social and production processes are significantly influenced by random factors, which are cannot be controlled by the

persons responsible for the adoption and implementation of decisions in the context of ensuring the optimal operation of systems.

If stochastic information affects the functioning of the system and the solution of the problem can be prepared with some degree of accuracy, the method refers to a group of approximate - such that does not guarantee the only solution according to the given optimal criterion. Such problems are solved by using one of the methods of simulation modeling - Monte Carlo (Monte-Carlo Simulation), which is used in the calculations for complex systems where the use of classical methods is practically impossible [Shannon 1975, p. 126]. The feature and one of the main requirements of Monte Carlo simulation modeling is the use of special computer programs because generation of random scenarios of the project is repeated 500-1000 or more times. The paper describes an example of Monte Carlo simulation modeling for optimal distribution of investment funds among several companies that have different investment attractiveness.

The most difficult step of the simulation process is model formulation. Modeling is the balancing act. On the one hand, a model should include the essential elements of the system, and on the other hand, it should not include unnecessary details [McHaney 1991, p 38]. According to Shannon, "model building requires an ability to analyze a problem, abstract from it its' essential feathers, select and modify basic assumptions that characterize the system, and then enrich and elaborate the model until a useful approximation results" [Shannon, Mayer, Adelsberger 1986, p. 275].

In the description of the model characteristics obtained on the basis of the study of empirical data about the object or selected based on the available accounting materials was used. Probable behavior was also taken into account.

In conducting simulations several assumptions were made. These assumptions do not affect the peculiarities of the modeling process, but allow evaluating its efficiency without excessive detailed elaboration of primary and intermediate conditions. For example, the type of business, type of currency, by which the investment fund is measured, etc, do not matter in this model. Therefore, solving the problem will be conducted on the example of abstract data, the calculation of the expected profits and the amount of investments performed just in monetary form without specifying a particular currency. As the real future money flows or discount rates are unknown, permissible values are assigned to different money flows and discount rates, and then the results are considered. These cases which are based on the assumption are called simulated events. Simulated events are used for projects' research with different money flows for the evaluation of investment feasibility.

So, let us demonstrate the practical application of Monte Carlo method for solving the following problem. Suppose a fund must be distributed among some promising enterprises. Suppose there are three such companies and the check-up of their performance will reveal some of their profitability. Between the three companies (let us denote them as C1, C2, C3) funds are allocated in the sum of 5 million monetary

units. The funds are allocated in numbers divisible by 1 million monetary units. The profit that can be received by the enterprise, depending on the allocated funds is presented in Table 1.

Table 1. Profits of companies with different amounts of investments

Investment, million monetary units.		**1**	**2**	**3**	**4**	**5**
The expected return of each company, million monetary units	C1	2	4	7	9	10
	C2	2	3	6	8	11
	C3	3	4	5	9	11

Source: the authors.

For example, if the company C1 is allocated 2 million monetary units, the profits from the use of these funds will be 4 million monetary units. It is necessary to allocate an existing sum in such a way that the total revenue that the companies will receive would be the maximum one and the entire amount of the investment fund would be used. In other words, it is necessary to determine the optimal distribution of investment fund.

The exact solution can be found for such problems, using the method of linear programming. But using this method becomes quite difficult because of a considerable number of influencing factors, i.e. the presence of a large number of enterprises and the large volume of funds that are distributed. Solving this problem based on Monte Carlo method involves the use of generating sequences of random numbers to simulate random choice of funds allocated to each company.

To achieve the purpose of modeling step-by-step algorithm was developed in word-formula form. The model is directly placed on the Excel sheet, and simulation algorithm is written in Visual Basic for Applications (VBA) language, which is integrated in the software package Microsoft Office and makes it possible to apply to the random number generator. Algorithm for solving this problem based on Monte Carlo method is implemented as follows (step by step description).

1. The value of funds allocated to the first company is played out (randomly selected). For this purpose, random number R1 is played out and the corresponding formula A = 0, B = 5: S1 = (0+ (5-0 + 1) * R1) is used, where B is the general fund of investments and S1 - the amount of funds received by the first company.
2. If the first company is not allocated all the funds (S1 <B), then the value of the funds allocated to the other enterprise is played out. For this purpose a random number R2 is played out and the following formula is used: A = 0, B = 5 - S1: S2 = =(0+ (5 - S1-0 + 1) * R2), where S2 is the amount of funds for the second company.
3. The remaining funds (if there are any) are allocated to the third company: S3=5 - S1 - S2.
4. The total profit is calculated based on the amounts of allocated funds (S1, S2 and S3) and the corresponding value of profits (see Table 1).

Steps 1-4 are repeated many times (e.g., 1,000 times). Only one option of distribution of funds is selected for which the maximum value of total profit is expected. The number of steps increases in case of larger amounts or more companies.

Let us show a version of the algorithm to solve this problem in a macro-program created by Visual Basic for Applications language and recorded in the Excel book as macro. The fragment of the program, which reflects the distribution matrix of possible profit amounts depending on the investment amount received by each company, is as follows:

```
Dim cc(1 To 3, 1 To 5), s(1 To 3), s_opt(1 To 3)
n = 1000
kol = 3: fond = 5
cc(1, 1) = 2: cc(1, 2) = 4: cc(1, 3) = 7: cc(1, 4) = 9: cc(1, 5) = 10
cc(2, 1) = 2: cc(2, 2) = 3: cc(2, 3) = 6: cc(2, 4) = 8: cc(2, 5) = 11
cc(3, 1) = 3: cc(3, 2) = 4: cc(3, 3) = 5: cc(3, 4) = 9: cc(3, 5) = 11
```

The next fragment macro analyzes all the variants of obtained total profits (*max_prib)* in the allocation of different amounts for different companies and determines the number of companies (*kol)* that will receive investments:

```
max_prib = 0
For i = 1 To n
a = 0: b =fond: prib = 0
For j = 1 To kol
If b > 0 Then s(j) = Int(a + (b – a + 1) * Rnd)
b = b – s(j)
Else s(j) = 0
End If
Next j
For j = 1 To kol
k = s(j)
If k > 0 Then prib = cc(j, k)
Next j
If prib > max_prib Then For j = 1 To kol
s_opt(j) = s(j)
Next j
max_prib = prib
End If
Next i
```

The results of the program displayed on the worksheet, as well as windows messages for convenience. Detail worksheet and windows messages are presented in Figure 2.

The company №1 received	4	million currency investments	
The company №2 received	0	million currency investments	
The company №3 received	1	million currency investments	
Maximum return on investment in all of enterprises is			12 million currency investments

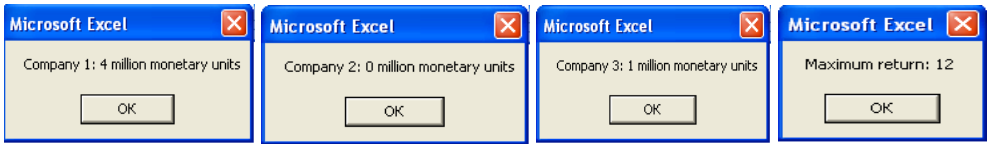

Figure 2. Fragment Excel sheet after the macro program and windows messages with final results

Source: the authors.

The next stage of the research was to solve this problem with Solver tool and compare the obtained results. Using this tool you can calculate the optimal values of input parameters under which the formula within the target cell takes extreme (max/min) value. The limitations that exist in the task must be taken into account. The results of the simulation exercise have shown that the maximum profit of 12 million monetary units can be obtained if the investment fund is distributed between both companies' №1 (investment amount 4 millions) and №3 (1 million).

An example of solving the problem of optimizing the distribution of investment fund among three companies by Excel tool is shown in Fig. 3

As you can see (see Fig. 2 end Fig. 3), the results of the simulation conducted by different methods coincided. In this case, it confirms the effectiveness of Monte Carlo method in optimization problems solution. This method has more advantages and opportunities with the gradual complication of simulation conditions, namely by increasing the number of enterprises, assessment of their profitability with the increase in investment options.

	A	B	C	D	E	F	G	H
1	Investment, million monetary units		1	2	3	4	5	
2	The expected return	C1	2	4	7	9	10	
3	of each company,	C2	2	3	6	8	11	
4	million monetary units	C3	3	4	5	9	11	
5	***The results of the problem solving by Solver tool***							
9								
10	Investment, million monetary units		**1**	**2**	**3**	**4**	**5**	2
11	The expected return	C1	0	0	0	1	0	1
12	of each company,	C2	0	0	0	0	0	0
13	million monetary units	C3	1	0	0	0	0	1
14		**5**	1	0	0	1	0	
15								
16	***Maximum return on investment in all enterprises is***			**12**	***million currency investments***			
17								

Figure 3. Task's conditions, formalized model and results interpretation when applying Solver tool on Excel spreadsheets,

Source: the authors.

Conclusions

The implementation of complex measures for the improvement of investment climate will intensify the investment process and get additional investments for economic growth. However, while distributing the allocated funds it is necessary to calculate all the possible options and choose the best ones for the investor. Therefore, the study and use of simulation modeling techniques that can help make the right management decisions is very important and relevant. The distribution of investments among enterprises can be calculated by various methods of economic and mathematical modeling, which have quite clear algorithm application.

The effectiveness of both Monte Carlo and Excel's Solver tool methods was proved on the basis of the experimental results. It should be noted that in solving problems using the Monte Carlo method, which enables a large number of tests (to 100,000 repetitions), the results have higher accuracy and explain the difference in results compared to other methods. Therefore, to solve such problems in practice several methods should be applied, and the verification and comparison of results should be made as the results may have slight differences and errors because of very different mechanisms of implementation.

Finally, managers have the opportunity to conduct preliminary calculations on a model without resorting to full-scale experiments to evaluate the risks and benefits of different options for investment decisions.

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Chapter 13

CMR AS A TOOL ENABLING ONE TO MODEL INFORMATION IN THE AGENCY FOR RESTRUCTURING AND MODERNIZATION OF AGRICULTURE

Brzozowska Anna, Kaszyca Karina

Introduction

Nowadays, the issues of good sales practice and a proper approach towards the customer are gaining importance. There are a lot of models of a proper approach towards the customer and sales rules. The most important sales rules include customer acquisition on a continuous basis, maintenance of relationships with the customers, planning of shared activities, organization of common events, provisions of mutual favors, attracting customers with information; learning how to sell in the triangle (the seller becomes an intermediary in further transactions), persistence and observance of the specific rules [Pałgan 2011, p.42].

Such activities are successfully applied in business. Today, the product and service market is very extensive. The customers collect offers, compare prices and check the seller's reliability before they decide to purchase a particular product or service. The producers or service providers are continually forced to compete for potential customers and keep the current ones. According to P. Kotler the fundamental stages of effective sales are as follows: search for and classification of new customers, initial contact, contact with the customer, presentation and demonstration, rejection of the accusation, completion of the order and continuation [Pałgan 2011, p.47]. This type of activities can be classified as conceptual CRM (Customer Relationship Management). In other words, it is a method or a model of dealing with the customer or potential customer. Usually companies develop their customer approach individually, taking into consideration the specific nature of their service or product. The most essential thing the customers expect from the service provider or the producer is a professional approach to them or their needs, when purchasing or giving advice. The scientific research shows that a professional approach makes the customers respond positively to their business partner. The majority of companies have learned and applied the conceptual CRM approach. The advantages of CRM approach include increase in the market share, increase in revenues, better customer service, satisfaction of the customers, etc.

In many companies the conceptual CRM is often replaced by IT-CRM system. This may be a program developed especially to or purchased by a given company or institution. The program is generally designed to collect data, prepare offers or reports.

The IT-CRM is often used to collect information about the customers, their needs and requirements. The obtained data can be archived using various methods. This may include individual files saved in the system as well as emails or reports created in the IT system.

The CRM is supported by both entrepreneurs and local government units. The Agency for Restructuring and Modernization of Agriculture is an example of an institution in which the CRM is implemented. It is a relatively new institution, established in 1994. The Agency's customers include farmers and residents of agricultural areas. The Agency for Restructuring and Modernization of Agriculture offers subsidies for the establishment of service and trading companies operating in rural areas, subsidies for afforestation and for many other projects. The IT-CRM system is definitely much better developed in the Agency for Restructuring and Modernization of Agriculture, since the Agency's personnel maintain records of the applicants in a clear and transparent way, submits reports to the headquarters and provides assistance with the current projects to persons who apply for subsidies.

CRM as a tool improving the corporate activities and its origins

The CRM abbreviation is derived from the English words Customer Relationship Management. In the most simple way the CRM can be defined as a strategy / business model introduced into the economic practice at the end of the 90s of the 20th century that is based on building the customer's loyalty to the company / brand through the development of long-term mutually beneficial relationships, using the latest achievements in the information processing technology [Deszczyński 2011, p.1733].

Regardless of its operational aspect the CRM is basically a business strategy helping the company to consolidate its actions undertaken while establishing relations with the customers within the framework of the entire organization. It is not only a response to the competitive pressure present nowadays in almost every sector of the market, but also a strategic basis which requires attention of the top-level management and relevant financial outlays [Dyche 2002, p. 32]

CRM is based on the thesis which says that "winning new customers is much more expensive than maintaining loyal purchasers" [Fonfara 1999, p.104]. It is therefore important to build long-lasting relations with the customers in order to make them want to eagerly come back to buy a particular service or product.

CRM also puts great emphasis on relations which do not result in direct financial benefits, but the purpose of which is to maintain contacts with the customers. These relations ensure constant monitoring of the customers' behaviour and opinions, enabling the company to respond to the so-called weak signals, usually preceding more radical changes in the market. The contact may be initiated by the customers, entrepreneurs or institutions [Deszczyński 2011, p.23].

The first prototypes of CRM systems appeared in the 80s and 90s of the last

century. The first application launched to the market was the CM (Contact Management) system, applied mainly by managers to back up contact information. The next stage was SFA (Sale Force Automation) application. This system was used within the company and its purpose was to improve communication between the management personnel and the employees. CSS (Customer Service Support) was another modification of the early CRM system. This application was designed for operational departments and was aimed at maintaining the customer service at the highest level.

The first CRM systems were a modification of two joint applications: CSS and SFA. The main concept behind the CRM system was to improve the customer service and ensure a proper a after-sales service.

Types of CRM

There are basically two types of CRM: the analytical and operational one.

Operational CRM is intended to improve the work of the operational departments. The operations supported by CRM are mainly connected with the improvement of customer relations or project management supervised by a manager [Skowron-Grabowska 2013]. Operational CRM is often called the “front office”. The relations covered by operational CRM include sending the customer a current offer via telephone, fax or email.

Analytical CRM consists in the interpretation of data concerning the customer collected by a compilation of information obtained from all possible sources available to the company or institution. In the reference books the analytical CRM is also known as "strategic– CRM" or "back–office". To ensure a proper functioning of CRM, one often requires additional modern system solutions which need to be purchased by a given company or institution. Entities often have to introduce additional procedures streamlining the processes functioning in companies or institutions to ensure that everything works well.

The main purpose of analytical CRM is to deliver and generate different types of reports. The reporting system is usually adjusted to the customer, and it is the customer who decides what reporting modules should be included in the application. There are a lot of possibilities. Here are several examples of available reports:

- report on generated revenues and profit margins, from the best to the weakest customer
- product report – from the smallest to the largest amount of products purchased by the company's customers
- transaction report – report on performed transactions
- report on customer – related activity - this application enables one to generate information about the type and dates of attempted contacts with the customer
- report on types of product – the manager is able to sort out what products have been bought by the customer and how much the company has earned on that

transaction

- direct report on a particular customer – the manager is able to generate information about the customer in a given period of time.

The internal report is another important issue. The manager should be able to generate a report on the activity of the customer. It is important that the supervisor should be given the opportunity to verify whether the sales representatives take good care of the customers and whether they call or visit the customers on a regular basis.

The CRM system has already been defined and modified in various ways [Dyche 2002, p 29]:

- eCRM – refers to "electronic" customer relationship management. In a nutshell, it is a CRM available on the internet. For example, one can use eCRM when logging into the website of the company to search for new services;
- ECRM – many experts use the term ECRM or "ERM" with reference to the corporate CRM, i.e. a CRM program covering an organization-wide overview of the customers. When referring to this term one should avoid confusing it with the electronic CRM;
- PRM – in simple words it can be interpreted as Partner Relationship Management. It enables the company to shape relationships with enterprises established in a way that ensures an optimal structure of the sales channel. One of more interesting tactics applied by PRM is the addition of links to websites of other enterprises in the company's own website;
- cCRM – "collaborative CRM" is associated with situations in which the customers have the opportunity to interact directly with the company, usually via the internet. An example of this can be the Dell company, offering its customers the possibility to select computer components on their own, enabling them to design their own computes;
- SRM – "Supplier Relationship Management" is similar to PRM, as it also focuses on satisfying the external partners of the company. The difference is that it is limited to the existing suppliers. The SRM helps the company to evaluate and categorize the suppliers, taking into account their particular needs, thus enabling the company to select a supplier with the best qualifications and consequently to optimize the supply chain;
- mCRM – "mobile CRM": it assumes a transmission of information to the customers, suppliers and business partners through wireless technology;
- xCRM – one is very likely to encounter various terms based on the CRM abbreviation, therefore the “x“ sign is used to replace any other name that may appear in the future [Dyche 2002, p 29].

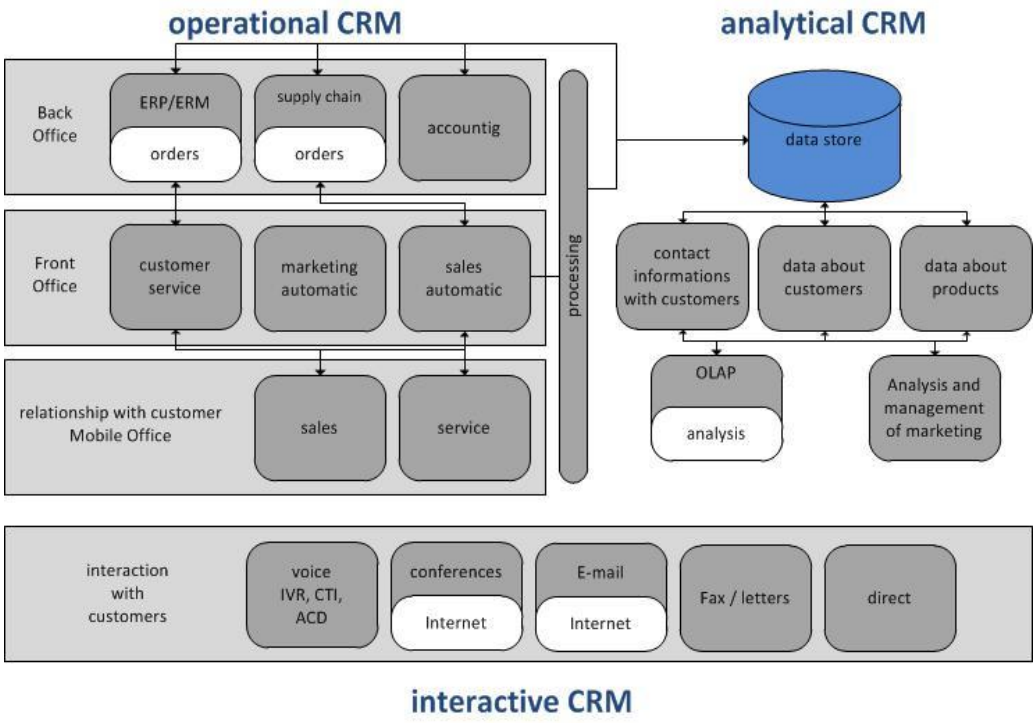

Figure 1. CRM Architecture

Source: [Mazur A, Mazur D. 2004]

CRM as concept and strategy

The strategic management can be defined as company's activities leading to the implementation and consequently to the defence of the business model, i.e. an abstract idea of development of the company leading to positive results [Deszczyński 2011, p.37].

The CRM, defined as above, can be described as a business model pattern. The manager determines the direction of development of the company, forecasts the profits and determines the financial outlays for the development.

In the context of the strategic management of the company in classical terms, the CRM business model (program) implementation process can be divided into the following four stages:

- strategic assessment (internal and external),
- strategy formulation (at different levels),
- strategy implementation,

– strategic control [Deszczyński 2011, p.39].

At this point it needs to be mentioned that those managers who perceive the CRM as a cure for their financial problems, can be deeply disappointed. The CRM cannot bring immediate and tangible financial benefits. The return on investment is usually prolonged in time and disproportionate to the invested funds.

In the B2C sector, the CRM is understood as keeping pace with choosy and increasingly more impatient customers, who are just about to discover the advantages of a given company's main competitor and who are more and more willing to share their negative opinions with that company's potential customers [Dyche 2002, p 33].

The key customer management, on the other hand, is aimed at a constant monitoring of all relationships between the employees and the major customers or CRM system suppliers. The key customer management mainly involves business partner management, key customer management, reports and strategies [Dejnaka 2002, p.146].

Business partner management. Business partners often have access to the same platform, where they can check the financial situation, current orders or a list of products.

Key customer management mainly involves provision of services to strategic business partners;

Reports and strategies. This application enables one to monitor the cooperation between the key customers. The sales representatives prepare meeting reports containing information about each contact with the customer (phone calls or emails). Such applications are often additionally equipped with a tool enabling one to prepare offers or contracts. The sale representative prepares the offer which is automatically registered in the system. The supervisors and other employees have real-time access to it. Documentation of contracts can be used in various types of audits because it contains data with different ranges: financial, operational, enviromental and safety, logistic e.t.c. [Bajdur 2006].

Agency for Restructuring and Modernization of Agriculture. Description

The Agency for Restructuring and Modernization of Agriculture was founded in 1994. Its main purpose is to introduce programs and grant subsidies offered by the European Union. The agency is subject to the supervision by the Polish government. The beneficiaries of the Agency include natural and legal persons, such as farmers, entrepreneurs, as well as social organizations and communes in rural areas. Contrary to popular opinion the beneficiaries are not necessarily persons registered in the Agricultural Social Insurance Institution.

The structure of the Agency for Restructuring and Modernization of Agriculture comprises three levels: the headquarters, 16 regional offices and 314 district ones. The Agency is headed by a President appointed by the Prime Minister of the Republic of

Poland upon a joint request by the Minister of Agriculture and Rural Development and the Minister of Finance.

The Agency supports the development of rural areas through the implementation of instruments co-financed from the European Union budget: the European Agricultural Guarantee Fund, the European Agricultural Fund for Rural Development and the European Fisheries Fund, supplemented by funds from the state budget and private sources. The Agency accomplishes its goals by distributing information to interested parties, assisting in filing the applications, receiving and processing the applications of the beneficiaries, allocating and monitoring the use of the allocated funds. The Agency is also responsible for the identification and registration of animals. The Agency's budget is divided into financial envelopes covering particular programs to be used by the customers.

The Agency provides its beneficiaries with information about the relevant programs through the Internet, advertisements in newspapers, information at conferences, participation in radio and television broadcasts. It chooses places and means of communication that ensure the greatest possible attendance of the beneficiaries, such as agricultural fairs, broadcasts about rural areas, industry magazines. The Agency does not send any information directly to individual beneficiaries.

The above activities take place at regional and district levels. The professional employees of the Agency eagerly provide information about current projects and help complete the applications.

The interested customers can choose a program that suits best their activities and apply for access in it through the Internet or by visiting one of the regional offices and filing personally the relevant application. The beneficiaries have to demonstrate their own initiative to participate in a given program. Some programs require personal appearance in the Agency's office. The Agency cooperates with the Silesian Agricultural Advisory Centre, which supports the beneficiaries. Each beneficiary expects efficient and content-related service, as well as consultancy on the selection of a relevant program offered by the Agency.

About 5000 applications are approved each year. The group of beneficiaries is rather unchangeable - the persons using the programs tend to come back and the fluctuation is small. Nevertheless, by conducting information campaigns in nationwide mass media the Agency attempts to reach as large number of potential beneficiaries as possible.

When it comes to the IT system, the matter is as follows: The Agency has at its disposal a computer system, called the Integrated Administration and Control System. This system is a kind of CRM. The clerk's task is to enter the application and the personal data of the beneficiary into the system. On this basis, the beneficiary is recorded and entered into the database of the so-called "Agency's customers". The applications are also processed through the system, because all required information and scanned documents are placed at the disposal of the responsible person in the

system. Using the Integrated Administration and Control System one can generate a variety of reports, e.g. about approved applications, contacts with the beneficiary (the clerk has to register in the system the entire course of the cooperation, starting from filing the application, through made phone calls and ending with the final acceptance or rejection of the application). On the other hand, it is possible to control the work of the regional and district offices. The President has access to ongoing information about the type and number of filed applications. One can also find out how much interest a particular project arouses.

The Integrated Administration and Control System has been tailored to the Agency's needs and it constitutes a model CRM. The system users enjoy full access to open projects and can check their application processing stage. Work in the system is smooth and quick. The flow of information between the beneficiary, the district or regional office and the headquarters is fast and efficient.

Conclusions

Having analysed the Agency for Restructuring and Modernization of Agriculture one can conclude that the IT-CRM approach is perfectly adapted to this institution. The transmission of information in the Agency for Restructuring and Modernization of Agriculture is a very quick and smooth. The beneficiary who applies for subsidies is offered very professional services. In conclusion, the IT - CRM is designed very carefully and takes into account all requirements (whether in the form of reports or databases) of the user.

However the CRM as a concept still needs to be polished up. In the Agency for Restructuring and Modernization it is the beneficiary who initiates participation in the program. The agency has a database and is willing to provide its services to new beneficiaries, but it lacks the initiative, the aim of which is to win the so-called "new customers". Below I present some examples where one can notice a lack of strategy. The registered beneficiaries do not receive current information about new projects directly, and no one tries to find or win new beneficiaries. Information about new projects is visible on the website and on television in the "Agrobiznes" program. The Agency does not conduct regular information mailing campaigns. It also lacks sections responsible for active customer acquisition, and it often happens that people who may have been able to apply for participation in a given project have no information about the application procedure.

A solution improving the cooperation with the beneficiaries could consist in the creation of a marketing department and sales department. Persons working in these departments should actively look for new customers and inform them about new activities on an ongoing basis. Research done on farmers of kujawsko-pomorskie province have shown that most of the inquiredc farmers are going to enlarge their farms [Starostka-Patyk, Kozak M. 2004]. It would be best if the marketing department

had its seat within the headquarters and if it coordinated the flow of information between the headquarters, the regional or district offices and the individual beneficiary. Based on marketing and sales activities one can generate analytical reports and monitor the work of the employees. The strategic approach of the Agency is very much underdeveloped. One can observe a lack of interest in the already existing beneficiary on part of the clerks. According to the Pareto's principle 20% of the customers generate 80% of the profits, so it's important to look after the already won customers (beneficiaries)

The conceptual approach to CRM would have a positive impact on the image of the Agency for Restructuring and Modernization of Agriculture, and the basic marketing and commercial activities would lead to the development of the institution itself. These two approaches (the conceptual and IT one) prove best when they interact with and complement each other, and the flow of information is fast and efficient. The already existing customers and the potential ones can expect professional service. However the managers should know how to arouse the interest of the employees (sales representatives and marketing specialists) in their work because human factor has a significant impact on the operation of an organization [Jelonek, Stepniak 2014]. The process of implementing the IT and the conceptual CRM concept is a long-term one, so it should be executed in stages, and the best results can be expected when these two approaches work together.

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Chapter 14

BASIC MODELS, MECHANISMS AND INDICATORS OF ORGANIZATION'S SUSTAINABLE DEVELOPMENT IN THE AGRICULTURAL SECTOR OF ECONOMY

Makhmudov Hanlar, Mykhailova Olena, Svitlychna Alla

Problem statement

In recent years, with the increasing frequency it's possible to found using of the term «sustainable development». It is used in relation to individual economical units, as well as to economic systems and society in general. The range of problems of sustainable development lies in the micro- and macroeconomic relations. Since the agricultural sector of the economy plays a decisive role in ensuring economic security, it necessitates the consideration of mechanisms, models and indicators of sustainable development.

Survey of latest researches and publications

The idea of sustainable development has been adopted in various countries and international organizations. Research of sustainable development issues has been held on both the society level and at the industries' level, different subjects of entrepreneurial activities and local communities. A significant contribution to the development of conceptual provisions has been made by Ukrainian scientists Vasylenko V.A., Perebyinis V.I., Shyian D.V., Shubrovska O.V. and others. However, despite the considerable results of their researches, action-oriented aspects of sustainable development require further study.

The aim of our research is the study and generalization of fundamental approaches, basic mechanisms and indicators of organizations' sustainable development in the agricultural sector of economy.

Survey of research data for study

Development of organization expresses in order strength of its structure element and elimination of spontaneity. Any organization, including those in agricultural sector, as well as each sociotechnological system, should regenerate and rebuild constantly, meanwhile, but not lose endurance. Considering this, it is necessary to study the concept of economic system's endurance.

Vasylenko V.O. notes, that «endurance should be considered as an ability of the system to save its capable condition after reaching intended results under different excitatory influences. Endurance has to be provided at under any conditions and situations that appear in the system and environment» [Василенко 2005, p. 412].

Endurance of different type systems is determined by different methods. Accurate and rigorous theory of endurance, which is described by general differential equations, was created by A.M. Lyapunov. Values of parameters under which the system is endurant is called endurance limit. The proximity of the system to the boundary of endurance limits is measured with margins of endurance by phases and range that are estimated by range and phase characteristics of open loop system of automatic management [Василенко 2003, p. 114].

Considering current situation in agricultural branch of economy, we deem appropriate to agree with idea of D.V. Shyian and O.V. Shubrovska, who think that «agricultural sector of the state should make definite transition to the model of sustainable development which needs the elaboration of an appropriate concept [Шубровська 2002, p. 35].

We will look upon the approaches to the definition of the concept of sustainable development using table 1.

Table 1. Interpretation of the concept «sustainable development»

Interpretation of the concept	Author, source
Sustainable development (of society) is development that meets the needs of the present without compromising the ability of future generations to meet their own needs	Materials of UN Conference on Environment and Development [Садовенко, Масловська, Середа, Тимочко 2011, p. 25
Sustainability of agricultural system is defined as the ability to provide its own growth in the conditions of compliance with optimal proportions of its inner development and balance with the development of others interacting with the units of national agricultural sector, in particular, and also with national and world economic systems, as systems of non-economic nature, such as environmental, demographic and social	O.V. Shubrovska [Шубровська 2002, p. 112]
Sustainable development of agricultural production is the process of optimizing the level of agricultural enterprises' economy, reservation and renewal of qualitative characteristics of environment and improvement of rural population status under the conditions of strengthening the state food security	I.A. Volovyk [Воловик 2003, p. 116]
Developing sustainability (of an enterprise) is the ability of agricultural manufacturer to resist negative influence of natural and climatic, socioeconomic and other forces, the ability to use their influence with the highest effect, receiving an income and satisfying scientifically-based rates of agricultural product consumption	D.K. Cherkashyn [Черкашин 2004, p. 259]

Source: own work.

Summurizing the interpretation of the concept given in table 1, we can state that organizations' sustainable development in the agricultural sector is,first of all, controlled development. It's ensured by the ability of its own growth, which does not threaten the satisfaction of wants of future generations.

According to Cherkashyn D.K.[Черкашин 2004, p. 260] the sustainability of agricultural production development depends on the legal basis and the stage of viability of agricultural enterprises; financial condition; workforce capacity of management and its capacity for adaptation and innovation; the interest of employees in work results; the state of market-type reforms and stabilization of the economy; the ability to find their own niche in the emerging market; the ability to increase the qualitative indicators of production. Sustainability economic, climatic, ecological, socio-demographic, financial, and investment, organizational and reformist factors, and factors of enforceability directly affect sustainability.

Sustainable development of production, according to Shyian D.V., «is formed by two components: changes in production volumes and changes that occur under its influence in the natural and social environments in assessing them from the perspective of profitability for further functioning of society. The general nature of the expression of the first component of the sustainable development from these positions is trend» [Шиян 2006, p. 41].

Based on the above mentioned, it is obvious that sustainable development of agricultural enterprises can provide sustainability of agri-food system, and it, in its turn, is the part of the formation of society's sustainable development (fig. 1).

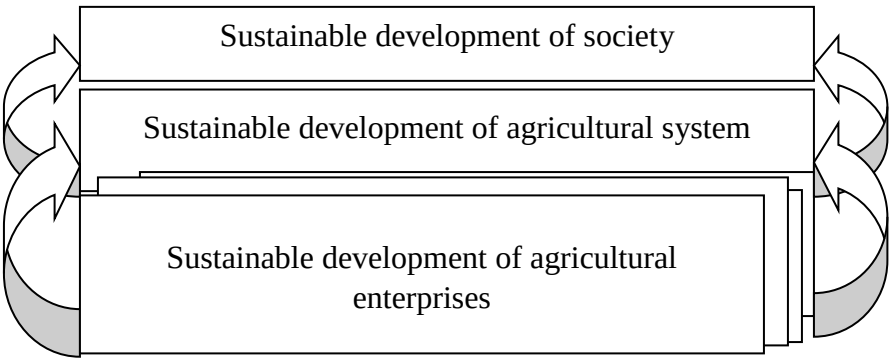

Figure 1. Place of sustainable development of agricultural enterprises in sustainable development of society

Information source: own design.

Makohon V.V. proposes to conduct sustainability research as an effective factor of manufacture reproduction, while noting that «sustainability of reproduction in agricultural complex characterizes qualitative state of dynamic socio-economic system,

in which, under the influence of the environment, rational combinations between resources and needs are not violated» [Макогон 2004, p. 97].

Modernizing the development of agricultural sector of Ukraine Perebyinis V.I. considered as one of the priority areas of the national economy's reorientation on the basis of socioeconomics. He offers to consider it not only from the standpoint of maximizing profits, but also because of the social and environmental aspects, and solving topical social problems such as food security; preservation of the natural landscape and traditional rural way of life; support of national culture and cultural values; environmental protection and maintaining ecological balance [Перебийніс 2015, p. 193].

New concepts of economic development are formulated in the theory of intellectual technology by F. Hayek and the theory of economic innovation and entrepreneurial society by P. Drucker. According to F. Hayek [Йохна 2005, p. 56-57] market process should be given the opportunity to develop spontaneously, and it itself will contribute to economic development. His research explained how knowledge becomes the foundation of entrepreneurial idea and gives impulse to the development of innovation; why the economy of some countries is senstive to innovation, and others' isn't. F. Hayek proved that institutional foundations of society play a crucial role in this process - both formal (formed by state laws governing economic activities) and informal (established regulations, customs, traditions, norms of behavior, morality).

The theory of economic innovation and entrepreneurial society formed by P. Drucker [Йохна 2005, p. 58-59] is based on the belief that the current economy is innovatiive. Intellectualization of labor is the main process of production development, and the cost of it and dissemination of knowledge is the main form of investment; the main form of ownership is intellectual property, that structures society and defines its development. In cooperation with innovative economy entrepreneurial society («society of knowledge», «informational society») is formed which is characterized by the fact that innovation and entrepreneurship cover a significant part of society.

V.V. Trehobchuk says that one of the most important preconditions for ensuring constant, competitive and sustainable development of agricultural sector is «organic combination of innovation and investment activities» [Трегобчук 2006, p. 12].

Innovative model of agricultural enterprises' development suggested by O.O.Moroz envisages not only increasing the level and structure of manufacture to the pre-reform parameters: «it is referred to a fundamentally new direction of microeconomic and social development, the elements of which will increasingly become effective management, increasing human capital, export oriented production, implementation of high technologies and other factors» [Мороз 2006, p. 392]. The state of internal innovative dynamics, according to O.O. Moroz model, determines market institutions (material aspects of motivation, investment mechanism, export orientation, anti-crisis mechanism, hierarchical competition, regulation of rental relations), organizational institutions (controlling and internal system of planning, structural optimization and

upgrading, the possibility of monopolistic dominance, management effectiveness at all organizational levels, the effectiveness of relationships with partners and suppliers), and cultural institutions (intellectual capital, concentrate impulse for changes, psychological aspects of motivation, direct and hidden conflicting influences).

The concept of improving the competitiveness of agricultural products got further development in the studies of M.A. Sadykov [Садиков 2002, p. 65-66] based on an innovative model of development. The essence of the model is connected with the integration of the national economy into the world economy and the introduction of domestic and foreign equipment with new qualitative characteristics on the market, the use of which will accelerate the development of resources and energy saving technologies as the most important factor of agricultural production development under the conditions of limited energy resources.

We believe that under the conditions prevailing today in Ukraine, the concept of agricultural enterprises innovative development becomes especially important. But since none of the discussed concepts cannot exist in «pure» form, during the elaboration of management mechanism of agricultural enterprises' development basic ideas of each concept should be taken into account: sustainable development, expanded reproduction and economic growth, innovative economy and entrepreneurial society.

In modern conditions of agricultural economy's development efforts should be strived on using theoretical ideas of the discussed concepts in practice. That is, to create a management mechanism of agricultural enterprises' development, which would contribute to their effective operation.

Agriculture is a specific sector. It differs significantly from other sectors of the economy that determines the features of its development. Here are the following features of the industry that have a direct impact on the sustainability of agricultural enterprises' development (fig. 2).

Thus, the management mechanism of agricultural enterprises' development includes a set of organizational and economic levers and production governors. It must meet the mission and goals of the company, along with its strategy, create conditions for activitied that have motivational value, base on scientifically-grouned management techniques, have the potential for its perfection.

Monitoring, evaluating the efficiency and controlling the goals for achieving the organizations' sustainable development are necessary for elaborating the system of appropriate indicators - indicators of sustainable development.

«Indicator of sustainable development (lat. indicator - indicator) is certain available means for monitoring and measuring characteristics, standards and conditions that allow to make conclusions about the state and changes in sustainable development» [Садовенко, Масловська, Середа, Тимочко, 2011, p. 101]. They serve as the main instrument of planning organizations' activities and decision-making.

Today common and generally accepted indicators of sustainable development are not formed. There are two research directions: under the first one new special

indicators are offered, under the second one attempts to find the integral index are made.

To determine the results of the implementation of society's sustainable development Commission agency on sustainable development of the United Nations in 1991-2001 developed a special system of 134 indicators, which, after the discussion and practical application in 2007, was reduced to 50 indicators and was in an interrelation with the system of indicators of the Millennium Development Goals.

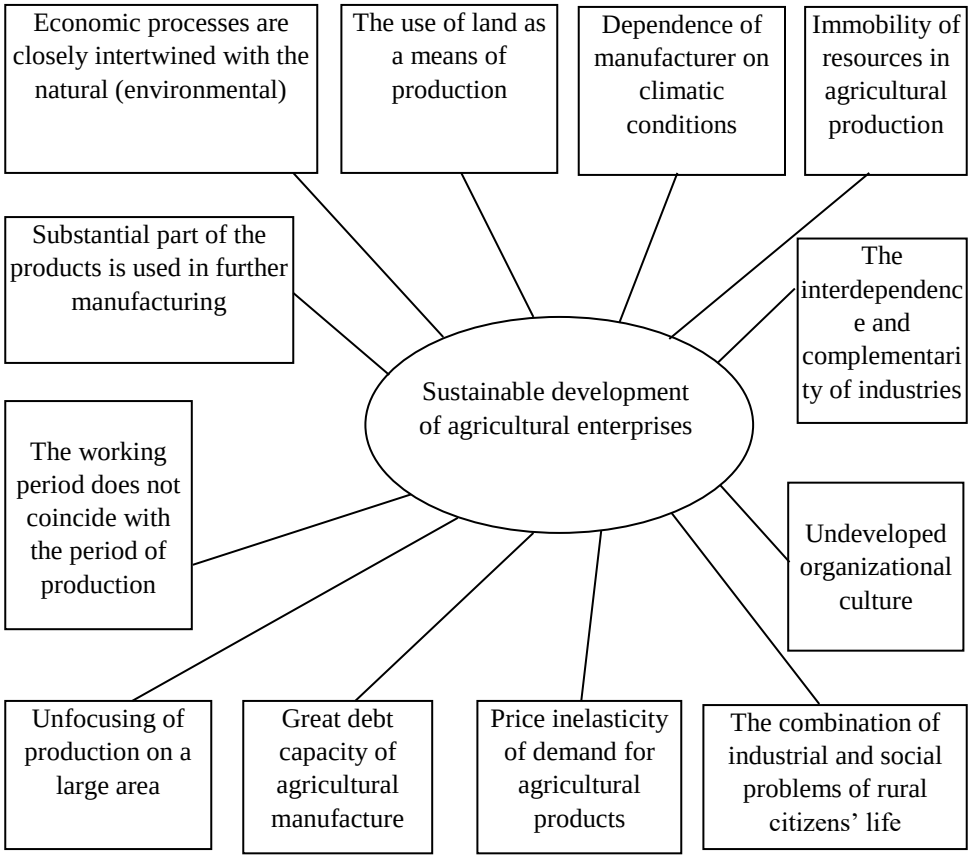

Figure 2. Features of agricultural production that have a direct impact on the sustainability of agricultural enterprises' development

Source: own work.

The main criteria developed by the European Union system of indicators of sustainable development [Садовенко, Масловська, Середа, Тимочко 2011, p. 107] were stability, flexibility and compactness, balance between the main priorities and interests of countries-members of the European Union including the consequences of

EU enlargement. According to the Strategy of sustainable development indicators are divided into 10 sectors: economic development, poverty and social exclusiveness, population aging, health, Earth climatic changes and energy, production and consumption, management of natural resources, transport, global governance, global partnership.

Lapygin Y.M. [Лапыгин Ю.Н.; www.elitarium.ru.] suggests using the following parameters to assess the development of the organization: legal capacity (degree of objectives achievement), efficiency (comparison of planned targets of using resources with actual ones), the quality of goods and services and their compliance with consumers' expectations, profitability, productivity, the quality of working conditions, implementation of innovation.

Noteworthy are the works by Ukrainian scientists on indicators of sustainable development. In particular, O.M. Zahorulkin [Загорулькін 2005, p. 19] identifies three categories of temporary criteria that characterize the economic sustainability of the enterprise: short-, medium-, and long- term.

Short-term criteria of economic sustainability include: performance as the ability to provide the required amount of services rendered in accordance with the requirements of the environment; quality as an opportunity to meet consumer demands' diversity; effectiveness as the relation of costs per unit of products to meet the needs of specific customer; flexibility as the ability to quickly reallocate resources from one activity to the other based on consumers' demand; satisfaction as the attitude of workers to the enterprise as a social system.

Medium- term criteria are competitiveness as the ability to provide necessary competitive tools in the market situation and in the industry, development as the ability not only to maintain its position in the chosen market, but also to respond to various changes if they occur.

Long-term enterprise's economic sustainability criteria reflect the survival as the ability to increase its sustainability through various activities' mechanisms of adaptation.

Shubrovska O.V. [Шубровська 2002, p. 32] proposes to assess the agri-food system sustainability by calculating the indices of economic sustainability (including integral) of system's units: food production and food market, and also its elements. The main principle of indices construction is the ratio of the current state parameters of the system to normative values, but in the absence of the possibility of obtaining the previously mentioned - to compare with the base period.

According to Perebyinis V.I. and Svitlychna A.V. [Перебийніс 2008, pp. 39-44] market environment of the economy requires the development of integral index of agricultural enterprises' development level, which will take into account not only the value of certain parameters (such as the average annual growth rate of agricultural land areas, the value of fixed assets, gross output, commodity products, net income per average annual employee, average monthly wages), but also their validity, the

calculation will not be too time-consuming, and be based on the data that can be obtained from the financial statements of an enterprise. As in majority cases it is quite difficult to speak of normative values of economic indicators, it is proposed to use the rating figures, making it easy to correlate the data from enterprises. Also when choosing indicators that will form an integral one, the necessary condition for it is the autonomy and independence from each other.

Conclusion

Thus, among the basic development concepts the following ones should be highlighted: sustainable development, expanded reproduction and economic growth, innovative economy, and the entrepreneurial society. Management mechanism of organizations' development in the agricultural sector of economy as a way to influence it in order to preserve stability, or transfer from one state to another according to specific objectives should take into account the main ideas of these concepts and provide capacity for its own growth, without endangering meeting the needs of future generations. Among the existing present studies concerning the development of indicators (parameters) of sustainable development, in our view, it would be reasonable to make more efforts towards the search of a universal rating index of sustainable development of a particular enterprise.

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Chapter 15

THE LEADER'S ROLE IN INCREASING THE MANAGEMENT EFFICIENCY OF THE ORGANIZATION

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Problem statement

To improve the efficiency of the organization, the manager must have the ability to conduct and implement innovative changes, especially during the creation and introduction of management innovations. The process of creating management innovations is quite complex and begins with identifying management problems, requiring removal by seeking new principles and approaches to its solution. Managers of all levels in the organization should be involved in this search process to form a portfolio of alternatives and select the best ideas of innovation management system. Innovation in management is a complex and ambiguous phenomenon.

Analysis of recent publications

The importance of leadership's influence on effective management of organizations was studied by such scientists as: Altman D, Bayhem V., Geyets V., Dayl D. Dilts R. Drucker, P., N. Kozak, J. Moreno, V. Novak, Filonovych S., Yukysh V. etc. As you can see, effective leadership always interested both domestic and foreign scientists. But the concretization of some issues requires further study.

The aim of the article is to study the characteristics of a leader's role and its impact on the effectiveness of management in the organization, determination of readiness of the staff to conduct and introduce the innovative changes, especially in the process of creation and implementation of administrative innovations that must be applied for the efficient operation of a modern organization.

Covering the main material

Problems of leadership are the key to achieving organizational effectiveness. On the one hand, leadership is seen as a presence of a particular set of qualities, which are inherent to those who successfully influence other people, on the other hand, leadership is a process of non-forcible influence for the organization to achieve its goals [Novak 2013, p.321].

All management functions must be ensured for modern organization to perform its tasks effectively. Leadership is the type of activity that permeates the entire

management system. You cannot effectively perform the functions of planning, organization, motivation and control if there is no effective leadership and leaders that can encourage other employees and influence them positively.

The role of leaders is particularly high in the current economic environment where you need to make decisions quickly to be able to respond flexibly to changing internal and external environment of the organization. It is often suggested that "a strong leader" can solve a significant number of problems alone.

The phenomenon of leadership is based on manager's authority. Formal, personal and complete manager's authority is distinguished in scientific literature.

The formal authority is derived from the head's rights to manage his or her subordinates, give them tasks, to demand their fulfillment, control and encourage their work. Personal head's authority is defined by a set of his personal qualities, such as humanness, tolerance, ethics, and so on. Complete head's authority or the authority of the leader, appears as the combination of formal and personal authority of the person who has a leading position.

In other words, leader is a person who enjoys undisputed authority and respect due to his personal outstanding human, intellectual or professional qualities.

It is usually considered that the leader is a manager who is able to influence others effectively and with whom most of the team wants to work.

Leadership qualities are not only determined by individual abilities to management. They can be described by the following components [Asanov 2013, p.36]:

Firstly, leader's lifestyle involves a close combination of career and personal life and biographical description that includes age, gender, socioeconomic status, and education.

Secondly, leader never stops in his development. Abilities, ambition, talent, knowledge stimulate leader to further development and improvement. His or her abilities include theoretical and practical intelligence, special skills, knowledge, competency and awareness.

In - third, the leader finds his true mission in the application of inherited abilities and acquired skills, intelligence, knowledge, talent as a means of self-fulfillment in managing other people.

Personal features that determine the effectiveness of management include: influence, self-confidence, emotional balance, stress resistance, ability solve problems creatively, the desire to achieve goals, responsibility, independence, sociability, reliability.

Despite the fact that the presence of modern management is an essential component of effective management, innovative leaders are not always effective managers. Sometimes effective leadership may interfere with formal organization [Kozak 2000], and, on the contrary, being a manager does not automatically mean that you'll be considered as a leader, because leadership is largely characterized by an informal basis. You can occupy the highest position in the organization still not being a leader.

Very often the manager believes that effective management is possible only while occupying a high position. Governing position does not make leader from a person automatically. If the manager runs only from the position of his post, then workers will follow him only because they are forced to do so as a part of his official duties. Overcoming this problem is possible by establishing connections with employees who are not directly subordinate to him. Manager needs to treat them with respect and dignity, appreciate as persons, show interest to their personality, not just to their work, then they will begin to trust him. Thus, the circle of his influence will expand.

Frequently experts say that the requirements that are applied to managers and leaders are contradictory. Their differences are at the level of subconscious conceptual ideas about chaos and order. Managers prefer order, stability and control, rapid problem solving, often not fully mastered the lesson that it provides. The leaders, in contrast, are willing to tolerate chaos and lack of order and can delay the solution of a question until it is properly considered. It is believed that managers do everything correctly, but leaders do the right things.

Nowadays, in most organizations there is too much management and the lack of leadership. Therefore, successful organizations are actively looking for people with leadership inclinations and build their careers in the way to develop their existing potential. Naturally, by careful selecting for training and adequate encouraging many people can become business leaders.

However, it should be noted that strong leadership combined with weak management is not always more effective than weak leadership and strong management. That is, the main problem is to combine strong leadership and strong management and take advantage of each mechanism to compensate the shortcomings of the other. Of course, not every person is able to be both a good leader and a good manager. So strategically focused organizations are trying to attract to their teams workers of both types [Dale 2007, p. 30].

It should be noted that quality is the key to efficiency and competitiveness of organizations. In this regard, there is a necessity leaders-innovators. Innovative leadership is connected with the regular transformation in organizations, relevant rapid social, economic and technological changes. Innovative leadership appears where managers are able to constantly change and adapt, and it is connected with the activities of managers, whose duties include the development and implementation of corporate administration concepts of innovation, motivation and support of subordinates during the difficult transformation [Dyachenko 2009, p. 25].

Some experts noted the change guidelines in this matter: instead of already familiar TQM (Total Quality Management), they begin talking about the advent of TQL (Total Quality Leadership): overall leadership based on quality.

Let’s stop on management innovations in more detail. It should be stated what namely distinguishes them from technological and industrial innovations, making the process of their creation unique. Technological innovations represent a combination of

knowledge that can be organized, as a combination of several physical processes or products, and can be relatively easily reproduced. Managerial innovations are more specific.

They are characterized by the influence of external agents - scientists, consultants, management experts who define the essence of innovation, form them, while the implementation of new management ideas can last for several years. In the case of a positive result administrative know-how is commercialized by independent consultants who promote it on the market as and repeat it as a successful experience. The model of appearing and developing innovations in management can be described by the following stages: awareness, development and formulation of ideas, its recognition.

In most cases, management innovations arise from the need to address certain external or internal problems in the organization to solve these problems to avoid the situations of threat, dissatisfaction. It should be noted that innovations in the field of management are local, that is, their implementation experience in one company may not be good for another, and also because of differences of foreign and domestic corporate culture and business specifics in case of using some "ready-made recipes." The uniqueness of each enterprise necessitates modifications and corrections of ready management decisions or requires a fundamentally new design that would combine various elements of the problem and options to solve it, a clear understanding of the internal and external environment of functioning. So, for the first phase it is typical to study the goal, which is developed to achieve innovation.

For administrative innovations there is a greater risk of resistance from the staff, the rejection of new ideas than for the production process. To support the innovative solutions the approval from the employees of the organization (internal recognition) is necessary, and also understanding of the viability of the idea of the possible benefits of its implementation, as well as it may be necessary to the approval of independent observers and experts - business school professors, consultants and others. (external recognition).

Solving the problem of the implementation of management innovation in organizations requires the development of an appropriate system of innovation activities' management, which is based on appropriate, in our view, ideas of decomposition of complex processes based on project approach and creation a kind of management "assembly line." As mentioned, the foundations of innovation most organizations are not defined and therefore not formalized, the implementation of each management idea requires the conducting of a significant amount of work, which greatly complicates the implementation of new ideas. The definition of the main functions and tasks of each department and the workers in the course of innovation, work rules and setting up the appropriate document circulation, and others will form a foundation for the implementation of innovations that in each case will only be corrected.

Thus, despite the fact that management innovations are integral part of organizations' activities and guarantee their competitiveness, the implementation of such innovation by domestic enterprises is complicated by a number of problems. In particular, the direction of further research is determined by the need to create adequate procedures for the development and implementation of management innovations [Illyashenka 2005, p. 345].

The implementation of management innovations requires a leader-innovator who successfully performs transformation activities has certain characteristics of activeness: supports changes, showing courage; believes in the abilities of employees; is able to form and defend the values change, can recognize his own mistakes and take lessons from them; is able to provide leadership in complex, uncertain and ambiguous conditions; sees a picture of the future and can describe it clearly.

It is important to understand that in today's unstable economic environment, where there is a constant struggle of organizations for a leading position in the market, innovation is the key advantage that makes it necessary to find mechanisms for directing internal environment of the enterprise, to create a systematic management of innovations.

Based on the above mentioned, let us emphasize on the importance of innovative changes in the modern organization. Their successful performing will be the key to successful leadership.

During the implementation of changes the major problems arising are the attitude of workers to the change and the behavior of managers of different levels. Analyzing the studies of some scientists we will present the main conditions to be followed by leaders to solve these issues:

1) creating a sense of extreme necessity;
2) modelling desired behavior and roles of managers during the implementation of changes;
3) using enforcing mechanisms (the improvement of the system of motivation);
4) developing the skills necessary for managers to implement changes. Such education should be based on improving the technical abilities under the conditions of changing basic thinking (mentality) of the manager that prevents from full using technical abilities.

In order to motivate people to change, leaders must be convinced that the management still follows the course of the given change. And the greater the change is, the higher is the need for leadership.

Summarizing the results of foreign and Ukrainian researchers concerning the implementation of changes in the process of creating administrative innovations the following directions of interaction between employees and management, which can be offered to modern organizations, are distinguished [Yukish 2014, p. 98]:

– the form of experimental model, which is to create a temporary model where all innovative ideas can be tested by means of experimental verification, all the

participants can watch the experiment and express their wishes, corrections and proposals;

- the form of periodic meetings, providing internal communication in organizations that are both held as general meeting (where are all employees are present), or administration meetings, where the main problems, including the issues of future developments and improvements of the company's functioning are discussed;
- the form of internal cooperation, which allows you to create union of workers (usually this happens in departments or according to position ranks), where the existing problems are periodically discussed, proposals for their solution are suggested, and recommendations on qualitative changes in the next period are provided; thus, the questions concerning innovation at the enterprise are approval and internal discussions are held;
- the form of corporate social networks, which is a communication of personnel in the information space with the help of software, which one can be freely interact at a distance and hold various types of the conferences, allowing quick access to internal information. It also allows the management to record comments and suggestions of all employees to conduct surveys on various projects or changes in the company.

Each of the above mentioned forms of interaction leads to further improvement of management systems (creation and implementation of management innovation) through joint problem solving, and taking into account suggestions and wishes of both sides.

To use this or that form of interaction between in the organization and its further effectiveness of work the important aspect is the availability of the necessary preconditions for effective selection of the method of interaction.

These methods include:

1) the method of individual approach, which presupposes finding creative people among the staff, and creating all the necessary conditions for their innovation activities;
2) the method of "overcoming fear" makes it possible to create a loyal, democratic environment in the collective of enterprise, giving the staff free opportunities of take action to solve local problems, opportunities sometimes to take a risk; overcome their fear to be "not like all people" and encourage to express their own ideas and criticism:
3) motivational method reveals the relationship between the initiative concerning creating innovations, interaction with management and efficient policy of incentives for workers. This can be both a financial incentive (bonus, premium, etc.) and non-material (training, attending branch conferences, workshops, etc.)
4) innovation culture method, which is aimed at creating "working spirit" in workers, a sense of loyalty to the enterprise, the desire to improve it and develop it.

Summing up, it should be noted that for achieving the effectiveness in the creation of innovation management it would be appropriate to combine these methods and apply them by stages.

The main point in the application of these methods is balancing between the risk of democracy turning into anarchy, but at the same time to act in such a way that people were satisfied - this will result in the expected outcome.

Taking into account all the above mentioned, I would like to draw attention to the need of education and development of leadership qualities of managers. To achieve this, some organizations conducted various trainings and seminars.

In particular, the personnel policy of "General Electric" is called – "Leadership in each." The management of the company believes that leadership – an innate quality which is practically impossible or extremely difficult to obtain. So, much attention is paid to the selection of personnel, and precisely through special means of assessing the leadership potential. The essence of this assessment is that person is tested in stressful conditions, where the real qualities of the applicant are revealed.

In addition, each year the company General Electric employees undergo place testing according to the system "360". It is to identify leadership qualities in employees in the workplace. The employee is assessed according to 40 criteria by all the categories of people with whom he or she collaborates (client, manager, colleagues and subordinates). As a result, workers are divided into three categories: A, B, and C). Representatives of categories A and B (the most successful) are sent to various trainings and Representatives category C must be dismissed.

It should be noted that this evaluation system allows you to identify the source of problems in managers' work and ways of their elimination. Also, employees become more open and frank. Such trainings are necessary even from the standpoint of the ability to think independently, improve climate in the organization, which will help facilitate the implementation of changes [General Electric: great ideas into brilliant performance. - Mode of access: http: //www.management.com.ua/bp/bp011.html].

Based on an analysis of staffing changes applied practically it is possible to identify the main effects from education of leadership qualities in employees:

1) decrease subordinates' fear of leaders;
2) increase the level of initiative and creativity; deepening the ability of workers and managers to analyze their successes and failures; the ability to find solutions to the development of unforeseen problems;
3) deepening and development of professional skills of each employee;
4) increasing the interest of middle managers in organizational development.

Conclusions

Organization without a leader is doomed to decline. The application of the program on leadership skills training aimed at developing effective management and stimulation

of employees with high leadership potential to the initiative on improvement activities is an imperative requirement of successful modern organizations. The leader, who has a conservative view of the world and in his work, has fear of changes and innovations, cannot bring organization on the new level of development. So, leadership is a key element in the implementation of innovative changes, especially management innovations.

So, the creation of administrative innovations in the organization – the system of interrelated organizational elements to change management, technology, management methods or management approaches is the key to increasing the efficiency of management in the organization.

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Chapter 16

INFORMATION SYSTEMS AND TECHNOLOGIES IN LOGISTICS – THE EXAMPLE OF THE „X" COMPANY

Kozerska Monika

Logistic information system of an enterprise

Management efforts require different concepts, methods, motivations, specialist knowledge and imagination, etc., although acquisition of current information is the most important in the process. If enterprises want to develop and build their strong competitive position in the market they have to collect adequate information, process and use it correctly [Dwiliński 2006].

Information may be acquired externally or may base on internal sources as research, ratiocinations, innovative ideas, research and development workings, plans, statistics, etc. Creation of information as well as its acquisition from research, expert workings, etc. are not indicated as tasks for logistics in enterprises, although they must be recognised as integral processes of value creation procedures at stages of products and services preparation for markets [Dwiliński 2006].

In an enterprise need for information results in creation of adequate information system that should include [Ficoń 2008]:

- sources of information,
- points of data processing,
- channels of transfer,
- users at different stages.

Creation, adequate interpretation of information and its transmission to users are logistically supported. Moreover logistic efforts include assurance of information transfer between an organisation and its environment, but also internally. The information usually flows two-way but the types of information that are transferred one way and the another differ. Logistics activities in the area of information include [Dwiliński 2006, p. 123]:

- ordering and provision of means to create, collect, process, transfer, archive and disclose information within an organisation,
- exploitation of information and IT technical tools,
- support of the process of communication with employees by creation and transfer of messages,
- support of information usage in an organisation,
- creation of central database to manage an organisation, as well as databases to manage its departments alternatively; the databases updating and protection,

– improvement of an enterprise and implementation of logistics in information area.

Information flows start and attend different stages of goods and services flows in production systems. Production systems are defined as purposefully designed material, energetic and information arrangements that are exploited and attended by people to produce goods and services to satisfy customers' needs [Michlowicz 2002].

Information flows are extremely important in organising and functioning of delivery chains. The flows link all main elements of logistic systems. This integration of information flows results in higher effectiveness and openness of logistic systems. Moreover the systems can easier overwhelm barriers that appear in processes of transfers. This way organisations, including the virtual ones, may adjust to requirements and changes in their environments more effectively [Szymonik 2012].

It may be assumed, that the following elements are the most important when integration and complexity of information transfer processes in the logistic systems are discussed [Szymonik 2012, p. 161]:

– integration of systems,
– unification of partial functions of the systems,
– assurance of accessibility of databases for each organisational unit,
– sharing ways of visualisation to assist analysing, decision make processes and their communication.

Information must not only be created, gathered and communicated but it needs to be used first of all, what requires information processing, selection, tabulation, and collation in forms of messages. Moreover a staff should be provided with information they need in adequate time. These functions can be indicated as activities of logistics in the area of information. They all may only operate basing on central databases or on databases created by organisational units or departments [Dwiliński 2006, p. 124].

Integration and complexity of the logistic systems must accommodate relations with its environment to join its all functional levels within internal and external environment more effectively [Szymonik 2012, p. 161].

Internal environment of an organisation includes all elements of its inside where the particular system is operated. The following elements of the system may be indicated [Szymonik 2012, p. 162]:

– structure of an enterprise's management,
– executive and managing staff employed,
– learning skills and improvement of the whole organisation,
– conducted research and development initiatives,
– the range of new technologies' usage,
– ability to manage trust in business,
– organisation of sales and other forms of trading,
– marketing tools applied,
– supplies and materials management,

– financial resources and dynamics of their rotation,
– financial and accounting departments,
– methods and forms to manage production systems.

External environment of an organisation contains of not only national or regional economy systems but also of other elements, including [Szymonik 2012, p. 162]:

– the level of technology, distribution and services,
– accessibility of internet,
– the level of modernity and quality, as well as prices of machineries and other production appliances,
– the banking system,
– production abilities of providers,
– infrastructure (communication, roads, airports, etc.),
– areas and possibilities for competing,
– economic condition of a state,
– energetic factors (electricity, water and heat supplies, solid fuels and gas),
– national legislation concerning economy,
– social and political environment,
– natural environment,
– methods and forms of management as well as control over production by central authorities.

Furthermore it means that [Szymonik 2012, p. 162]:

– comparisons of production systems that seem similar may result in erroneous assessments and conclusions if environmental conditioning of the systems is not considered,
– production systems may collaborate effectively only if they operate in similar or identical environments,
– the first and the second degree systems should be analogous in main parameters of their functioning to achieve sought effects of production within the production system that is analysed.

The tasks that logistic is expected to achieve in the area of information creation are very complicated. Their realization require knowledge of individuals, who would use the information, and about their needs. It also require skills to search for necessary data and its further appropriate processing. Logisticians should undertake their tasks creatively, hone their implementation, indicate possibilities to improve logistic information systems and to improve an organisation as a whole [Szymonik 2012, p. 162].

To collect and to proceed data the way that enables its usage to undertake effective logistic decisions, as well as information sharing after it is recaptured are the main goals of the logistic information system.

Logistic information systems enable continual accessibility of reliable and current information for supply chains.

Characteristic of a logistic information system

Logistic management relates to acquisition, gathering and proceeding as well as transmission of large amounts of information. To fulfil information needs of management functions an information system that assures continual accessibility of current, reliable and actual information is expected to be designed and introduced [Szymonik 2012, p. 163].

An information system consists of elements and connections between them that enable transformation of original, obtained information into the final one that is useful and expected by different models and procedures [Dwiliński 2006, p. 125].

While preparing the information system it is necessary to fulfil the following requirements [Szymonik 2012, p. 163]:

- the system should cover all areas of functioning of an enterprise and should be adjusted to needs of all levels of management;
- the system should provide all people who demand information with it, in the range that is expected, and in the form that enables its usage without necessity of any further processing;
- the system should offer updated information;
- the system should assure adequate intensity of information circulation;
- the paths of information flows should be the shortest realisably;
- the way of information creation should assure possibility to track production of offers, their distribution and selling, realisation of feedbacks, indication of economic assessments and anticipation of future activities;
- costs of information acquisition should be significantly lower than cost of results of their implementation;
- the system should be protected from unauthorised users and constantly improved.

The information system is formed by information streams that combine executive elements of the logistic system with a management system, as well as by sets of procedures for information proceeding [Szymonik 2012, p. 163].

There are many advantages of introduction of the information systems in enterprises when logistic perspective is considered. Among them the following may be indicated [Szymonik 2012, p. 163]:

- synchronisation of supply, production and distribution processes,
- production according to a reported level of demand (pull model) instead of production for storage (push model),
- improvement in the area of customer service,
- higher level of trust due to effective communication between entities in supply chains,

– possibilities to use electronic signatures, systems of data protection and certification, as well as standardisation in e-businesses,
– reduction of the level of stock held,
– reduction of costs, especially the ones relating to transport and storage,
– improvement of deliveries' promptness, as well as reduction in number of erroneous orders,
– curtailment of documentation.

Formally, the information systems may be: traditional or may base on information technologies. Because of the fact that logistic management bases on proceeding of large amounts of data though, the logistic information system should use information technologies.

The level the systems are saturated with computers or other electronic devices and the level of computerisation of the systems may be different. The computerised system is defined as a part of the information system, while its structure is detail analysed (computers, networks, software, transfer, etc.) [Dwiliński 2006, p. 126].

The computerised system mainly consists of:
– employees of computer support system (managers of computing centres, operators, IT specialists, maintenance personnel, programmers, etc.);
– IT equipment (central units, monitors, output and input appliances, auxiliary storage, data storage media, etc.);
– installed and stored software;
– databases containing information stored at electronic storages;
– communication appliances (phones, electronic mail, etc.).

Adequate introduction and usage of IT tools and techniques supporting logistic information systems influence higher effectiveness of an organisation's functioning that may result in [Szymonik 2012, pp. 163-164]:
– improvement of performance,
– improvement of quality of production,
– improvement of level of customer service,
– reduction of costs and improvement of competitive position in the market in consequence.

Information technologies are used to support many logistic functions. Among them the main ones may be indicated, that use common data bases [Szymonik 2012, p. 164]:
– scheduling of production,
– planning of materials' supply,
– customer service as well as communications that should be aimed at improvement of relations between customers and suppliers,

- planning and manoeuvring aimed at preceding of customers' expectations as well as monitoring of physical flows within an organisation to indicate the moments where inconsistencies with the plan occur,
- coordination that is aimed at making all logistic activities joint to create one, coherent system.

The quality of information depends on methods of its proceeding as well as on the ways in which data is presented. The subsystem of data proceeding is aimed at evaluation of information based upon its importance, its separation from different types of noises and overflow of unimportant information, sorting of information and its proper presentation [Szymonik 2012, p. 165].

The following applications may be indicated as the most popular ones when advisory systems of logistics are discussed [Gołembska 2001]:

- the matter of own production or purchase,
- production planning, including assortment composition, planning of production floors, creation of materials' flows, indication of tasks for production machinery, reduction of stocks level in work in progress,
- supply of raw materials planning, including decision on a supplier, anticipation of sales level, planning possibilities of materials' and parts' substitution,
- customer service including identification of needs and expectations of clients,
- estimation of demand level – its time and spatial dimensions,
- planning of distribution including indication of distribution channels,
- planning of localisation of warehouse facilities including estimation of their sizes and number,
- warehouse economy, including planning of warehouses' space management, estimation of receptions and removals, estimation of stock allocation,
- stock management including estimation of the safety stock level,
- modelling of distribution networks including location of logistic centres, warehouses, transport bases, road and rail hubs, configuration of connections between them,
- configuration of cargos including location of products in cargo units,
- management of transportation including configuration of ownership of a transport fleet, selection of a branch and a carrier,
- management of the transport fleet including designing connections between the fleet and orders, the fleet and staff, managing the process of the fleet refurbishment,
- planning of transportations, including planning of the cargo movement as well its completing, and planning of its flows.

The logistic information system enables effective integration of numerous functions of logistics management. It also influences synergy of logistic efforts. Additionally its strategic character may be discussed. When the system is designed and introduced it should support an organisation's strategy and implementation of organisational goals.

Electronic stock exchanges and their types used within the X company

Each adequate usage of information technologies in logistics contributes to growth of effectiveness of its support palpably.

Electronic logistic is one of the key areas of electronic business. There are several elements that may be pointed out as specific for e-logistic. Among them, the following may be indicated [Wieczerzycki 2003]:

- concentration on products and services that are tangible;
- immense importance of the ERP systems, that are indispensable to run a modern organisation in more and more demanding and competitive market;
- effective, reliable and automated to a great extent (what means that it does not need to rely on employees as intermediaries) communication, based onEDI standards or ebXML for example;
- usage of more or less specialist mobile devices (for example: PDAs – Personal Digital Assistants) and wireless telecommunication;
- usage of devices for automatic identification, for example: barcode scanners, RFID scanners, as well as telemetric devices;
- common usage of global satellite navigation systems, for example: GPS;
- multi-criteria support in the process of numerous resources division (human resources mainly) and other logistic activities.

The X company started operating in Poland in 1994. The company is a worldwide leader in systems' technologies and provider of electronic products that are widely used especially in automotive and telecommunication businesses. Modern technological solutions that the company provides, such as air conditioning systems, engine management systems, electronics, may be found in many types of vehicles all over the world.

The X company uses a potential of electronic stock exchanges. The following forms of electronic stock exchanges are used by the company [Wieczerzycki 2009]:

- **WebPages.** After users' registration web pages offer them access to databases where customers may look through different offers and also submit their own offers. Exchange of information takes place through www pages, usually made at the request of servers. The services of that type are usually paid. Typically registration of users is associated with the procedure of fee payment. Moreover the time of registration is limited what requires refreshing of registration that causes charging of succeeding fares. Less often customers are charged for exposure of information about chosen service providers that were indicated basing on selected criteria of searching defined by them. The exchanges available in the form of web pages are advantageous because of many reasons. Their exploitation requires usage only of a web browser. Their structures are mostly quite transparent, and therefore, the internet users used to searching for information in many places in internet, can relatively quickly learn how to navigate at the web pages of the exchanges of that

type. At the same time that type of services have also some disadvantages. Firstly, effectiveness of usage of a stock exchange in the form of a website requires a lot of bandwidth to exchange information with the servers as well as long connections necessary to look through web pages of all potentially interesting providers. Practically it means necessity to provide an organisation with fixed internet connection what relates to some additional costs that cannot be ignored especially in case of small enterprises. Secondly, usage of different web pages of stock exchanges means that users need to adjust to many ways of navigation between different web pages, many ways to seek for information and ways to present information. That inconveniences may be indicated as a consequence of the fact that there is not any standardised system how to create electronic exchanges in forms of web pages, so each of the web page has its own structure, architecture, functional and graphic specification. As a result, offers presented at two different web pages are difficult to be compared, because they differ so much in areas of their structure, as well as in content downloaded from the web pages;

– **Off-line databases**. Users use an application on their computers. The application is provided by an organisation that offers that type of services. The application enables browsing different offers and submission of new ones. It may also be used as a mean of communication. After a computer is connected with the server of the stock exchange, data transfer begins. The database is updated. Usually the offers that interest the user are the ones that are updated. At the beginning customers of the exchange may look through different offers that are put into local databases without necessity to connect with internet. When adequate offers are not found or if the local database has not been refreshed for a long time and uploaded with current offers, the user may connect with the remote server at the second stage. The third stage includes assignation of new offers by a server, what means indication of the offers that have been submitted since the last visit of the customer. At the fourth stage, new offers are filtered by the server to make it possible to indicate the ones that the user may be interested in. Then, at the fifth stage, the filtered offers are send via internet to local database and they are expanded informationally. The last stage, that is preceded by disconnection with internet, includes another off-line browsing for offers among the updated database records. That type of exchange has one main advantage – the requirement of internet communication is limited what lowers the costs of the exchange usage. Connections with internet are short and rare, once a week for example. Servers “remember” preferences of unique users what can be indicated as another advantage of the exchange. This way local databases are expanded with offers that may interest the user but not with all that have been published. As the result operating at the platform is much faster and seeking for interesting information much simpler. But also some disadvantages of the off line databases may be indicated. First of all the local database is a historic presentation of an appropriate server for most of the time. It does not include the

newest offers and some of them are not available any more. Secondly, the local data is a type of software that must be purchased and installed in a computer of a customer. In other words, using of that type of exchange is quite often connected with high costs of purchase of adequate software. Moreover, although quite rare, it is possible to be charged for uploading the offers from servers. Thirdly, when customers want to use different stock exchanges at the same time, basing on the rules that were presented and discussed above, they have to purchase and install different software products, i.e. local databases compatible with remote servers. It makes the costs of electronic stock exchange usage higher, as well as comparison of offers provided by different producers more demanding. It may be observed that offers that come from different off-line stock exchanges may have different structures and contents, similarly to the web pages that were presented above.

- **Mailing lists** is one of the oldest group of options for the stock exchanges. Using electronic mail customers exchange their offers. Users who are interested in access to a stock exchange have to send an e-mail to members of a group to subscribe communications about all new offers that occur within the group. Producers submit their offers in asynchronous way using e-mails. Generally it is possible to send the offers through www web page of a server. There the access paths for files, where new offers have been published, are indicated. When a new offer is submitted, the stock exchange that operates in a form of server of electronic mail, sends the copies of all received offers to all registered users, who subscribed communications, straight away. The offers are uploaded at the moment when users open their mailboxes. Thus after email browser or any type of www pages browser, that enables access to a mailbox, are started. That type of exchange may be characterised by its one main advantage that some of entrepreneurs may find quite important – these types of services are generally offered free of charge. It has some significant disadvantages though. First of all, all the users receive all the offers that have been submitted to an e-mail server that manages the service. Most of the offers are obviously not interested to a particular user but there is no option to precise preferences, as it could be done in case of off-line databases that were presented previously. The second disadvantage of the product is the fact, that these types of stock exchanges are rarely moderated. Offers in forms of e-mails are received and forwarded, and some of them are not even related to the topic of the stock exchange (for example spam). Another serious problem of the stock exchange in that form concern the fact that offers in forms of e-mails sent to group members are not structured in any way. Each of them include different contents and ways of their presentation. That makes the process of analyzing and comparison of the offers much more complicated for a user.
- **Instant messengers.** The stock exchanges that have occurred in internet, and that function in forms of so-called instant messengers, may be indicated as the newest

products available in the analysed area. They function similarly to programs like Gadu-Gadu, Tlen, MSN Messanger or ICQ. They enable conducting of conversation in real time (in the form of exchange of communications), synchronically, with many users at the same time. The conversations may include presentations of business partners or potential partners. All users of the messenger have their own, unique identifiers. The messenger enables archiving of the conversations that were conducted, remembers communications that were send to other users at certain time even when they were not available. Those messages are presented to the users as soon as they start the messenger. Moreover the program enables grouping and flirting of partners for conversations as well as rejection of the ones who we are not interested in at the moment. It is also possible to hide our presence from the users or groups of users that we do not want to contact with. Stock exchanges in forms of instant messengers are complemented with elements that are characteristic and expected in certain industries that the stock is dedicated to. For example, in case of transport stock exchanges, the element of express reporting to certain group of users on new available transport means or loads may be included, as well as tables containing data on new offers of loads and vehicles proposed by the users of the system. There is no doubt that the possibility to conduct conversations in a real time is a main advantage of the instant messengers. There is no need to use other communication channels and current monitoring of offers that are being published. Secondly, instant messengers are usually available free of charge and their installation is not very complicated. Fares, if any, are usually charged in forms of subscription fees, and they are usually connected with unveiling of additional information and address details of an enterprises or its representatives which offer a user found interesting. At the same time the stock exchange in form of the instant messenger may be mainly used by enterprises and individuals that are not operating within the branch of business that is interesting for a particular user. That aspect is one of disadvantages of that form of a stock exchange because it results in creation of unnecessary communication noise. Moreover, in situation when free of charge instant messengers are vailable, it may be observed that the risk of getting involved in cooperation with unreliable and deceiving contractors is higher unfortunately.

Reassuming the discussion on usage of electronic stock exchanges by the X company the assumption that the usage of that type of exchanges influences communication with customers positively, can be made. It enables browsing of offers of other producers and publishing of own ones. Accessibility of databases influences faster transfer of information and an enterprise is able to respond to needs raised by markets more effectively. Instant messengers and mailing lists are the most frequent types of stock exchanges used by the X company.

Conclusions

Considering the fact that each type of business is connected with information that may be revealed and may be spread in all possible directions because of new technologies usage, the situation of nowadays enterprises has changed dramatically. Soon the whole business environment may also be significantly changed and transformed because of that. The physical structures in forms of warehouses, buildings, machineries, supply systems or distribution networks, that have been created and built for years, may turn out to be unnecessary and nothing but costs generating units. Nowadays competition may emerge in internet at any moment and from anywhere.

Usage of information systems and technologies in logistics has generally changed functions and structures of traditional enterprises. It also become possible to create new ways and forms of performing of all process at the level of an enterprise as well as in case of external relationships.

Instant development of worldwide communication and logistic systems caused the situation that purchase and sales processes have become global. A company of the future is more and more frequently reckon as virtual organisation that is a modern form of cooperation in internet.

Information and storage mediums have become one of the most fundamental resources of organisations and one of the most important tools to manage an enterprise of a future.

Increasing importance of information resources is incomparably faster than in case of any other resources of an enterprise. It is equally important in logistics of the X company.

Basing on results of research conducted on assessment and analysis of information systems and technologies introduced in logistics of the X enterprise it may be assumed that they are very effective and they positively influence functioning of the company.

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Chapter 17

INNOVATIVE ACTIVITY AND INFORMATION TECHNOLOGY IN THE CONTEXT OF DEVELOPING RURAL ECONOMY

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Introduction

The global economy and particularly the necessity of change forced the broad perception of innovativeness on enterprises. The variety of notions, types and criteria have led to the situation whereby as in the case of entrepreneurship [Illés, Dunay, Jelonek 2015, s. 48-58], almost every action may be termed innovative. An innovative enterprise however, should fulfil certain requirements in order to create an innovative economy. In particular, it should run activities with a large market potential, which in present times is dependent on the Internet in the majority of cases. The global communicative network [Dudek 2000, s. 515-520]. facilitates transmitting the latest information [Brzozowska, Nowakowska 2009, s. 53-58] in a rapid and direct way, constituting in the majority of cases the output data for further analysis. The situation in rural regions is seldom identified with the global economy, yet enterprises frequently choose rural areas as a place of production with regard to the practical skills of the labour force and the cheaper costs of living [Sałek, Wiśniewska-Sałek 2012, s. 17-28]. This paper attempts to evaluate the dependencies resulting from access to the Internet, as well as its impact on the magnitude of outlays on innovations in rural areas, as well as analysis of the magnitude that is characteristic of an innovative and computerized economy in rural areas.

The results of research were acquired from the data available on the website of Głównego Urzędu Statystycznego (Main Statistical Office) [http://stat.gov.pl]. Analysis and comparison of the research results relates to the annual data with a distribution of the provinces of Poland in terms of the rural communities in the years 2009-2014 in the following detailed categories:

1. Analysis of the dynamics.
   - phone connections of the main operators - encompass the standard main connection increased in number in the available ISDN.1. The notion "standard main connection" matches the notion used until 1999 of the "licence-holder of cable telephony" (namely, the entity is the party to the agreement on the provision of telephone services with the operator). 2. ISDN – digital telephone network with the integration of services enabling the use of the same network for the transfer of sound, picture, fax, data (number of terminals) [Explanations for the sub-groups are provided on the following website: http://stat.gov.pl],

- industrial enterprises that incurred outlays on innovative activity according to the size classification (magnitude of outlays in thousands of PLN),
- newly-registered entities in REGON (Business Identification no.) according to the section PKD 2007 (Polish Classification of Business Activities - number of enterprises),
- entities deregistered from REGON according to the ownership sector (number of enterprises).

2. Analysis of dependencies
   - industrial enterprises that incurred outlays on innovative activity according to the size classification (percentage notion).
   - utilization of ICT in enterprises (percentage notion). Objective scope: possessing their own website; for which a website fulfils the function of presenting catalogues, goods or price lists; receiving or submitting orders via computer networks – website, EDI system type.

The particular divisions were carried out on the basis of the cohesion of the interpretation due to the identical units.

Index method as the quantitative method facilitating the evaluation of variability of the factors analysed

Analysis of the gauges of dynamics [Nowak 2001, pp. 31-34], indicates the direction and intensity of changes taking place in the phenomenon analysed within a specific timescale depending on the period chosen as the base period. With regard to adopting such criteria, two types of gauges are distinguishable:

- of a constant basis;
- of a fluctuating basis.

Single base gauges of dynamics, utilized for the definition of changes to the level of the phenomena in the following consecutive periods (x_t), in juxtaposition with the period adopted.

Chain gauges of dynamics, utilized for the definition of changes to the level of the phenomena in the following consecutive periods (x_{t-1}).

The gauges are featured in a dual fashion as follows:

- **growth**, presenting the variability of the phenomenon in the period under analysis in the context of its relation with the level of the period adopted as the base period:
  - ***absolute*** – dimensional quantity, defines how many units underwent change in their levels in terms of the phenomenon in the period under analysis (x_t), referring to the level of the phenomenon in the base period (fundamental) (x_1);

    Absolute fixed based increase

    $$\Delta x_{1t} = x_t - x_1 \qquad \text{for } t = 1,2,\ldots n \qquad (1)$$

    Absolute chain increase

$$\Delta x_t = x_t - x_{t-1} \qquad \text{for} \quad t = 2,\ldots n \tag{2}$$

- ***relative*** – define the percentage value of change in the period under analysis with relation to the base period;

  Relative fixed based increase

$$w_{1t} = \frac{x_t - x_1}{x_1} \cdot 100 \qquad \text{for} \quad t = 1,2,\ldots n \tag{3}$$

  Relative chain increase

$$w_t = \frac{x_t - x_{t-1}}{x_{t-1}} \cdot 100 \qquad \text{for} \quad t = 2,\ldots n \tag{4}$$

– **index**, illustrate the relations of the phenomenon in the period under analysis as well as the base period:

- ***individual*** – estimation of the percentage value of change in the base period (x_1), which constitutes part of the level of the phenomenon in the current period;

  Individual fixed based index

$$i_{1t} = \frac{x_t}{x_1} \cdot 100 \qquad \text{for} \quad t=1,2,\ldots n \tag{5}$$

  Individual chain index

$$i_t = \frac{x_t}{x_{t-1}} \cdot 100 \qquad \text{for} \quad t=2,\ldots n \tag{6}$$

- ***aggregate*** – create the possibility of carrying out analysis of the phenomena that are connected with each other bearing in mind value, price and quantity.

Medium-term tempo of change refers to the analysis of the whole timescale of the phenomenon analysed in terms of its averaged value.

$$\overline{w} = \overline{\imath} - 100 = \left(\sqrt[n-1]{\frac{x_n}{x_1}} \cdot 100 \right) - 100 \tag{7}$$

The practical utilization of the gauges of dynamics containing the calculations of the medium-term tempo of change presented in Table 1.

The number of telephone connections relating to all the operators in rural areas indicates a downward trend. On average, in annual terms the most decreases were registered in the province of podlaski with a level of -17.47% while the lowest decrease in the province of opolski where it amounted to -6.98%. The value of the highest singular growth in the number of links in comparison with the base year (2009) was in the province of łódz at the level of 4,830 (2009/2010), which constitutes an increase of 4.34%, while in turn the lowest -90,313 (2009/2014) occurred in the province of mazowiecki. In the province of wielkopolski the highest growth in the number of links was noted in comparison with the consecutive years with a level of 8,766 for the period 2013/2014, which constitutes an increase of 11.38%, while the

lowest in the province of mazowiecki with -33,890. In percentage terms, the largest decreases occurred in the province of łódz, in a single base notion of -53.73% (2009/2013), as well as in the chain notion of -42.31% (2011/2012).

Table 1. Medium-term tempo of change in the years 2009-2014

Provinces of Poland	phone connections of the main operators	industrial enterprises that incurred outlays on innovative activity			newly-registered entities in REGON	entities deregistered from REGON
		10 - 49	50 - 249	> 250		
ŁÓDZKI	-0,131	0,150	-	-	0,016	-0,133
MAZOWIECKI	-0,115	0,043	0,046	-	0,046	-0,082
MAŁOPOLSKI	-0,101	-0,125	0,216	0,112	0,031	0,105
ŚLĄSKI	-0,121	0,172	-0,016	-0,018	0,011	-0,021
LUBELSKI	-0,145	-	-	-	0,050	-0,001
PODKARPACKI	-0,093	0,711	-0,021	0,179	0,022	-0,012
PODLASKI	-0,175	-	-	-	0,052	-0,100
ŚWIĘTOKRZYSKI	-0,136	-	-	-	0,047	-0,038
LUBUSKI	-0,119	-	-	-	0,018	0,038
WIELKOPOLSKI	-0,099	0,444	0,141	0,318	0,040	-0,058
ZACHODNIOPOMORSKI	-0,130	-	-	-	0,006	0,056
DOLNOŚLĄSKI	-0,161	-0,316	0,059	0,236	0,031	0,013
OPOLSKI	-0,070	-	-	-	-0,009	-0,029
KUJAWSKO-POMORSKI	-0,133	0,456	0,343	-0,169	0,008	-0,051
POMORSKI	-0,146	-	-	-	0,057	0,096
WARMIŃSKO-MAZURSKI	-0,167	-	-	-	0,031	-0,048

Source: Own study

In the case of all the parameters relating to the base year (2009), systematic decreases were observed with the exclusion of the province of łódz, where growth was noted in 2009/2010. In the case of the parameters analysing the relations in the consecutive years growth observed, only 6 provinces had growth in terms of the number of links in the years 2013/2014 (małopolski – 1.69%; podkarpacki – 0.05%; wielkopolski – 11.38%; dolnośląski – 0.22%; pomorski – 0.8% and warmińsko-mazurski – 3.86%).

Analysis of the enterprises that incurred outlays on innovative activity is examined in the distribution of the magnitude of employment. The data acquired contains zero values, which may also be the result of the lack of information on the magnitude of outlays, as well as the zero outlays on innovations. Unfortunately, this factor hinders the full analysis in a substantial way, thus the dynamics described do not illustrate the complete gauge of the variability of the phenomenon under analysis.

Small enterprises achieved the highest level of outlays on investments in the province of podkarpacki and achieved 386,899 PLN when compared in terms of the period of 2009/2014, as well as in the years 2013/2014 with 357,673 PLN, which constituted the appropriate growth of 756.34% and 444.98%. The lowest growth constituted 81.43% in the province of dolnośląski and -90.25% in the province of świętokrzyski when compared in terms of the period 2009/2011 and 2013/2014. The medium-term tempo of changes in terms of the highest growth was noted in the province of podkarpacki, while the lowest in the province of dolnośląski.

Medium-sized enterprises presented a similar structure of change to small enterprises. The average annual high growth is visible in the province of kujawsko-pomorski (34.33%), where 380,439 PLN was registered, outlays grew in 2009/2014 (225.57%) and by 271,970 PLN in 2013/2014, thus by 98.14%. On average, the lowest growth during a year was noted in the province of podkarpacki -2.13%, where the largest decreases may be viewed in 2009/2010 with a magnitude of 210,926 PLN, which constitutes 55.08%.

Large enterprises did not significantly differ from the small and medium-sized firms. The province of mazowiecki registered the largest growth of 548,411 PLN in 2009/2010, however the largest decrease occurred in the province of śląski with 883,311 PLN in 2013, in comparison with the base year. In the chain notion, the largest growth and decrease were in the provinces of świętokrzyski i warmińsko-mazurski, where they noted 196.89% and – 67.69% respectively. The highest average tempo of growth occurred in the province of wielkopolski, which reached the level of 31.75%.

The analysed enterprises were featured by a rather undifferentiated variability, while the average annual changes may indicate the advantage of growth which constitutes a good signal for the economy.

Analysis of the enterprises that were entered into the REGON (Business Identification no.) as new firms illustrates an upward trend. The highest growth was noted in the province of mazowiecki with a total of 2,714 firms (29.1%) in 2009/2010, while in turn the lowest growth and decreases occurred in the province of śląski in 2009/2012 and in the province of mazowiecki in 2010/2011 and amounted to -188 and -1713 respectively, giving a total of -3.15% and -14.23%. The average tempo of change in terms of the highest growth was registered in the province of pomorski at 5.74% (which gave consecutive growth figures of 586; 614; 95; 1284), while the lowest in the province of opolski at -0,88% (-61; -129; 4; -52), simultaneously constituting the only negative percentage value. It is possible to notice the clear growth trend, which in economic terms is a good signal in terms of the developing economic structure.

Analysis of the enterprises deregistered from REGON presents a general downward trend. The largest increase in terms of deregistration is possible to note in the province of małopolski with a total of 2,761 firms in 2009/2011, while the lowest in the

province of mazowiecki with -5966 firms in 2009/2010. The average yearly value in the province of pomorski was 9.58% of firms deregistered, constituting the largest growth, while in turn the province of łódz noted the lowest drop of deregistration at -13.32% (the decreases were formulated as follows: -3836; -2228; -3446; -3372; -2841). In this case, the downward trend constitutes a favourable economy as it suggests the continuity of running business activities in rural areas.

Analysis of correlation and regression

The definition *correlation coefficient* [Nowak 2001, pp. 44-52] constitutes the criteria of strength and linear relation, which may take place between two variables, however the *regression function* enables the definition of the quantitative link, which may take place between an independent variable and a dependent variable.

The *linear dependence* occurring between the Y variable (dependent variable) and the X variable (independent variable) constitutes a symbolic value that is placed within a range of $-1 \leq r_{XY} \leq 1$. The values that are convergent in the direction of unity provide information about the strong link between the variables, while in turn its lack is in the case whereby $r_{XY} = 0$. The coefficient also relates to the direction of dependence. A positive correlation signifies that the growth in value of a single variable matches the growth in value of a second variable. A negative correlation provides information that the growth in value of a single variable is accompanied by a decrease in the second variable.

In striving towards the analysis of whether the dependence occurring between the Y variable and the X variable is statistically significant, it is possible to avail of the *test on the significance of the correlation coefficient*. Estimates are based on the values read from the statistics table of T-Student (T^*) for the chosen level of significance (α) and degree of flexibility, while subsequently its comparison with the statistics calculated. This test facilitates the verification of the hypothesis of the following:

– $H_0: r_{XY} = 0$ correlation between the Y and X variables is insignificant $t_{r_{XY}} \leq T^*$
– $H_1: r_{XY} = 1$ correlation between the Y and X variables is insignificant $t_{r_{XY}} > T^*$

The analytical illustration of change is presented by the parameters of the *function of linear regression* by adopting the following form: $Y = a_0 + a_1X_1 + a_2X_2 + \cdots + a_nX_n$. The value of the parameter $a_0$constitutes a constant level of the dependent variable and is independent of other dependent variables. The subsequent parameters $(a_1 \rightarrow a_n)$ provide information about the average growth of the dependent variable evoked by the singular growth of the dependent variables.

The test on the hypothesis of the significance of the parameter verifies the following hypothesis:

– $H_0: t_{a_0 \rightarrow a_n} = 0$ parameter $a_0 \rightarrow a_n$ is insignificant $t_{a_0 \rightarrow a_n} \leq T^*$

– $H_1: t_{a_0 \to a_n} = 1$ parameter $a_0 \to a_n$ is significant $t_{a_0 \to a_n} > T^*$

The afore-mentioned assumptions relate to comparing the values of the calculated statistics from the value (T^*) read from the statistical table (T-Student) for the adopted level of significance (α) and the appropriate degree of flexibility.

Adjusting the function of regression to the empirical data is described with the aid of the *coefficient of determination* (R^2). This coefficient constitutes information as to which part of the entire variability of the dependent variable constitutes the variability of theoretical values of this variable. The square of the correlation coefficient on multiple occasions belongs to the scope [0;1]. Achievement of the upper marginal value suggests functional dependence, however the values removed from unity describe the failure to adjust the model to the empirical data.

The statistics based on the F – Fisher – Snedecor distribution (F table) for the adopted level of significance and two values of the degree of flexibility verifies the hypothesis as follows:

– $H_0: F = 0$ multiple correlation coefficient is insignificant $t_F \leq T^*$

– $H_1: F = 1$ multiple correlation coefficient is insignificant $t_F > T^*$

The calculated value of the *statistics analysing the significance of the coefficient of determination* is compared with the value read from the statistical table (F).

The description of the calculations (tables 2-5) was carried out for each type of industrial enterprise which incurred outlays on innovative activity with regard to the magnitude of employment (micro-scale – up to 9; small scale – from 10 to 49, medium scale - from 50 to 249; large - over 250) in correlation with enterprises availing of ICT Technologies (X_1 – possessing their own website; X_2 – for whom the website fulfils the function of presenting catalogues, goods or price lists; X_3 – receiving orders via computer networks – website, EDI system type; X_4 – submitting orders via computer networks – website, EDI system type; in a range of 16 provinces (łódzki, mazowiecki, małopolski, śląski, lubelski, podkarpacki, podlaski, świętokrzyski, lubuski, wielkopolski, zachodniopomorskie, dolnośląski, opolski, kujawsko-pomorski, pomorski, warmińsko-mazurski).

Analysing the correlation for enterprises incurring outlays on innovations employing up to 9 workers indicated that the highest dependence occurs with relation to enterprises submitting orders via computer networks. The critical value read and its comparison with the calculated value of the significance of the correlation coefficient indicates that only for the fourth variable should the alternative hypothesis be adopted, which constitutes the statistical significance of correlation. In the case of analysing the parameters, it is possible to note that no parameter, nor the variables alongside it are created to a significant degree by micro-scale enterprises incurring outlays on innovations. Poor adjustment is confirmed by the lack of statistical significance.

Table 2. The list of correlation and regression analysis measures for micro-enterprises

Correlation coefficient	r_{X_1Y} = 0,312	r_{X_2Y} = 0,144	r_{X_3Y} = 0,278	r_{X_4Y} = 0,518	
Significant correlation coefficient	t_{rX_1Y} = 1,228	t_{rX_2Y} = 0,545	t_{rX_3Y} = 1,082	t_{rX_4Y} = 2,268	
Critical value	$T^*_{0,1;14}$ = 1,76				
HYPOTHESIS	H_0	H_0	H_0	H_1	
Linear regression function	$y_1 = 1{,}111 + 0{,}505x_1 - 0{,}517x_2 - 0{,}056x_3 + 0{,}260x_4$				
Significant structural parameters	t_{a_0} = 0,103	t_{a_1} = 0,750	t_{a_2} = 0,845	t_{a_3} = 0,123	t_{a_3} = 0,761
Critical value	$T^*_{0,1;11}$ = 1,796				
HYPOTHESIS	H_0	H_0	H_0	H_0	H_0
Determination coefficient	R^2 = 0,314				
Test Fisher – Snedecor	F = 1,259				
Critical value	$T^*_{0,1;4;11}$ = 2,54				
HYPOTHESIS	H_0				

Source: Own study

Table 3. The list of correlation and regression analysis measures for small enterprises

Correlation coefficient	r_{X_1Y} = 0,119	r_{X_2Y} = - 0,047	r_{X_3Y} = 0,343	r_{X_4Y} = 0,334	
Significant correlation coefficient	t_{rX_1Y} = 0,448	t_{rX_2Y} = - 0,177	t_{rX_3Y} = 1,366	t_{rX_4Y} = 1,327	
Critical value	$T^*_{0,1;14}$ = 1,76				
HYPOTHESIS	H_0	H_0	H_0	H_0	
Linear regression function	$y_1 = 41 + 0{,}397x_1 - 0{,}829x_2 + 0{,}784x_3 + 0{,}168x_4$				
Significant structural parameters	t_{a_0} = 2,635	t_{a_1} = 0,410	t_{a_2} = 0,943	t_{a_3} = 1,194	t_{a_3} = 0,341
Critical value	$T^*_{0,1;11}$ = 1,796				
HYPOTHESIS	H_1	H_0	H_0	H_0	H_0
Determination coefficient	R^2 = 0,312				
Test Fisher – Snedecor	F = 1,249				
Critical value	$T^*_{0,1;4;11}$ = 2,54				
HYPOTHESIS	H_0				

Source: Own study

Of the enterprises employing between 10 and 49 workers that allocate outlays for the purpose of innovativeness, the value of the correlation coefficient with regard to the each dependent variable is very low and suggests the lack of links between them. The test on the significance of the coefficient confirmed that the value of the correlation does not have statistical conformity. The value of the coefficient of determination provides information about the low adjustment between the outlays on innovations in small firms and the analysed variables, while the F test rejected its significance. Structural parameters for the adopted 10% of error in calculations adopted a zero hypothesis constituting the lack of their significance.

Table 4. The list of correlation and regression analysis measures for medium enterprises

Correlation coefficient	r_{X_1Y} = - 0,169	r_{X_2Y} = - 0,318	r_{X_3Y} = 0,165	r_{X_4Y} = 0,209	
Significant correlation coefficient	t_{rX_1Y} = - 0,641	t_{rX_2Y} = - 1,254	t_{rX_3Y} = 0,627	t_{rX_4Y} = 0,80	
Critical value	$T^*_{0,1;14}$ = 1,76				
HYPOTHESIS	H_0	H_0	H_0	H_0	
Linear regression function	$y_1 = 50{,}09 - 0{,}178x_1 - 0{,}533x_2 + 0{,}899x_3 + 0{,}327x_4$				
Significant structural parameters	t_{a_0} = 3,839	t_{a_1} = 0,215	t_{a_2} = 0,709	t_{a_3} = 1,6	t_{a_3} = 0,777
Critical value	$T^*_{0,1;11}$ = 1,796				
HYPOTHESIS	H_1	H_0	H_0	H_0	H_0
Determination coefficient	R^2 = 0,401				
Test Fisher – Snedecor	F = 1,839				
Critical value	$T^*_{0,1;4;11}$ = 2,54				
HYPOTHESIS	H_0				

Source: Own study

Analysis of the medium sized enterprises allocating outlays on innovations relating to employment at the level of 50 – 249 workers illustrates a low correlation as in the case of the small enterprises. The test indicated that all the correlations are statistically insignificant. Likewise, in the case of adjusting the medium sized enterprises to four types of Internet activities, it is possible to state that the correlation is weak and insignificant, which is indicated by the dependence of the calculated value (F) and the critical value (T^*), with regard to which the zero hypothesis was adopted. Likewise, at the level of the 10% error it is possible to estimate that parameter a and the variables alongside it are not created to any degree by the medium sized enterprises and their outlays on innovations.

Table 5. The list of correlation and regression analysis measures for large enterprises

Correlation coefficient	r_{X_1Y} = 0,491	r_{X_2Y} = 0,392	r_{X_3Y} = 0,572	r_{X_4Y} = 0,134
Significant correlation coefficient	t_{rX_1Y} = 2,106	t_{rX_2Y} = 1,596	t_{rX_3Y} = 2,609	t_{rX_4Y} = 0,508
Critical value	$T^*_{0,1;14}$ = 1,76			
HYPOTHESIS	H_1	H_0	H_1	H_0
Linear regression function	$y_1 = 19{,}726 + 3{,}331x_1 - 2{,}726x_2 + 1{,}341x_3 - 1{,}805x_4$			

Significant structural parameters	t_{a_0} = 0,717	t_{a_1} = 1,947	t_{a_2} = 1,753	t_{a_3} = 1,155	t_{a_4} = 2,074
Critical value	$T^*_{0,1;11}$ = 1,796				
HYPOTHESIS	H_0	H_1	H_0	H_0	H_1

Determination coefficient	R^2 = 0,532
Test Fisher – Snedecor	F = 3,121
Critical value	$T^*_{0,1;4;11}$ = 2,54
HYPOTHESIS	H_1

Source: Own study

Enterprises employing more than 250 workers constitute the largest share in terms of creating innovativeness on rural markets. The coefficient of determination to a medium degree reflected adjustment of the data to the model and its statistical significance, which is supported by the correlation between the enterprises with outlays on innovations and receiving orders via computer networks. Analysis of the parameters indicates that the activity of large enterprises with outlays on innovations at an accepted level of significance (α = 0,1) is influenced by the parameters α_1 and α_4 (this rejects the zero hypothesis in favour of the alternative hypothesis H_1), which reveals that possessing their own website and submitting orders via computer networks to a statistically significant degree has an important influence on these enterprises.

Conclusions

The afore-mentioned calculations illustrating the codependence of the phenomena indicate unequivocally that the largest role in the creation of the innovative economy in the case of micro-scale and large enterprises is the submitted orders via computer networks- websites, EDI system type. In addition, in the case of large enterprises, possessing their own websites also makes a contribution to the development of innovativeness. Analysis of the dynamics illustrates that on the one hand, there is a drop in the telephone connections which may be caused by the resignation from stationary phones, but not necessarily Internet connections. The remaining factors

described indicated upward and downward trends, yet have a favourable impact on the creation of innovativeness by means of increasing their outlays.

Hence, it is possible to acknowledge that availing of information technologies in rural areas is part of the general trend of their impact on innovativeness. On the basis of analysis, it is necessary to however evaluate the factors that actually have an impact on innovations in rural areas. One should not assume that the generally perceived access to the Internet shall bring positive results, while only some activities are connected with its possibilities fulfil the requirement of dependence.

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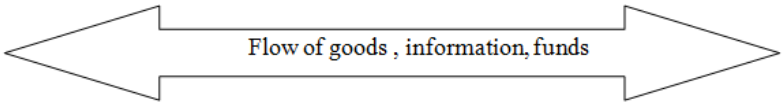
Chapter 18

IT TECHNOLOGY TO ELIMINATE THE RISK IN MEAT SUPPLY CHAIN IN JAPAN AND THAILAND

Katarzyna Szymczyk

Introduction

Food quality is the genuine issue nowadays, and the awareness among the consumers around the world about the importance of well produced and delivered food is permanently increasing. Especially, meat production is a delicate and sensitive to disturbance subject. What an average customer buys is a final result of the whole and long chain of manufacture, the chain which according to C. Martin's definition exists as a logistics pipeline involving the interactions between all organizations functioning inside it and the realization of necessary processes and activities which generate products or/and services for the consumers [Lysons 2004, s. 85]. Frequently, the food supply chain is focused on the effective and fast delivery of the product to the customer so according to the theory of A.J. Battaglia and G. Tyndall's, the supply chain is somewhat a strategic concept of understanding and managing of the actions sequence starting at the suppliers point and finishing at the customer point as in a delivery pipeline. For many authors, the supply chains become networks of complex organizations and the logistics interactions and connections are less linear and sequential and more diverse and multifaceted [Ciesielski, Długosz, 2010, s. 13]. Therefore, the information and the product flow in such chain involves more individuals and more knowledge as well as a full cooperation between all entities in the chain, controlling system and risk elimination system. The example of basic model of supply chain is illustrated in Fig. 1.



suppliers	manufacturers, retailers	customers
raw materials	production, warehousing, distribution	finished goods

Figure 1. Basic model of supply chain

Source: Own work

The key to effective managing of the supply chain is the right identification of all links and interactions between them so that the process of planning and the flow of goods and information should follow without disturbances. Thus, the supply chain understood as network or pipeline or as multileveled system includes several aspects: configuration, planning, controlling, coordination of supply processes, production, storing and distribution, information flow inside and outside, organization structure [Kot 2001, s. 61]. Supply chain management leads to the concepts of effective logistics. This trend is present in the economy and market for many years. The main assumptions of effective logistics are fast and smooth delivery of goods. The consumption around the world has been significantly increasing during the globalisation processes and the effective delivery has become a crucial issue for producers and retailers. The most important and quite sensitive part in the whole process of delivery is fulfilling each of the fundamental requirements. The well conducted delivery of goods as the basic assumption of effective logistics has been illustrated in Tab.1. [Gebresenbet, Bosona 2012].

Table 1. Delivery in effective logistics.

EFFECTIVE LOGISTICS DELIVERY REQUIREMENTS					
right product	right quantity	right condition	right place	right time	right cost
positive impact on the partners success in the supply chain					

Source: own work

Having in mind all stages of supply chain and basic assumptions of logistics or rather delivery process of goods, it is worth focusing on one of the most significant component of logistics system and the whole supply chain, mainly meat supply chain.

Meat supply chain characteristics

Before the final product enters the shop, the whole complicated and demanding process takes place and the very first stages in meat production at the level of supply or provision are crucial in terms of success and safety. Meat production is expensive and risky process. First of all, the consumers have become more aware of dangerous diseases that can occur in the meat production and even earlier in animal farming and breeding stages. The mass production and sale of meat has been recently regarded as not that healthy and valuable as the production on local, regional scale by small farmers and butchers. Portions of packed meat with long expiring dates found in huge super- and hypermarkets are frequently seen as meat less nutritious or even dangerous for health. Such thinking results from the information flow about the production

processes which include several steps for eliminating all risks of possible infections, diseases, and contagions in the meat supply chain. The process of meat supply is strictly controlled and requires usage of all available means of combating viruses, microbes and other sources of infections. Even if the meat is delivered to the customers within the same place of living and the time or distance are relatively short, the product needs at least basic veterinary inspection because meat production in all its stages carries risks that may result in serious outbreaks of diseases. Production for distributors and retailers and finally for the customers on a huge scale is much more complicated and demanding. The example of red meat supply chain in UK showed in Fig. 2. includes several stages which all need permanent inspection and well managing [Hirst 2016]:

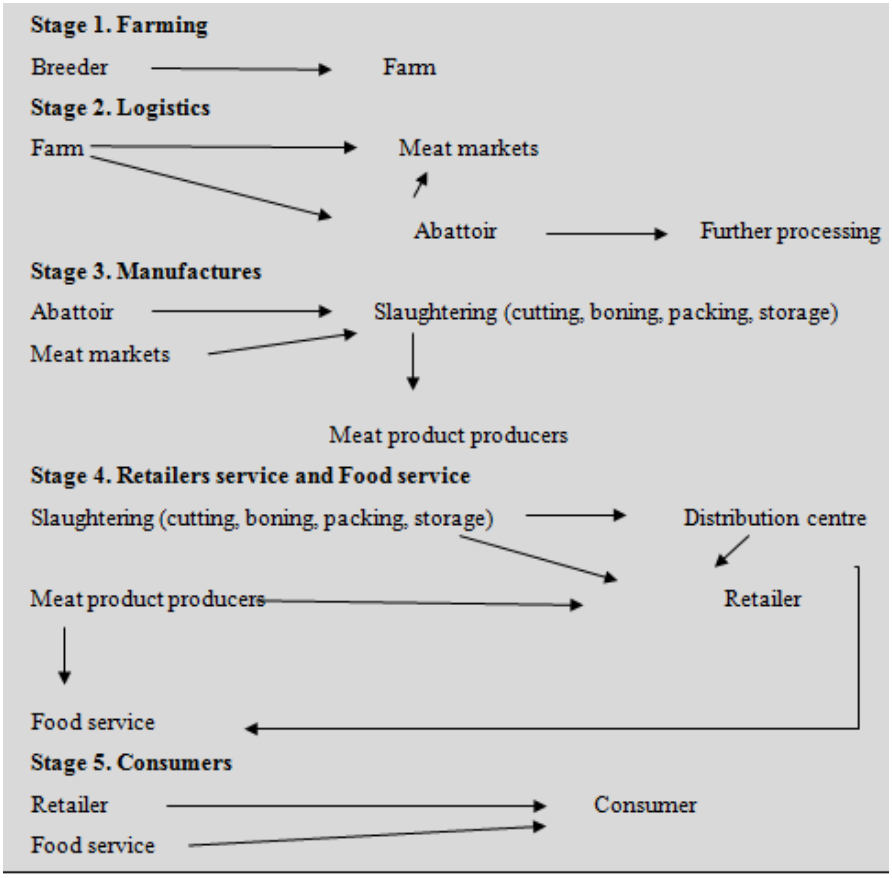


Figure 2. Meat supply chain

Source: own work

In meat supply chain, the attention should be drawn at animal welfare, especially at the slaughter animals that require particular handling and transporting in good conditions, as well as meat quality which mainly results from the adequate animal welfare [Gebresenbet, Bosona 2012]. The way the animals are kept and bred is a key factor in terms of successful and safe meat supply chain. The sanitary and hygienic conditions besides the veterinary regulations of production should come together with all necessary action to reduce the negative impacts of meat production on environment and negative impacts of the environment on the meat production. Due to that, the meat production should improve, which means that farming and breeding stages should be fully inspected and meat distribution ought to go through controlled channels by distinctive means of transport in order to can eliminate the risks of diseases outbreaks [Nowakowska-Grunt, 2005, s. 377]. Meat industries as well as all parts of food industry need implementation of traceability systems and develop and maintain the standards of transparency in food supply management. The way the humans treat animals and help them to avoid pathogens can improve the meat quality and its safety [Gebresenbe, Bosona 2012].

Danger issues in meat supply chain

There are basically three aspects of meat safety challenges [Gebresenbe, Bosona 2012]:

- animal identification,
- traceability in meat processing,
- traceability in meat distribution.

Both livestock breeding process as well as abattoir system should eliminate the risk of outbreaks of serious diseases among the living animal or in meat as pre-manufactured material. Among the cattle bred for red meat, the list of possible diseases is very long, but the most dangerous because heavily contagious cannot be spotted and treated without reporting to the World Animal Health Organisation (OIE). The Tab. 2. shows the list of cattle diseases [The Cattle Site, available at: http://www.thecattlesite.com/diseaseinfo, Access on: 25.01.2016].

All diseases reportable to OIE are very dangerous and of a high mortality rate. Anthrax occurs suddenly among the cattle due to infection by toxic bacteria Bacillus anthracis which comes from contaminated soil, fodder or compound feed. It can outbreak anywhere on every continent and is fatal to all mammals including humans. The treatment is hard when the outbreaks occur because the bacteria kills the infected object within 2 or 4 hours, or 24 hours in the longest situation after symptoms to become visible like trembling, high temperature, collapsing, respiration difficulties or convulsions. Only well conducted and controlled vaccination can prevent from outbreaks, but very often farmers avoid paying attention to that when the disease is not observed for a long time.

Table 2. The cattle disease features

TYPE OF DISEASE	DISEASES
Respiratory	Bluetongue, BVD, Calf Diphtheria, Calf Pneumonia, Fog Fever, IBR, TB, Thrombosis, Trypanosomosis [More at: http://www.thecattlesite.com/diseaseinfo/#sthash.31TCeCyK.dpuf.]
Reproductive	Abortion, Bovine Anaemia, Bovine Trichomoniasis, BVD, Brucellosis, Vibriosis, Cystic ovaries, Leptospirosis, Neosporosis, Repeat Breeding Syndrome, Retained Fetal Membranes, Schmallenberg, Trypanosomosis [More at: http://www.thecattlesite.com/diseaseinfo/#sthash.31TCeCyK.dpuf.]
Metabolic	Acetonaemia, Fatty Liver, Rumen Acidosis [More at: http://www.thecattlesite.com/diseaseinfo/#sthash.31TCeCyK.dpuf.]
Youngstock	BVD, Calf Diphtheria, Calf Pneumonia, Calf Scour, IBR, Joint Ill, Peri-Weaning Diarhheoa, Calf Scour, Rotaviral Diarrhoea [More at: http://www.thecattlesite.com/diseaseinfo/#sthash.31TCeCyK.dpuf.]
Skin, Eyes And Feet	Bluetongue, Bovine Anaemia, Calf Diphtheria, Digital Dermatitis, Epizootic Hemorrhagic Disease, Foot Rot, Foot and Mouth, Lice, Mange, New Forest Eye, Photosensitisation, Pruritus/Pyrexia/Haemorrhagic Syndrome, pseudocowpox, Ragwort Poisoning, Rain Scald, Ringowrm, Sole Ulcer, Wooden Tongue [More at: http://www.thecattlesite.com/diseaseinfo/#sthash.31TCeCyK.dpuf.]
Udder	Mastitis, Pseudocowpox, Summer Mastitis, Ulcerative Mammillitis [More at: http://www.thecattlesite.com/diseaseinfo/#sthash.31TCeCyK.dpuf.]
Enteric	Blackleg, Bloat, Coccidiosis, Cryptosporidiosis, Displaced Abomasum, Gut Worms, Johnes, Listeriosis, Liver Fluke, Molybdenum Toxicity, Necrotic Enteritis, Peri-Weaning Diarhheoa, Calf Scour, Rift Valley Fever, Rumen Acidosis, Rotaviral Diarrhoea, Samonella, Selenium Deficiency, Traumatic Reticuliti, Trypanosomosis [More at: http://www.thecattlesite.com/diseaseinfo/#sthash.31TCeCyK.dpuf.]
Neurological	Acorn Poisoning, Anaplasmosis, Botulism, BSE, Bovine Anaemia, Bovine Babesiosis, Bracken Poisoning, Cold Cow Syndrome, Copper Poisoning, Hypermagnesaemia, Lead Poisoning, Leptospirosis, Listeriosis, Nitrate poisoning, Pruritus/Pyrexia/Haemorrhagic Syndrome, Tetanus, Rabies, Thrombosis [More at: http://www.thecattlesite.com/diseaseinfo/#sthash.31TCeCyK.dpuf.]
Zoonoses	Anaplasmosis, Anthrax, Brucellosis, Leptospirosis, Listeriosis Pseudocowpox, Rabies, Rift Valley Fever, Ringowrm, Samonella, TB [More at: http://www.thecattlesite.com/diseaseinfo/#sthash.31TCeCyK.dpuf.]
OIE Reportable	Anthrax, Bluetongue, BSE, Foot and Mouth, IBR, Rift Valley Fever [More at: http://www.thecattlesite.com/diseaseinfo/#sthash.31TCeCyK.dpuf.]

Source: own work based on: http://www.thecattlesite.com/diseaseinfo.

Goats, sheep, deer and sometimes cattle, buffaloes, camels, or antelopes may suffer from bluetongue – a viral disease caused by the non-contagious virus from the

Reoviridae family occurring in animal's organism after being bitten by an insect. Small number of infected animals after death had their tongues blue, thus the name of the disease became known as bluetongue. The virus has been noticed in Africa, the Middle East, India, China, the United States, and the bluetongue disease was reported in Australia in 1975, then seen in Southeast Asia, Papua New Guinea, northern South America.

IBR – Infectious Bovine Rhinotracheitis is a respiratory disease extremely contagious and infectious. All kinds of cattle can be affected by Bovine Herpesvirus-1 (BHV-1). Additionally, apart from respiratory fatal problems, the disease cause conjunctivitis, abortions, encephalitis, and widespread systemic infections. The virus when inside the organism stays there forever in nerve cells in the brain in hidden form and when active, it will lead to the death of the animal. Only separation of infected animals from healthy pieces in the herd and antibiotics together with anti-inflammatory drugs treatment can stop secondary infections. Nevertheless, the best disease avoidance takes place if herd is under control with the use of vaccines among the young calves and widely spread biosecurity on the farm is a standard practice.

Rift Valley Fever is present in Africa and is caused by the mosquito bites. Cattle and sheep mainly suffer from this viral disease especially during the rainfall seasons.

Foot-and-mouth disease (FMD) is a severe, highly contagious viral disease which spreads fast among cattle and swine, but also occurs among sheep, goats, or deer. Seven types of virus generate the same symptoms of disease. The animals having the immunity to one type are not safe and can suffer from the disease. Because the symptoms are the same but virus types differ it is hard to say which virus affected the animal. Viruses occur in contaminated fodder and the environment and stay there active for more or less one month. What is worse, the disease outbreaks appear in other places when infected meat or meat products are imported, or when contaminated objects like vehicles or tools are used. People can easily carry the virus and spread the disease. FMD happens anywhere and is hard to control. Export restrictions may prevent from accidents of introducing the disease. In case of outbreak, only segregation among the animals can help to stop the scale of epidemic and the treatment is not needed. Quarantines, euthanasia of affected animals and those being in-contact with the infected pieces, as well as washing out and disinfection of property, equipment and vehicles can help to eliminate the disease occurrence.

Bovine Spongiform Encephalopathy known as BSE cattle disease for the first time appeared in 1986 in the United Kingdom and quickly became a fatal in consequences brain disease of cattle, very transmissible and neurodegenerative. Its long, four to five years, incubation period brings the animal to death within weeks to months of its inception. According to the results of epidemiological studies, the BSE agent responsible for the disease outbreak had been found in bovine tissues, such as brain and spinal cord from which the food for cattle was prepared. The BSE agent does not react to freezing, drying, heating at normal cooking temperatures, or temperatures used

for pasteurization and sterilization, it is stable and resists in the whole cattle food chain, but is not contagious. The observation of cows infected by BSE agent showed the gradual degeneration of brain ability to give commands to stand and walk straight. The animal mentally and physically loses its natural body behaviour and acts as drunk or mad. Therefore, the disease is frequently called the "mad cow disease'. All animals affected by BSE agent and suffering from the disease soon or later die [The Cattle Site, available at: http://www.thecattlesite.com/diseaseinfo, Access on: 25.01.2016]. In 1996 the British House of Commons announced that the BSE can give reasons for occurrences of nvCJD (new variant Creutzfeld Jacob Disease) in humans. The decline of beef consumption in European countries in late nineties of the XX century was very visible. BSE disease scared away almost 70% of Irish consumers, 50% consumers of five UE countries and a year and four months after BSE outbreak 43% of Irish consumers still avoided buying the beef. Apart from BSE, beef was concerned due to hormones, bacteria, salmonella or antibiotics [McCarthy 2001, s. 82]. Since 1992 in Great Britain, the amount of outbreaks of BSE disease is systematically decreasing. Randomly, the disease has occurred in other countries. Three such cases were noticed in Poland in 2002, and none since that year [Gąbczaste zwyrodnienie mózgu (BSE), Współczesna Żywność 09/2002, Available at: http://www.eufic.org/article /pl/1/5 /artid/52/, Access on 25.01.2016]. Nevertheless, when the outbreak happens, the trust in beef production lessens rapidly.

In Japan, before the first confirmed cases of BSE in 2001, the country claimed to be free of possible BSE entry in Japan. The disease outbreak change the whole Japanese food policy. The Ministry of Agriculture, Forestry and Fisheries (MAFF), the Ministry of Health, Labour and Welfare (MHLW) and the Food Safety Commission of the Cabinet Office in Japan introduced the whole package of new regulations and measures to eliminate the possibility of BSE occurrence, such as: blanket BSE testing, removal of specified risk materials at slaughterhouses, surveillance of risk animals, meat-and-bone meals ban, traceability on all farms. The BSE became a national problem. The evaluation of risk and ways to manage it by the Japanese government bodies have been illustrated in Tab.3 [Yamanouchi, Yoshikawa 2006].

BSE outbreak caused not only the rapid decrease in beef consumption but also led to the growing customer awareness of meat quality and health attributions. Diseases that may occur in beef forced the customers to look for other products mainly poultry and pork. Both pork and white meat of poultry had been regarded in 1990s as safe and healthy and strongly recommended by the nutritionists as a good alternative to beef. The consumption of these kinds of meat rose relatively high. However, both may be prone to pathogens and generate several diseases on a very large scale. According to the Poultry Site [The Poultry Site, http://www.thepoultrysite.com/diseaseinfo, Access on: 24.01.2016], there are over 140 diseases or conditions that may occur in case of poultry animals, meat, or poultry products. Avian flu has been considered as one of the mostly affecting diseases the worldwide trade which, according to Rabobank Food

& Agribusiness Research and Advisory report, was reduced by 13 % in first quarter of 2015.

Table 3. BSE risk evaluation and management in Japan 1996-2005

Year	**The Ministry of Agriculture, Forestry and Fisheries**	**The Ministry of Health, Labour and Welfare**	**Food Safety Commission**
1996	Ban for feeding cattle with meat-and-bone meals (MBM)	none	Non-existing
1997	BSE on the list of prevention law for diseases	none	Non-existing
2001	Ban for importation and feeding all animals with MBM	Specified Risk Materials (SRM) removals: central nervous system and distal ileum eye; BSE testing in slaughterhouses	Non-existing
2003	Bovine traceability system at the production phase	Spine on the SRM list	Creation of Food Safety Commission
2004	BSE test for all dead cattle		Review of measures on BSE
2005	Bovine traceability system at market distribution level; Exclusive production lines in factories; Notifications about the imported compound feed	BSE testing changed for cattle over 21 months old	Food safety evaluation and risk assessment of beef distributed from USA and Canada

Source: own work

The bird disease is fought against globally as it occurs on each continent [https://far.rabobank.com/en/sectors/animal-protein/poultry-quarterly-q2-2015.html, Access on: 20.01.2016]. Food and Agriculture Organization of the United Nations (FAO) reports that in case of chickens avian influenza (HPAI) causes up to 100 percent mortality. The disease may affect people who have contact with poultry for a long time and cause H5N1 disease. We distinguish two kinds of "bird fu': highly pathogenic avian influenza (HPAI) and low pathogenic avian influenza (LPAI). The first, as it was mentioned earlier, is very hard to fight as it results in death of almost all affected birds. For the first time, it was notices in Southeast Asia in late 2003 where nearly 250 million birds died because of the illness itself or had to be destroyed before they died. the outbreak was the global record. The influenza sub-type virus H5N1 regularly outbreaks in many parts of Indonesia and in some parts of China, Egypt and Nigeria. In eastern and southern regions of Asia more or less 6 billion birds live in domestic environment, where half of them are held in intensive holdings lacking strict hygiene

or biosecurity regulations. Those kept frequently in open areas are exposed to viruses transmitted by wild animals happen to attack the birds from the livestock. The holdings are kept in the neighbourhood of forest reserves and open water pools and because the birds live usually squashed in a small production area, the disease breakout is simple to come. The avian influenza can be transmitted to other regions due to illegal poultry trade. The affected birds are sold on open-air, wet markets, moved from one place to another, or sold legally but in dramatically dreadful conditions. Not only birds, but also eggs, parts of birds, equipment, vehicles, cages and other things used in poultry trade can transmit the virus [http://www.fao.org/avianflu/en/qanda.html, Access on 12.01.2016].

EU and global standards in meat supply chain

All EU countries are forced to keep high standards in meat industry at the same level. Both the veterinary restrictions and the meat trade regulation are under continuous modification in order to modernize the meat sector. First of all, EU focuses on the use of highly developed technology and the most modern equipment consistent with the HACCP system - the Hazard Analysis and Critical Control Point system [Gurgul, Kielesińska 2001, s. 143]. There are seven principles in HACCP system Tab 4. [http://www.fao.org/docrep/005/y1579e/y1579e03.htm, Access on: 12.01.2016]:

Tabble 4. Seven principles of HACCP system

THE HACCP SYSTEM - 7 PRINCIPLES	
PRINCIPLE 1	Conduct a hazard analysis
PRINCIPLE 2	Determine the Critical Control Points (CCPs)
PRINCIPLE 3	Establish critical limit(s)
PRINCIPLE 4	Establish a system to monitor control of the CCP
PRINCIPLE 5	Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control
PRINCIPLE 6	Establish procedures for verification to confirm that the HACCP system is working effectively
PRINCIPLE 7	Establish documentation concerning all procedures and records appropriate to these principles and their application

Source: Own work based on: http://www.fao.org/docrep/005/y1579e/y1579e03.htm

Restrictions in EU meat industry include the necessity to identify the animals and producers. The production chain is strictly controlled, especially at the supply stage where the raw materials are put into manufacture [Gurgul, Kielesińska 2001, s. 145]. Apart from that, EU countries are gradually changing attitude to the farm animals as the source for meat production. The general tendency is to shorten and ease the transportation system so that the animals do not suffer the huge stress during the

loading process, transport itself and the unloading process. Additionally, the researches work on special computer solutions based on video camera and GPS that will be used by the drivers transporting the animals and help them to monitor the stress level among the animals transported to the abattoirs. Such system has been introduced in Sweden but can be implemented around the world in the whole meat industry. According to researchers, the stress during the transportation and waiting period in abattoirs may have an impact on the animal's health and eventually the meat quality. The meat product itself should also include the minimum time needed for packaging, distribution and storage because in most cases, the amount of meat processed, transported and stored at the same time and the length of the distribution affect the product and frequently cause its spoilage [Gebresenbet, Bosona 2012]. Another important issue in the food industry, apart from the globally incorporated the HACCP system, is the idea of traceability, now globally and commonly put into practice in the whole food supply chain. The guidance and regulatory requirements of traceability should be applied in the all sectors of food industry and additionally piloted by regional or national programmes and organizations. For example, the U.S. Food and Drug Administration (U.S. FDA) projected a framework based on idea of Critical Tracking Events (CTEs) and Key Data Elements (KDEs), but it initially implemented for only two specific food-product categories, fresh tomatoes and processed foods, the application used for other food sectors remains undetermined. The traceability system incorporated in the supply chain basically links the physical flow of products with the flow of information about them. The system in its external stage identifies the products by assignment with a Batch codes or lot numbers (product labels, paper or electronic business documents should also be included) and the information about the identified item is spread through the distribution channel participants. Internal traceability system requires that the organizations keep attention on the correct labelling process, so the products get their unique labels with numbers and can be fully identified, i.e. the identification history will provide the link between the raw materials and finished goods. All partners and organization in the traceability system should have the opportunity and ability to control and gather information about the products from their initial until the final point. The, so called, farm to fork traceability focuses on identification of the direct source and the direct recipient of traceable items. The role of all distribution channel participants is collecting, recording, storing, and sharing minimum pieces of information for traceability. The labelling procedure can be done manually, but today the radio frequency identification (RFID) is used in many cases or businesses are advised to look for other IT solution that will simplify the identification process. Unit identification can be done by electronic messaging protocols or standardized interfaces (protocols for two-way communication). Both may facilitate the exchange of essential business information between goods and information flow, as well as share crucial traceability event information within a network [http://www.lowrysolutions.com/blogs

/the-best-practices-in-food-traceability/, Access on: 20.01.2016]. IT technology is commonly used in the transportation and shipping and includes:

- scanning of cargo: physical and manual, means opening the lorry, or modern with the use of scanners (X-rays, Gamma rays, neutron rays), such as: RAPISCAN GaRDS Portal or RAPISCAN Eagle M4500;
- electronic seal (e-seals): disposable or reusable, RFID tags connected to GPS;
- smart containers implemented with RFID/GPS/GSM technology;
- monitoring and tracking of cargo, for example with the use of the TREC (Tamper-Resistant Embedded Controller) [Biernikowicz 2013].

IT technology in agriculture industry in Japan

Japanese people lost their confidence in food after BSE outbreak in 2001 and Fukushima nuclear plant disaster after earthquake in 2011. The role of ecological food and food produced in organic way resulted from the national concern about the quality and healthy aspects of Japanese products and those imported from other countries. The consumer movement led to developing of organic food chain in Japan which mainly focused on:

- raise of organic farms and organic food production;
- adopting organic standards for crop and livestock production due to FHO/WHO Codex Committee;
- introducing in 1999 the Japanese Agricultural Standard Law (the JAS Law) to inspect and guideline the organic food grow, except the livestock [Nagamatsu, Matsuki 2008].

In Japan the Sanchoku and the Teikei system has been introduced and its basic assumption is to guarantee the safe and secure product delivery directly from the production area (Sanchoku) to the Japanese retailer (Teikei) by following three basic features of that system:

- clear production places and all methods used in production;
- clear methods in raising procedure;
- maintenance of communication between producers and consumers.

The idea covers with the traceability issue practiced in the global food supply chain, however in Japan, the system of traceability is strictly controlled by the consumers organization focusing on monitoring the agri-food chain. Some of them, such as: the Zen-Noh Security System, or The Nichirei *Kodawari* are worth mentioning because they control the meat supply chain. The first includes cooperation of the biggest organizations controlling the agriculture in Japan after its establishment in 2000 in order to monitor beef production. The aim of the Zen-Noh is to establish secure standards and implement the traceability in meat production, record its history and inform the consumers about the history and environmental issues by implementing environmental indicators informing about the biological diversity in manufacturing

areas. The Nichirei focuses on high-quality food by developing the brand called "Kodawari livestock products". The brand sell chickens raised with Chinese medicinal herbs, natural pork and organic beef according to five concepts: safety, security, health, deliciousness, consideration for the environment [Nagamatsu, Matsuki 2008]. The government in Japan has introduced the number of laws regulating the food industry and the whole safety-food policy, namely:

- the Animal Infectious-Diseases Control Law;
- the Feed-Safety Law;
- the JAS Law - regulations conducted by Ministry of Agriculture, Forestry and Fisheries (MAFF);
- the Law Concerning Meat-Disposing Places;
- the Law Concerning Food Hygiene;
- the Nutrition-Improvement Law - conducted by the Ministry of Welfare and Labor (MWL);
- the Measuring Law under the Ministry of Economy and Industry;
- the Law Concerning Gift Indication under the Fair-Trade Commission.

Additionally, the food safety agency has also been introduced by the Japanese government and supervised by the Prime Minister office. The agency works independently from MAFF and MWL and is responsible for risk evaluation and risk communication. The other bodies MAFF and MWL are responsible for the risk management [Nagamatsu, Matsuki 2008].

Apart from the input of government bodies and consumer organizations, the Japanese food industry adjust IT technology so it can be helpful in keeping up the high standards in Japanese agriculture. The IT technology is used in seed planning, growth condition monitoring, field management, as well as in collecting and distribution systems. Japanese farmers use IT devices for different objectives Tab. 5 [http://www.gpic.nl/ITinAgri(Japan).pdf, Access on: 13.01.2016].

Table 5. IT services used by Japanese farmers

Device and service	IT use in agriculture	IT use objectives
61% own PCs	24% used by farmers	59% used IT for sales
71% own and use mobile phones	43% used by certified farmers	51% for production management
69% farmers uses Internet services		

Source: own work based on: http://www.gpic.nl/ITinAgri(Japan).pdf.

From the objectives of using IT, the farmers mainly focus on collection of necessary data that will help them to manage the work in the field. The below Fig. 3 shows the percentage of Internet services objectives among the Japanese farmers.

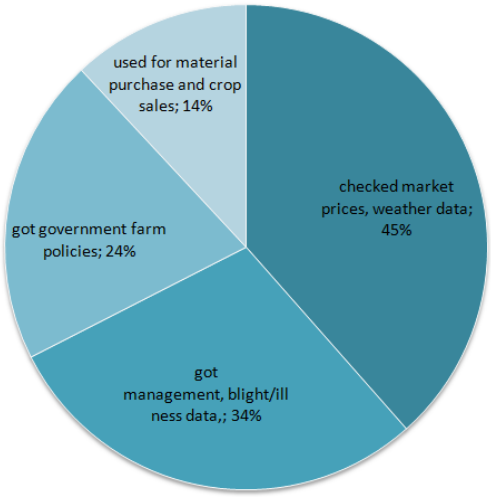


Figure 3. Internet services used by Japanese farmers

Source: own work

Farmers who uses IT technology at work admit that it improved data gathering (52%), farm management (33%) or fasten the necessary data correction (19%). According to 9% of farmers, IT helped to expand sales and information about the customer base. There were 18% of farmers who declared no benefits of using IT technology [http://www.gpic.nl/ITinAgri(Japan).pdf, Access on: 13.01.2016].

In order to monitor the livestock and avoid the presence of microbes, The Japanese Veterinary Antimicrobial Resistance Monitoring System (JVARM) has been introduced in Japan. The main assumption of the system is first all to monitor the amounts of antimicrobials used in animals, secondly, control resistance in zoonotic and indicator bacteria isolated from healthy animals, and thirdly, to observe resistance in animal pathogens isolated from diseased animals. The outline of JVARM is shown in Tab 6 [http://www.maff.go.jp/nval/tyosa_kenkyu/taiseiki/pdf/jvarm2008_2011.pdf, Access on: 19.01.2016].

Table 6. JVARM outline

THE JAPANESE VETERINARY ANTIMICROBIAL RESISTANCE MONITORING SYSTEM		
Healthy animals	**Diseased animals**	**Pharmaceutical companies**
resistance in zoonotic and indicator bacteria	resistance in animal pathogens	antimicrobial consumption
		submitting data to the National Veterinary Assay Laboratory (NVAL)

Source: own work.

IT in Thai poultry industry

Social and economic damage in Thailand caused by avian influenza in the last two years made the government to look for unique solution and the best policy to control the outbreak of the bird flu disease. The Thai agriculture sector includes 60% of population and the broiler industry, as well as other livestock and poultry sectors are regarded as the major export value of Thai economy. Therefore, the national programme to eliminate the avian influenza risk from the meat supply chain has become the most important aspect of the government policy. First, the Department of Livestock Development (DLD) has been introduced. But, the most essential was not the body or organization itself, but the tool that would help to gather information about the meat industry. A huge database and the information system were required to gather data about the whole network of poultry supply chain. The database was supposed to inform about the outbreak control showed with the use of GIS - a geographic information system and the use of management information system MIS. Both systems were connected into GIS-MIS system and prepared to control the disease. The system analyzes the livestock, both registered with DLD and non-registered with DLD: standard livestock system and native livestock system. The structure of system showed the poultry movement form parent stock farms to the market [http://www.agnet.org/htmlarea_file/library/20110721132540/bc54018.pdf, Access on 13.01.2016]. The livestock system is shown in Fig. 4.

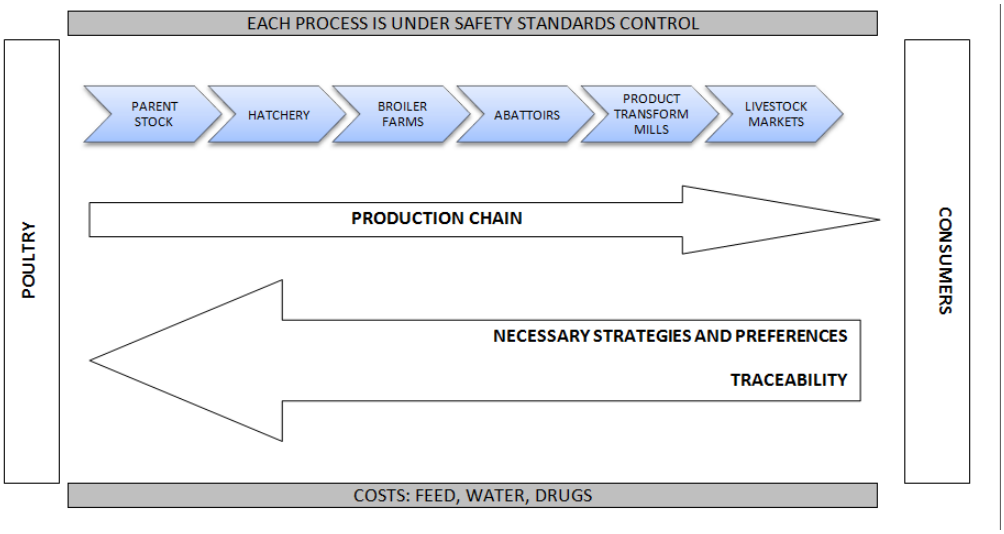


Figure 4. The Standard Livestock System

Source: own work.

The system distinguish all types of poultry into: broilers, chicken and eggs, duck and eggs, geese. The data is collected about the animals, their records in parent stocks, hatchers or farms, the other data informs about the records in slaughter houses, markets or mills. All animals are implemented with special certificates given to farm operators. Information about the type of poultry, the population variety and about farms is also collected. The database system design used to monitor poultry in Thailand is divided into five groups of standard farm, native farm, DLD, primary and system. The standard farm collects the information about the type of bird, seven types: broiler, hatching egg, native chicken, duck meat, duck egg, goose, partridge. Each bird has its production lines, and data describes statistically location: efficiency of production and safety, and dynamically status: current population of birds. The native farm monitors farmers. The system gathers information about the disease and guides the disease surveillance, i.e. implementation, symptom, sample, disease data. The system includes reference data that provide animals with codes and location codes. To present all necessary and informative data, a web application system is used and different formats like maps, graphs or tables are used to show the results. The web application is another system which combines two sections: Front Office (map) and Back Office (data management). The computer system used to monitor the poultry includes the server which links DLD with Government Information Technology Services (GITS). The other server is implemented in GITS. The first server is for poultry population survey, the second for avian influenza survey operation. The system as a whole is still under development and improving. The aim of the system in final stage is to gather rapid, full and accurate information about the avian influenza in the poultry. Fast reporting and flow of information between the institutions will help to reduce unwanted expenses and processes. The system controls the entire livestock in Thailand [http://www.agnet.org/htmlarea_file/library/20110721132540/bc54018.pdf, Access on 13.01.2016].

Conclusion

The consumer awareness and the government policy combined together help to put into practice all necessary implements to put a stop to diseases outbreaks in meat supply chain. The IT technology can be helpful but only together with the accurate operation systems conducted by government bodies. The use of Internet, web applications or IT services may be supportive in the process of incorporating the traceability system in the meat industry. The surveys and experience of Japan and Thailand show that the most efficient way to control the livestock and diseases outbreaks are information flow and records of healthy and sick animals, as well as data about the farmers, farms, markets and trade practice. Such information, transparent and available may smooth the progress of implementing the hygiene and biosecurity standards in the whole supply chain. Information flow through channels should be

quick and effective in order to monitor the spread of disease and stop it from entering another area. The computer system may be used by all government bodies and organizations responsible for managing and controlling the possible risk in meat supply chain, as well as in the entire food industry in order to eliminate the disease outbreak at the very beginning stage or to eliminate the disease risk at all.

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Chapter 19

MANAGEMENT OF DRINKING WATER QUALITY

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Problem formulation

The current level of anthropogenic impact on the environment is a cause of pollution of the soil and its water-soluble component by toxic impurities. The problem of contamination of soil cover and water largely depends on regional differences.

Among the sources of pollution, first of all, we should remember about of chemicalization of agricultural land and certain types of economic activity, including disordered dumps of industrial and household waste, storage of fertilizers and pesticides [Коваленко 2002, С.3–13. Last years there was a tendency to increase using of groundwater in Poltava region [Екологічний атлас Полтавщини 2007, 128 с]. In 2012 248.4 million m^3 of water have been raised, 77.06 million m^3 of which were the underground water [Проект Національної доповіді про якість питної води та стан питного водопостачання в Україні у 2012 році. [Електронний ресурс]. – Режим доступу http://www.minregion.gov.ua/attachments/content-attachments/1185/Проект Національної доповіді про якість питної води та стан питного водопостачання в Україні у 2012 році.pdf].

At the same time the quality of water in rivers and streams is unsatisfactory (53% of the water samples are characterized as “very dirty” [Проект Національної доповіді про якість питної води та стан питного водопостачання в Україні у 2012 році; http://www.minregion.gov.ua/attachments/content-attachments/1185] [3]). The quality of groundwater and groundwater is also deteriorating. It is mainly used for drinking purposes [Проект Національної доповіді про якість питної води та стан питного водопостачання в Україні у 2012 році; http://www.minregion.gov.ua/ attachments/content-attachments/1185; програма «Довкілля - 2015»]. More than 50% of the population in the region uses ground water for drinking, the quality of which is very different depending on the location and depth of the pumped. The large amounts of waste that have accumulated in the area, and excessive use of nitrogen fertilizers are the main causes of unsatisfactory water quality. All salts of nitrate and nitric acids (nitrates and nitrites respectively) are soluble in water, migrate to aquifers over long distances and accumulate in vegetables [Екологічний атлас Полтавщини, 2007]. The pathogenic effect of nitrite and nitrate ions on the human body is well-known [Дорогунцов 2004; Яцик 2000]. Pollution of the first aquifer by nitrate ions is very actual problem to Poltava region. There is an increased concentration of nitrates in decentralized water of all districts of Poltava region [Дорогунцов 2004; Яцик 2000] Nitrates accumulate in water and food and then enter the body of animals and humans.

The ability of nitrate-ions to recover into nitrite-ions in the human-body leads to formation of methemoglobin. Long-term use of water with excess of nitrate-ions and nitrite-ions is the reason of disturbances in the gastrointestinal tract, cardiovascular and nervous systems. Nitrosamines and nitrosoamides are formed in the organism under the influence of microorganisms of the gastrointestinal tract. They cause cancers, destroy the nervous and cardiovascular systems, affect the development of embryos [Дорогунцов 2004; Коваленко 2002, С. 3-13]. The main regulatory document for water quality "State sanitary rules and norms. Drinking water. Hygienic requirements for water quality of centralized utility-drinkingpotable water" (DergSanPin) establishes maximum permissible concentration of nitrate-ions of 50 mg/dm [ДСанПіН 2.2.4-171-10].

In our previous works we have performed a series of experimental studies to find available sorbent for improving the quality of drinking water and its purification from nitrate ions [Senenko 2015, pp. 116-148; Senenko, Maliuchenko, Senenko 2014, pp. 36-40]. To study we took decentralized water of the private sector of Poltava (Brayilky area), which had the inappropriate concentration of nitrate-ions. We have identified possibilities to improve the quality of the investigated samples of water by well-known mineral sorbents purchased in pharmacy of Poltava. These sorbents are widely advertised and recommended to consumers by different information resources. We have determined the main physical and chemical quality of decentralized water, and have investigated the treatment of the water quality improvement by natural sorbent. We have made the chemical analysis of water quality after contact with them. Our previous studies [Іваницька, Сененко, Степаненков 2010, с. 162-166; Senenko, Chala, Romanovych, Sanzharevska, Nakonechna 2012, p.340-349]. have shown that it is possible to improve the quality of drinking water on indicators of the content of water-soluble salts, total hardness and alkalinity. We have identified the basic indicators of the quality of drinking water from dug well (depth up to 10 m). Chemical analysis of the water samples revealed that there is exceeding of nitrate-ions, total hardness, content of water-soluble salts, magnesium hardness and alkalinity. The water is not suitable to use as drinking water. We have used such natural sorbents as shungite, flint, as well as we treated water by "coral calcium" and partially frizen water. We investigated five water samples. Sample 1 – decentralized water from dug well (depth up to 10 m) (sample 1). Sample 2 – decentralized water (sample 1), treated by flint (10 mg/l). Sample 3 – decentralized water (sample 1), treated by shungite (10 mg/l). Sample 4 – decentralized water (sample 1), treated by "coral calcium" (0,5mg/l). Sample 5 – decentralized water (sample 1), previously frozen in household conditions at 70%. Sorbent "coral calcium" "Alka–Mine" increases the nitrate-ions and water-soluble salts. We have made conclusions that using of flint leads to further deterioration of water quality; partial freezing of water does not improve the quality of it; shungite significantly reduces the amount of nitrate-ions. This allows to use it for water purification only from this type of pollution.

That is why, the problem of water purification from nitrate-ions is still not completely solved.

Formulation of tasks

In our work we offer a complex method of groundwater purification from nitrate-ions and pathogenic organisms at household level. These are the most common pollutants in the groundwater of Poltava region. The problem of water purification from nitrate ions in household conditions is very relevant. Cheap household filters don't clean water from nitrate ions. Nitrates and nitrites can be removed by filters with reverse osmosis and ion- exchange installation. But they are expensive and remove almost of all the water-soluble salt. This is a negative factor.

Results

We suggest to use the aterial with defined composition as a filter material (clay as widely used as filter) [Стороженко, Сененко, Сененко, Степаненков 2013; Senenko 2015, pp. 116-148] to improve the macrocomponent composition of the water. The main task was to remove the nitrate ions.

We propose to use a probiotic preparation "Sviteko PPV" based on Bacillus subtilis as a supplement to remove pathogens.

Selected clay material is a relatively cheap and widespread in Ukraine and it is well suited for the use in household filters. Bacillus subtilis is a known antagonist of harmful bacteria and isn't pathogenic to the human body [Бациллюс субтилис (сенная палочка, Bacillus subtilis), http://www.gastroscan.ru/handbook/118/5648; Субтильная сенная бацилла – палочка Bacillus subtilis, http://probakterii.ru/vidy-bakterij/sennaja-palochka.html].

The population tries to clean water and buys expensive filters. Most of them do not provide the expected result. Besides the cost of filters and their service is very expensive. That is why consumers cannot provide themselves with high quality water. Therefore, the problem of drinking water purification from nitrate ions is extremely important. It remains unresolved.

We have performed series of work on searching sorbent of nitrate ions. Clay soil has been selected as the test material (sorbent) because natural water is filtered from pollutants during passing through the earth's crust. As a result of many experiments we have found that different water aquifers contain various concentrations of nitrate ions. At depths of 400 – 600 m their content is tenth of a milligram per liter of water.

The aim of our study was to investigate the sorption properties of clay raw material relatively to nitrate-ions to produce high quality sorbent that can improve the quality of drinking water. In addition, we had a plan to investigate the influence of its sorption ability of other physical and chemical parameters of water.

The basic requirements that we had set for the sorbent were a good sorption capacity relatively to nitrate ions, readily availability, a large amount, and hence low cost. The reason for our research was that rural population that is not able to buy expensive filters suffers from pollution of nitrate ions.

Clay raw material is highly dispersed sedimentary rock of layered or layered-tape silicate that differs in hydrophilicity and capacity for sorption and ion exchange. In natural conditions clay minerals have particle size of less than 1-10 microns. Therefore, they are found in most thin (clay) fraction of sedimentary rocks, which usually include particles smaller than 1 micron.

Clay raw materials are widely used in industry, namely, the production of ceramic products, refractory materials, fine ceramics, porcelain and sanitary wares; in construction industry (production of bricks, keramsit, expanded clay blocks, wall panels, etc.), as heat and sound insulating materials and other building materials); for domestic use in cosmetics and as a material for decorative art and architecture.

The use of clay for treatment of domestic wastewater is widely used, but we propose to use clay raw material with a high content of silicon oxide (SiO_2) and lower content of iron oxide (III) and aluminum (Fe_2O_3+Al_2O_3) for purifying drinking water from nitrate ions. So we tried to avoid the possible desorption of clay raw material impurities to the drinking water during their contact. We have identified the basic structure of clay raw materials.

The chemical composition is given in Table 1.

Table 1. The composition of the clay material

Indicators	Clay material
SiO_2	84.4%
Fe_2O_3+Al_2O_3	5.83%
Fe_2O_3	1.46%
Loss of weight at calcination	t = 700ºC – 9.75%
	t = 1000ºC – 10.3%
The content of organic substances	0.2%
Hygroscopic moisture	4.83%
The content of crystallization water	4.72%

[Results of own research]

Exchange processes in the system sorbent-solution depend on many parameters. Initial chemical composition of the solution (natural water) is the main of them. Therefore, the absence of toxic ions, which previously could be in a natural sorbent, is very important. The advantage of using our proposed sorbent clay materials with a high content of SiO_2, is the improvement of basic water quality parameters according to the requirements.

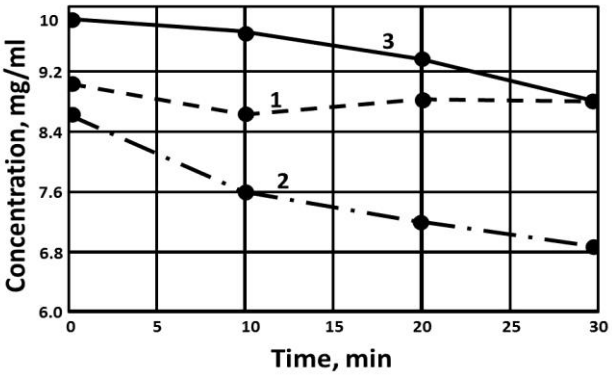
Besides the benefits of our proposed sorbent is the availability of powerful deposits of natural occurrence, low production cost, minimal power inputs in preparation for

using, – therefore cheapness and accessibility for people with low income, the absence of necessity of regeneration the possibility of waste-free using in the construction industry, that is ecological safety of using.

Previously, we have prepared samples of clay raw material to air-dry state (sample 1). In addition, we have done their heat treatment, – pre-calcined one part of the sample to constant weight at 700°C (sample 2) and at the temperature of 1000°C (sample 3). With all the samples we have done a complex of studies concerning their sorption properties.

All clay raw material samples were kept in an aqueous solution of potassium nitrate with concentration of nitrate ions 10 mg/dm^3 (recalculated to nitrate nitrogen). At regular intervals, we have determined the residual concentration of nitrate ions in the solution.

The research results are presented in Figure 1.



1. Clay in the air-dry state
2. Clay calcined at 700°C
3. Clay calcined at 1000°C

[Results of own research]

Figure 1. The dependence of the concentration of nitrate nitrogen on contact time of solution with sorbent in air-dry and at temperatures of calcination 700 ºC and 1000 ºC.

Obviously, that sorption begins from the first seconds of contact in all three cases. But in case 1 (not calcined sample №1) sorption is negligible. The two other cases like №2, calcined at 700 ºC (line 2), showed better absorption of nitrate ions. At high temperature (1000 ºC) structural and textural characteristics of the clay raw materials (sample №3) change. This influences the absorption properties. Therefore, further experiments were carried out with sample №2.

Our proposed method consists in the following: clay raw material was previously calcined at 700 °C for 1 hour. Exactly after this treatment, volatile compounds,

hygroscopic water and water of crystallization, organic matter removed but there is no sintering and saved fine dispersion.

In all experiments we used sorbent and investigated water in the ratio 1:15. We explored the impact of the proposed sorbent in distilled water and the natural drinking water.

The results are presented in Table 2.

Table 2. Quality of distilled water after treatment, drinking natural water before and after processing by sorbent

Indicators	**Distilled water (after processing)**	**Natural water (before processing)**	**Natural water (after processing)**
Smell, points	0	0	0
Flavor, points	0	0	0
Chromaticity, degrees	0	3	1
Total hardness, mmol-eq/dm^3	2.04	7.7	5.8
Calcium hardness, mmol-eq/dm^3	1.92	6.8	3.9
Magnesium hardness, mmol-eq/dm^3	0.12	0.9	1.9
Alkanity, mmol-eq/dm^3	–	4.0	4.0
Content of nitrate ions mg/dm^3 (nitrate nitrogen), mg/dm^3	0.0	25.4	11.8
Content of water-soluble salts, mg/dm^3	31.35	627	711

[Results of own research]

It is obviously that a significant improvement of the quality of natural water by total hardness and content of nitrate-ions exist. Clay raw material doesn't desorb any impurities to the natural water. The increase of water-soluble salts is small and does not exceed the value which is allowed by DerzhSanPiNom. Although desorption of small amount of calcium ions in distilled water occurs, on the contrary there is adsorption in natural water. Simultaneously, desorption of magnesium ions in natural water is more significant (within normal limits), which significantly improves the quality of drinking natural water. In addition, we found decreasing of the value of chromaticity.

So, we have proposed the method of decentralized water purification from nitrate ions in domestic conditions. We have proved that clay raw material has adsorption properties relatively to nitrate-ions from the first seconds of contact. We have shown

that the absorption properties of clay raw materials depend on the temperature of prior calcination and of the time of contact with the solution. Sorption properties of clay also depend on the textural and structural characteristics that vary at high temperatures. The noncalcined clay has the lowest adsorption properties. We have found that clay calcined at 700 ºC is the best sorbent. The most important result of our work is that after processing by sorbent of drinking natural water is improving its quality concerning indicators of nitrate ions, general and magnesium hardness.

In the next part of our work we have investigated the effect of *Bacillus subtilis* on water quality. This part of the experiment consisted of two stages. At first, we have studied the effect of the preparation on the composition of water in spring (the temperature was near to 14–15ºC). This was a negative factor for the development of bacteria. We have investigated the effect of this preparation on the concentration of nitrate ions and the pH value of water. We have studied the samples: natural water (sample №1), natural water + probiotic (sample №2) and distilled water + probiotic (sample №3). The first studies were carried out the next day after adding of the preparation to the samples. We have investigated the samples for 11 days.

The results are presented in Table 3.

Table 3. Dynamics of nitrate-ions content and the pH in the spring

Day	**1**	**2**	**3**	**4**	**7**	**8**	**9**	**10**	**11**
Nitrate-ions, mg/dm^3									
Sample №1	92.6	88.3	97.8	95.2	90.4	90.4	92.2	89.1	97.0
Sample №2	100.0	95.2	101.7	102.6	94.8	94.4	100.0	99.6	100.9
Sample №3	0.0	0.0	0.9	3.0	0.0	0.0	0.9	2.2	2.6
pH									
Sample №1	6.9	6.9	6.8	7.0	7.0	7.2	7.2	7.3	7.3
Sample №2	7.2	7.2	7.1	7.3	7.4	7.4	7.5	7.6	7.6
Sample №3	5.9	5.9	5.6	6.0	6.1	6.0	6.3	6.2	6.3

[Results of own research]

The concentrations of nitrate ions in natural water with or without preparation are approximately the same for the entire study period. In the sample of distilled water with probiotic the small concentrations of nitrate ions are appeared periodically.

It's obviously that the preparation makes distilled water more acidic, and the natural water – slightly alkaline. This requires additional studies. The gradual increase in the pH has also been observed in the first two samples.

In the second stage, we investigated the same characteristics, but with favorable temperature for microorganisms.

The results are presented in Table 4.

Table 4. Dynamics of nitrate-ions content and the pH in the summer

Day	**1**	**2**	**3**	**4**
Nitrate-ions, mg/dm^3				
Sample №1	101.1	99.4	99.8	94.1
Sample №2	117.0	96.7	102.9	94.5
Sample №3	0.4	0.0	0.4	0.0
pH				
Sample №1	7.7	7.7	7.4	7.4
Sample №2	7.7	7.7	7.7	7.7
Sample №3	7.3	7.2	7.3	7.1

[Results of own research]

The situation is quite similar to previous investigations. However, we have found only the traces of nitrates in distilled water as on the first day and on the other days of the study. In all samples the value of pH was slightly alkaline. The proposed probiotic doesn't change the content of nitrate-ions and pH. That means, it can be used as an adjunct to complex water purification from contaminants in methods based on adsorption.

The other advantage of our method is the lack of regeneration of spent sorbent. That is why it can be used in the building industry in this form. This makes the water purification process waste-free, cheap and accessible to the household conditions for the majority of the population with low incomes. A small sorption capacity of the sorbent is compensated by its low cost and the possibility of frequent filter replacement.

Conclusions

1. Our researches show that using of water for drinking purposes is not possible without preliminary analysis of its quality. This underlines the necessity of chemical methods of analysis state main components of the environment – soil and water.
2. The method of complex purification of drinking water is proposed.
3. This method makes it possible to purify water from nitrate ions and pathogenic organisms.
4. The probiotic doesn't change the pH of water.
5. The probiotic doesn't affect on the content of nitrate-ions in the water.
6. The sorbent doesn't require regeneration, which facilitates its use.
7. The spent sorbent may be used in the building industry, which makes the process without waste.

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Chapter 20

INFORMATION TECHNOLOGY IN ENTERPRISE MANAGEMENT IN RURAL AREAS

Łęgowik-Małolepsza Małgorzata

Introduction

The functioning of enterprises in turbulent environment requires a modern approach to management from managers, also including the implementation of the latest information technologies. Enterprises operating in rural areas are not exempt from the application of effective information tools. On the contrary, the effects of their activity are reflected in the surrounding environment. Therefore, a modern approach to management is necessary in the company as well as the cooperation with the local community. The aim of the paper is to explore the possibilities of the application of modern information technologies by the manufacturing company operating in a rural area. To achieve the assumed objective there have been used literature studies. In the empirical part, there has been applied descriptive analysis. The empirical studies have been conducted in the manufacturing company operating in a rural area.

Information systems of enterprises

Nowadays, information system transformation is essential for management of enterprises operating in rural areas since the market dynamics and changing environment force entrepreneurs to continuously adapt to new conditions. The possibility of the implementation and application of a wide range of information systems brings about an increase in competitiveness of enterprises. The authors, R. Vetter and L. Wiesenbauer, emphasize social and individual grounds for creating information systems. They indicate the necessity of considering the following factors while designing them [Vetter, Wiesenbauer 1992, p. 32]:

- personal relationships between employees taking part in the process of communication,
- expectations of employees concerning information needs,
- needs for participation of employees in the information process,
- needs for identification of employees with specific courses of communication.

The approach to individual needs of employees in the process of creating an information system in enterprises in rural areas develops trust of employees and allows to gain acceptance for its implementation. The implementation of a new information system in enterprises often faces the resistance of employees. Therefore, the right

motivation and identification of benefits associated with the implementation of new solutions for the organization is necessary.

The information system of the company may have a different level of advancement. L. Kiełtyka and W. Jędrzejczyk presented the four-level classification of advancement of information systems of the company, according to which the first level is characterized by the lowest degree of organizational and functional advancement and, similarly, the fourth one - by the highest degree. The set of levels of advancement is the following [Kiełtyka, Jędrzejczyk 2010, pp. 70-71]:

- the first level – informal information system, functioning without IT support or with the selective IT support,
- the second level – formal information system, based on the IT support and separate sub-systems of specified input and output interface, characterized by a small degree of flexibility,
- the third level – formal information level, based on the IT support and the integration information system characterized by a low degree of flexibility,
- the fourth level – formal information system, based on information business processes, integrated information system, of a high degree of flexibility. It is a type of the "model information system".

The structure of the functioning of the information system of the company may consist of five stages. The first stage includes the identification of information needs (scope) – which amounts to the identification of the subject and type of the activity, the area of the activity of the enterprise, time horizon and functions, scope, idea and also the objective. At the second stage, there is the initiating and directing of the processes of collecting information – this stage consists in the identification of sources of gathering information and the mode of collecting information. Moreover, in the framework of the second stage, there is the selection of methods and techniques for obtaining information and the selection of instruments for processing information. The identification of the set of information is the third stage of the functioning of the information system of the company and consists in building the set of primary and secondary information. In the subsequent stage, there is the processing of information using specific modes, methods and techniques. The last stage includes the analysis and assessment of the obtained information [Krwawicz, Marciniak 2006, p. 285.

Within the operation of the information system, there can be indicated the existence of the information process [Nowicki, Sitarska 2010, pp. 43-59], which "can be understood as the semiotic, economic and technical process" [Zygała, 2007, p. 34; Oleński 2000, p. 255]. The information process may consists of the stages such as [Oleński 2000, p. 255]:

- generating (producing) information,
- gathering (collecting) information,
- storing (remembering, storing, archiving) information,

– transferring information (transmission),
– processing information (transforming, transformation, translation),
– sharing (spreading) information,
– interpreting information (translation into user language),
– using (utilizing) information.

According to J. Oleński, the order of elements [Fertsch, Matulewski 2002, pp. 76-77] (processes) contributing to the definition of the information process is not incidental. It, among others, results from the life cycle of information processes and determines the hierarchy of the requirements that should be met by information processes. Therefore, first of all, they should comply with semiotic requirements, subsequently, economic ones and finally, technological ones. While referring to the discussed information process, in Diagram 1, there is presented the flow of information in the company.

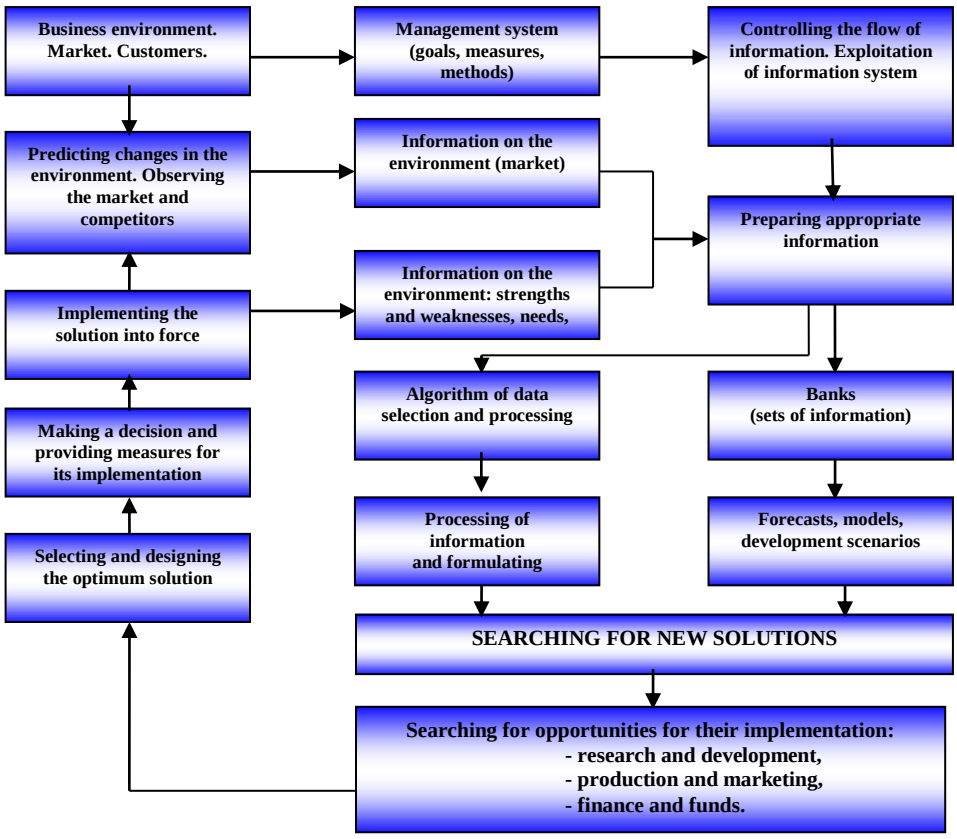

Diagram1. The flow of information in the company

Source: [Wiatrak 2002, p. 351].

While discussing information technologies, right next to the information system, there should be emphasized management information system, consisting of three components: technology, organization and people, which is presented in Figure 1. The knowledge of the listed elements, the environment of the organization, the ability to analyze and solve problems and organizational and behavioral skills allow to create management information systems. Skillful cooperation of the listed three components brings about that the implemented technologies are effective and contribute to an increase in efficiency of the company.

Figure 1. The basic components of management information system

Source: [Sroka 1999 , p. 37].

Management information system is aimed at providing support for activities conducted by organizations. These activities may include: an increase in productivity (cost reduction, an increase in effectiveness) and improvement in the quality, creativity and innovativeness. Management information system [Łęgowik-Świącik 2015, p. 91-99; Skowron-Grabowska 2014, p. 35-39] affects the creation of competitive advantage of the enterprise and development of the strategy of the organization. Among other

measures of management information system supporting the organization, there can be listed: making better and more effective decisions, satisfying customers' needs more rapidly and implementing changes in the organization and its environment [Sroka, 1999, p. 38-39].

Information and IT [Tomski 2015, p. 227-234] systems enable the flow of information in enterprises. The right information, at the right place and time is of particular importance, especially in large enterprises characterized by complex and complicated machine parks where the management of their operation "requires decisions on technical tasks, management of materials and tools, human resources, transport and also the economic and organizational aspects of the performed tasks, in short time intervals, based on current and historical data and taking into account forecasts" [Kaźmierczak 2000, p. 205]. The implementation of information systems in the area of maintenance brings about measurable effects in the form of reliability of the machine park.

Information technology is viewed in the literature as an integral part of business strategies in the enterprise. Matching information technologies with business strategies in the enterprise represents an important decision-making problem. Decision-making concerning future directions of development in the enterprise necessitates not only assessment of current conditions but also application of useful instruments which allow for quick changes in the strategy of the enterprise [Bratnicka, Dyduch, p. 167]. Thinking ahead is becoming a necessary competence of the manager and it translates into innovativeness [Grudzewski, Hejduk, Sankowska, Wańtuchowicz, p. 29]. Planning future directions of development of enterprise activities necessitates changes in the method of collecting, processing and analysis of information, which has now become the basic subject of labour for entrepreneurs today.

The functioning of the information system of maintenance in the enterprise operating in a rural area

The empirical research was based on descriptive analysis of the information obtained from the enterprise conducting economic activity in rural areas. In the analyzed company, information systems have been applied in maintenance processes. Effective functioning of the information system of the maintenance of technical objects in the surveyed company enforces the automation of the process of collecting and processing information. The implementation of computer-aided maintenance management improves and supports the processes of the operation of machines and equipment. The acquisition and processing of information on the processes of the operation of technical objects is used for monitoring the course of exploitation, enables decision-making and helps in work planning.

Reliability of machines and equipment is necessary to eliminate problems associated with loss of efficiency of technical objects, arising from the need to retool

and set up, which brings about loss of time. The adjustment of machines and equipment, being a part of the process line, is the routine activity. However, losses resulting from the need to conduct it make specialists take possible actions to minimize their occurrence. The objective is to identify such activities that can be avoided and the ones whose conduct is necessary. The situation is much easier in the case of modern process lines functioning perfectly without the need for adjustment. The adjustment and setting of obsolete process lines not only brings about loss in working time but also generates high energy and opportunity costs. The situation is similar in the case of replacement of equipment and retooling of the process line to activate the production process of another product.

The surveyed company uses the system of the CMMS group, which is widely used to reduce retooling and setting time. In the surveyed company, the objective is to ensure that all the work related to retooling and setting is performed during planned periodic inspections, in accordance with the "CMMS Machine" software, to avoid double shutdown and start-up of the device, generating high consumption of energy and fuel. To reduce adjustment activities of the process line, specialists attempt to arrange their conduct to implement, in case of failure or other unplanned stopover, all necessary actions to optimize precision setting of technical objects, while ensuring the proper functioning of the process line within some, previously determined, period of time. Proper setting and adjustment of machines and adherence to the adopted measurement standards, resulting from the "CMMS Machine" software, contributes to the achievement of a minimum amount of adjustment.

In the surveyed company, the "CMMS Machine" system operates on the basis of the complex databases holding information on technical objects, their exploitation and the environment and also the availability of materials and spare parts in stock. The information gathered by the "CMMS Machine" system is quantitative and qualitative and it is currently supplemented and updated, while providing competent users with current and up-to-date information for effective management of maintenance systems of technical objects of manufacturing companies. Such a system enables the planning and scheduling of repairs and its primary objective is to "ensure the maintenance of objects of exploitation covered by the operation of the system in the state of airworthiness by signaling the need to carry out maintenance activities, rapid reporting and taking actions associated with the occurrence of emergencies and to optimize and minimize the time required for maintenance and, at the same time, to reduce costs related to the exploitation of the specific object" [Kaźmierczak 2000, p. 236].

The "CMMS Machine" software, implemented in the surveyed company, includes the integrated records of machines, equipment and vehicles, stores technical and administrative information, counters of hours of operation and downtime of machines and vehicle mileage counters. The software registers the records of failure and its exact analysis: reasons, course and effects. The system analyzes costs of failure, used spare parts, machine downtime, repair time and effects for the whole process line.

Additionally, the software is used for planning interim reviews and technical examinations, allowing for verification of technical condition of individual components, thus preventing possible failure. Diagram 2 shows the standard screen of the "CMMS Machine" software along with the main dialog boxes.

The functioning of the modern enterprise in a rural area is associated with a range of benefits for its direct environment. There can be noted the existence of feedback between the implementation and the functioning of advanced information technologies in the surveyed company and its pro-development attitude towards the local community. The application of modern information systems of maintenance in the surveyed company is inseparably linked to the use of modern approaches to maintaining positive relationships with its stakeholders. The surveyed company cares not only for internal development but it also emphasizes the cooperation with its neighbors. This should be understood as a range of actions taken by the company for the benefit of local communities or educational institutions. The surveyed company is monitoring its impact on the natural environment and building the ecological awareness of its neighbors. At this point, one should also mention a wide range of activities of the foundation operating at the analyzed company, whose volunteers are involved in sporting, integration or aid charities.

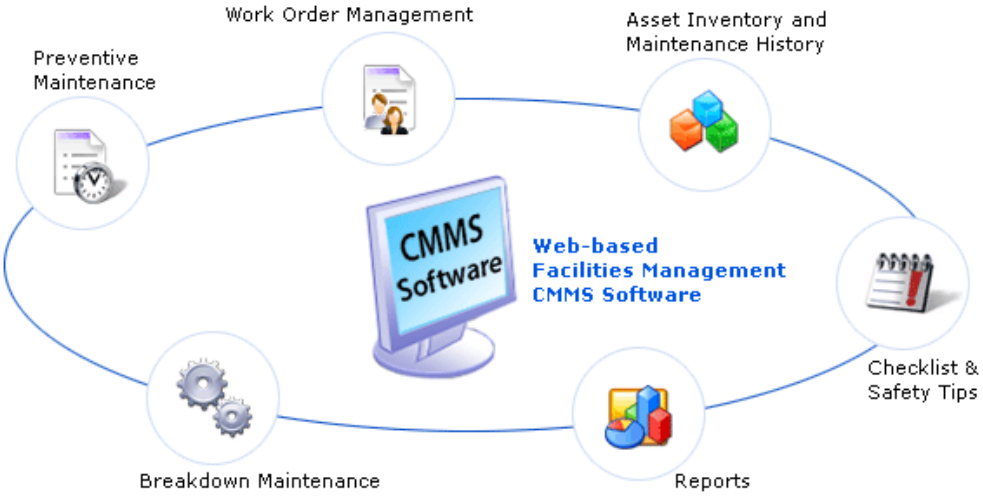

Diagram 2. The standard screen of the "CMMS Machine" software

Source:http://www.elatewiki.org/index.php/Computerized_Maintenance_Management_System_%28CMMS%29accessed on 07.01.2016.

The implementation of the "CMMS Machine" software was rapidly reflected in an increase in the effectiveness of management of the production process. Additional

applications of the discussed software, such as the possibility of storing essential resources: photographs, drawings, documents or files, and also the records of the realized production and efficiency of the machine, and even the information on technical staff operating the device, positively affect the minimization of downtime associated with retooling, setting and removing failure. The access to the collected information on used spare parts and consumables, their prices, suppliers, delivery time, durability and efficiency deserves a special attention. The use of this system raises the standard of work in the surveyed company which, while operating in a rural area, influences the development of rural areas.

Decisions on selection and implementation of particular solutions of information technology have substantial effect on business processes. Information technology represents an instrument that supports achievement of strategic goals in the enterprise. Constant monitoring of adjustment of information technology to business strategy increases generation of value added in the enterprise. A negative assessment of the information technology used might imply making the decision on implementation of other solutions, such as cloud computing [Orlański 2014, p. R9]. Making the decisions on the future of the enterprise should take into consideration the necessity of financial outlays in the IT infrastructure since it directly affects the quality and speed of information which is generated.

Conclusions

The aim of the paper has been to explore the possibilities of the application of modern information technologies by the manufacturing company operating in a rural area. In the paper, there has been presented the case study of the application of modern information technologies by the manufacturing company operating in a rural area. The presented research indicates that the implementation of the "CMMS Machine" system allowed the managers of the surveyed company to conduct complex monitoring activities in the area of the functioning of the machine park, while minimizing losses generated by activities such as machine retooling and setting. The application of advanced information technologies by the surveyed manufacturing company is inseparably linked to the modern approach to pro-development attitude and cooperation with the local community of rural areas.

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Chapter 21

TRANSFER OF INFORMATION IN AGRITOURISM USING PORTALS AS PART OF THE LOGISTICS MANAGEMENT OF RURAL AREAS

Arkadiusz Niedziółka

Introduction

Agritourism has played a very important role in Poland in economic and social development of rural areas for over twenty years. However, it concerns mainly regions characterized by appropriate natural values and by the ability to relax in attractive tourist spots. These are, among others regions by lakes, mountain regions, forests. Moreover, these are winter tourist reception areas where tourists have the opportunity to ski tourism.

The development of agritourism services is determined by various factors. Promotional activity and agritourism information connected with it, are very important in the group of marketing conditions. Especially a large role in this process falls on online advertising which is applied by individual agritourism farms, agritourism associations and municipalities and counties on its official websites on the internet.

Transfer of information about provided agritourism services is an important factor of agritourism development but also an important element of logistics management in rural areas development. Logistics management in this regard is to manage all related activities on the flow of i agritourism information from its direct bidders, mainly farmers with agritourism farms, also from other entities involved in agritourism to potential tourists.

Ads about agritourism offer posted on the network play an important role in logistics management related to transfer of information about agritourism. It mainly relates to official agritourism farms' websides. It is the responsibility of their owners to prepare a suitable portal about their object and putting on it all the necessary information about agritourism offer. Moreover, photographs are valid because thanks to them a potential tourist can make up his mind to come to any agritourism farm.

The aim, range and test methods

The aim of the article is to define the role of Internet advertising used by farmers providing agritourism services in areas of high natural value. In order to achieve this ambitious aim, a survey with 31 agritourism farms' owners from two communities: Skala and Suloszowa were carried out. Within these municipalities is the Ojcow National Park. This park is the smallest national park in Poland but located close to

Krakow. Respondents answered for both open and close questions included in the questionnaire. The survey research was carried out in the summer of 2015.

The essence of agritourism promotion

The promotion of agritourism affects the interest of tourists rest in rural areas in agritourism farms. It is a very important element of marketing and has the task of finding buyers for goods and services agritourism.

Promotional activities of agritourism services can take various forms. Farmers engaged in agritourism can advertise their tourist services in various publications, eg. in catalogues of agritourism farms, any area guides. They can also present their offers on the agritourism fairs. This form of promotion is often co-organized by agritourism associations and municipal governments. The hosts can also promote their agritourism farms on the Internet. The best option is placing its offer on the official website of the municipality. The desirable thing might be also the membership in agritourism association and placing the offers on the website of this organization. But the best the farmer who receives vacationists at his object has his own website of his property, not only included contact, address and telephone, but also interesting and developed tourism offer. Such portal should consist a lot of interesting information about basic services provided: accommodation and gastronomic services, and also about recreational services offered for guests. On the official webside of agritourism farm should be enclosed photographs which show a house in which farmer receives tourists, photographs of guest rooms, kitchen and environment of a house.

Internet advertising is one of the most promotional tools in agritourism services development. It is the Internet's largest number of people looking for any information for recreation in hotels, motels, boarding houses, in other accommodation establishments, among them also in agritourism farms [Malarczyk, Szklar 2004, p. 70].

Internet advertising in agritourism

Agritourism offers can be found on the official websites of municipalities, counties, agritourism associations and agricultural advisory centers. The important point is that farmers had official portals of its facilities. Entering the portals should be just from pages of listed entities.

Online advertising is a very important promotional tool in agritourism. Agritourism portals containing leisure offers at agritourism farms are one of the most important forms of communication with the market. So many people choose to stay with farmers just due to online advertisements, which are posted on the official websides of municipalities, counties, agritourism associations or tourists attractive region.

Internet services, which networks are massively used in the promotion of agritourism services in Poland are an important department of informatics. In the field of rural tourism and agritourism they are a powerful tool in agritourism promotion.

Internet advertising of agritourism farms must be properly prepared. It has to include all services provided by farmers for guests. Agritourism farms always provide tourists accommodation and very often catering services, too. These services are classified as basic hotel services. In recreation offers in a country number of and differentiated services are also provided.

In the opinion of M. Drzazga, properly designed website should [Drzazga 2006, p. 141]:

- have a short, easy to remember address of agritourism farm,
- should stand out against competitors,
- should be characterized by transparency, plausibility and ease of use,
- should encourage customers to return visits (eg. through interesting graphics, news information),
- should contain all the necessary for customers information (eg. address, phone number),
- should contain counter the page.

The advantages of using the Internet are [Marcinkiewicz, 2003, p. 77]:

- possibility of a low-cost and high-speed transfer of large amounts of information,
- cheap and fast contact with co-workers, subcontractors, suppliers of services,
- opening doors to new markets,
- the possibility of immediate customer response,
- easy to estimate interest in the offer,
- availability 24 hours a day.

To the advantages of using online portals J. Sikora also includes the current updates of pages, reduction in advertising costs and acceleration contacts with customers [Sikora 2012, p. 188]. The author also draws attention to the fact that the website is the most frequently used by agritourism farms promotional tool [Sikora 2012, p. 188]. Thanks to the websites customers are able immediately to exchange information with agritourism farm, for example by expressing an opinion on its products, services, and by placing an order [Sikora 2012, p. 188].

Even before the Polish accession to the European Union Internet was an important instrument in agritourism promotion. It was confirmed, among others, by L. Strzembicki's surveys, who examined 416 tourists rested in agritourism farms in different parts of Poland in 2003. It turned out, that the vast majority of them learned about the offer rest at farmers' just with internet portals [Strzembicki 2005, s. 32]. On the other hand, a few years later, the author of this paper conducted a surveys with the owners of 365 agritourism farms operating in Malopolska province about forms of communication with the market used by them. The results of surveys showed that 61,9% of rural providers used internet as the kind of promotion [Niedziółka 2008, p. 80].

A similar study was conducted in 2008-2009 by J. Zawadka on a sample of 81 agritourism farms in the Lublin province. Results of the study confirmed the high role of the Internet in promoting agritourism. Over 90% of farmers involved in agritourism advertised themselves on web portals [Zawadka 2010, p. 142]. The same author, during this period surveyed also 218 tourists resting in agritourism farms. It turned out, that 63,3% of them indicated on the internet as the source from which they learned about opportunities for recreation in agritourism farm [Zawadka 2010, p. 143-144]. Internet portals with agritourism offer also apply various organizations, agritourism associations. Moreover, on the official website of municipalities and counties it is often possible to find offers connected with the rest at farmers'.

Various organizations also play an important role in the online promotion of agritourism. In 1996 the Polish Federation of Rural Tourism "Hospitable Farms" was set up. It is a national organization of professional and regional agritourism associations. The main task of the Federation is to promote agritourism in Poland and the categorization of objects of rural accommodation facilities [Sznajder, Przezbórska 2006, s. 136]. The most important form of promotion used by the Federation is Internet advertising.

On the use of online advertising on agritourism used by agritourism associations numerous scientific studies were written. The authors dealing with this subject pointed out the role of these organizations in promoting agritourism and rural tourism services using not only online advertising, but also press releases, organizing trips to agritourism fairs or various forms of public relations, for example conferences, symposiums [Filip., Lechwarz 1998, p. 141-142; Knecht 2009, p. 147; Koniusz 2009, p. 83; Zawadka 2010, p. 112].

A municipality also plays an essential role in agritourism promotion. In regions attractive for tourists from the activity of local authorities in the area of agritourism promotion depends to a large extent, the development of this form of tourism in rural areas.

In the management of agritourism different logistics concepts are often used. It's seen, among others in common activities relating to the promotion of agritourism. Logistics in this case is in fact the planning process and the flow of agritourism information from the point of origin (from the owner of agritourism farm) do the point of consumption, so for tourists vacationing with farmers in the countryside [Niedziółka, Brzozowska 2013, p. 124]. It should be added, that it's important to choose the appropriate logistics system to estimate the associated costs [Man, Nowicka-Skowron 2010, s. 165].

In the flow of agritourism information, mainly in Internet, in the Malopolska Province an important role is played by the activity of agritourism associations. Four of these organizations belong to the national Polish Federation of Rural Tourism "Hospitable Farms". These are: Galician Hospitable Farms, Tourism and Agritourism Association of Mountaineers, Association of Limanowa County and Malopolska

Association of Rural Tourism “Hospitable Roznow”. The main task of these organizations is agritourism promotion in this part of Poland. These organizations support the associated country providers by publishing, possibility of advertising on its official websides and by organizing trips to agritourism fairs [Niedziółka 2012, s. 1138].

Results of survey

The questionnaire was sent to 31 owners of agritourism farms operating in or in the labbing of the Ojcow National Park. It consisted of 21 questions and was divided into two parts. The first one concerned the respondent, and the second one included questions related to his agritourism activity. Most questions from this part of the survey referred to the promotion of agritourism, including promotion of agritourism services on the Internet.

The study involved 29 women and only two men. The largest group of respondents were people falling in the age group 45-54 years, 8 persons declared their age between 35-44 years. Among the respondents, only five people were in the 55-64 age group and two farmers were aged 25-34 years.

The dominant group of owners of agritourism farms are persons with secondary and vocational education.

The second part of the questions related directly agritourism. It turned out, that the majority of respondents have been engaged in agritourism for over ten years. 24 surveyed people pointed at this respond. Only 7 farmers have been providing agritourism services from 5-10 years.

All respondents stated that the summer season is most common for tourists to visit the Ojcow National Park, but in all farms tourists are welcomed off-season, too.

The examined owners of agritourism farms the most welcome their guests for 1-2 nights. Less frequently it happens that tourists remained in the farm for 3-4 nights or longer.

The following question included in the questionnaire was referred to motives for setting up agritourism farm. It was possible to sign more than one answer. The theme of the start of agritourism activity in all farms was the desire to earn additional income. In addition, 25 people wanted to use the existing accommodation facilities and the attractive location of their holdings.

However, for the question about one the most important motive related to setting up agritourism farm, the vast majority of respondents pointed to the terrain and landscape – 25 people.

Respondents also pointed to factors conducive to the start of agritourism activity. In this case they could choose more than one answer, too. Also in this case they could choose more than one answer. All the respondents pointed to the terrain, 27

respondents to the proximity of monuments, 22 people on the unpolluted environment and 6 on good transport accessibility.

For the question about running agritourism farm and guests service, 25 people answered, that they are assisted by family. Only five farmers responded that they deal with agritourism alone, and only 1 respondent hires extra help during the peak season.

The majority of examined farmers (26 people) have up to five rooms. It is connected with to the lack of tax exemption and the need to pay income tax on individuals with the titles of its profits from the provision of accommodation and catering services. 5 people declared, that they have from 6 to 10 rooms for tourists.

All respondents have in bathrooms in their guest rooms. In addition, 27 owners of agritourism farms offer their customers the access to wireless Internet Wi-Fi. In 18 farms in its rooms there are TVs and in 15 farms are refrigerators.

In addition to the guest rooms for guests, in 15 agritourism farms it is also a possibility to pitch tents around the house. Sometimes arriving vacationers choose just this option of accommodation, while in all facilities catering services for tourists are provided. At the same time all respondents hosts offer their guests possibility of making bonfires and grilling.

21 owners of examined agritourism farms declared, that they are planning for the future construction of recreational equipment such like pitch, children's playground in order to improve the quality of services provided. In turn, 9 hosts plans to expand its offering accommodation.

Another question included in the survey concerned cooperation with local authorities in the field of agritourism. Again, 21 respondents cooperates with the local government municipalities but only 11 of them are satisfied with this cooperation.

Some questions included in the questionnaire were connected with promotional activity. It turned out, that at the beginning of respondents' activity they promoted their services in internet. Till now they have the offer to rest at their agritourism farms in the net. Most of them, namely 24 people have an official webside of their agritourism farm, and only six people promote themselves on the official webside of their community giving only phone contact and mail.

On official portals of own agritourism farms, the respondents set the most information connected with their activity. There are information about prices, guest rooms, possibility of board, accessible equipment, etc. There are beautiful photographs included there, too. They relate to a view of the house, rooms in which tourists stay, bathrooms, kitchens, garden, garden furnitures, places for bonfires and grilling.

All the examined confirm, that internet advertiing is the best form of promotion which they use. Only few people indicated on others additional tools of promotion like catalogues with agritourism offer or trips to agritourism fairs.

Over half of the examined who have own websides of their agritourism farms (13 people) think about improving this portal. The respondents take into account enclosing much more information and adding new photographs.

Conclusions

Internet advertising is a very important internet tool in agritourism. It is very widespread among farmers providing agritourism services. On the official web portals of their agritourism farms are included information about the services of accommodation, catering and recreational facilities. They also posted photographs of houses, guest rooms., kitchen, home environment, recreational equipment. A potential tourist can also find on these sites contact by phone, sometimes mail to the object. He is able to get to know about tourists attractions, environmental values and architectural monuments, which are near agritourism farm, too. Tourists who spend nights on a farm can visit them.

In logistics management in agritourism, in the transfer of information about offers of agritourism farms, the internet is a very important promotional tool.

On the basis of surveys with farmers having agritourism farms in or near the Ojcow National Park you can make the following conclusions:

- in the management of agritourism promotion is a very essential element of marketing in agritourism and extremely mportant factor of agritourism services development,
- Internet advertising is commonly used tool of promotion in agritourism, all examined farmers promote their agritourism farms in Internet,
- in all respondents' opinion Internet advertising is the form of communication with the market, plays an important role in the logistics of agritourism services,
- all farmers at the beginning of its activities have used online advertising,
- the vast majoraty of hosts have own website of their agritourism farm,
- part of the examined think about improvement their agritourism farm,
- in logistics activity in agritourism, in the flow of information about offers to rest at farmers, official portals of individual agritourism farms are the most widespread and the best mean of communication wiuth the market.,

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Chapter 22

THE APPLICATION AND DEVELOPMENT OF INFORMATION TECHNOLOGIES IN LOGISTIC MANAGEMENT OF AGRICULTURAL FARMS

Dudek Dariusz, Sałek Robert

Introduction

The functioning of agricultural farms to a significant extent involves the same market laws that influence the activities of industrial enterprises. The constant pursuit of increasing the effectiveness of production and the global flow of goods derived from agriculture pose new challenges for agricultural farms, as well as providing new possibilities of growth. The increasingly greater accessibility to new industrial technologies has led to the inevitable, yet also positive changes in the agricultural areas.

Agriculture in highly developed countries is to be found at a very high level in the context of availing of modern IT technologies. The integration of Poland into the structures of the European Union enabled the more efficient flow of industrial and agricultural technologies, as well as facilitating the opening up of new markets, while also forcing entrepreneurs and farmers to increase their level of competitiveness. Within the last decade, it has been possible to observe the significant growth in the sphere of modern and innovative technologies utilized in rural areas and particularly in agricultural farms. Thanks to the increased level of subsidies from the EU funds, Polish farmers have the opportunity to acquire the appropriate resources for the development of the particular farms, thus simultaneously improving the production capacity and level of competitiveness with relation to the agriculture of Western Europe.

Agricultural production systems

The agricultural system or the system management is defined by the ways of managing agricultural space in the sphere of animal and plant production, while also their processing which is defined by ecological and economic criteria. In contemporary agriculture, it is possible to distinguish three basic systems as follows [Harasim 2002, p. 119-126; Niewiadomski 1993, pp. 9-23]:

- conventional agriculture,
- ecological agriculture,
- integrated agriculture.

With relation to the agricultural system, a frequently accepted definition is the agro-technical system or agro-ecosystem. A particularly characterized notion was presented by T. Nowacki, in which he describes the agro-ecosystem as the following: „…a semantic description of an autonomous set of elements of a humanistic, natural and technical nature that synergistically cooperate with each other with the aim of transforming various forms of energy and components of the environment into products that are suitable for the metabolic processing into living organisms…" [Nowacki 2002, pp. 485-496].

This notion is availed of in the differentiated degrees of complexity of the given agro-ecosystem. It is applied in the sample specification of the crops of agricultural farms and logistics flows of supplies, processing and distribution of plant products [Walaszczyk 2012, pp. 875-883].

In subject-related literature, the difference between a farm and an enterprise is expressed in the following way: "an agricultural farm is the smallest production unit of agriculture in the production sphere, while an agricultural enterprise is treated as a unit in the economic sphere that exists thanks to connecting the agricultural workshop with the external world" [Budzinowski 2009, pp. 58].

Conventional agriculture has been defined, according to the European Commission, as the most widely dispersed and applied agro-ecosystem in a given place and time. Most frequently, this system is associated in Europe with an intensive economy characterized by high energy and material outlays with the aim of acquiring the maximization of production [Perspective Analysis of Agricultural Systems, 2005]. The alternative systems of production include the following [Zimny 2007, pp. 507-518]:

- ecological agriculture,
- protective agriculture,
- integrated agriculture,
- sustainable agriculture,
- qualitative agriculture,
- urban agriculture,
- precision agriculture – availing of ICT technologies for the appropriate adjustment of the outlays to the production requirements.

While listing the array of systems of agricultural production, it is necessary to take into account the fact that there is a multitude of other ones of a significantly lesser importance. Nevertheless, it is worth bearing in mind the fact that all systems are registered in a classification according to two principal categories as presented in Fig.1.

The intensively developing trend of agriculture observed over the past few years is that of precision agriculture. However, it is essential to take into account the fact that this term does not define a new system of agricultural production as it involves the application and utilization of the latest technological novelties in the existing systems

of agriculture. Hence, it is necessary to support the claim that precision agriculture should be perceived as systems of precise agricultural techniques [Granstedt, Tyburski 2006, pp. 72-95].

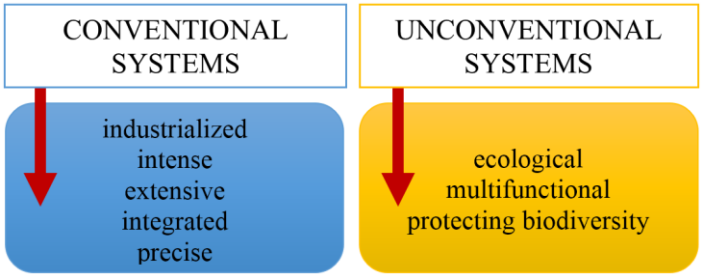

Figure 1. General classification of agricultural systems

Source: Own study based on: [Baum, Wajszczuk, Wawrzynowicz 2012, pp.74].

Information technologies in precision agriculture

The dynamics of technological development to a significant degree also led to the IT implementation in the agricultural systems of production. Precision agriculture constitutes the response to the need to realize the concept of sustainable development, as it constitutes one of the more important elements and requires specialized qualifications from the user. The essence of precision agriculture is the utilization of advanced information and navigational technologies, as well as the wide-ranging methods of acquiring and processing data [Kulej-Dudek 2012, pp. 94-111]. Credible and precise information constitutes the basis of the effective functioning of the systems of precise agricultural techniques, thanks to which it is not only possible to control by actuators, but also build entire production strategies [Doruchowski 2008, pp. 19-20].

The main tasks facing precision agriculture may be distinguished as follows [Bertschinger, Callesen, Costa, Doruchowski, Zurcher 2006, pp. 04-129]:

- minimization of outlays,
- respect for the environment,
- protection of natural and human resources,
- care of dignified and safe working conditions.

By taking account of these tasks, together with the aim of the development of the agricultural farm, it is necessary to acknowledge precision agriculture, namely IT systems of precise agricultural techniques, as one of the most significant tools constitutes the future direction of the development of agriculture.

The activities of agricultural farms in the context of availing of precise techniques come down to the implementation of the integrated information-production system,

supporting the achievement of more favourable economic results with the simultaneous reduction of the violation of the natural environment. Hence, it is possible to conclude that the generally termed precision agriculture or the information systems applied in it may be identified as the perspective direction for agriculture facilitating the integration of economic and ecological aims [Brodzińska 2009, pp. 5-18].

The principal achievements of the systems of precise techniques utilized in agriculture over the past three decades include the following [Doruchowski 2008, p. 21]:

- satellite navigation of agricultural machines and equipment,
- computerized mapping of crops,
- monitoring of features of soil,
- control of conditions of plants,
- precise utilization of machines,
- precise application of fertilizers.

At present, access to the modern agricultural techniques is very wide. Enterprises offering complex ICT systems for agriculture also render complex services in the field of for instance carrying out land surveying measurements, taking samples and scanning soil. The greatest progress is noted in the area of acquiring, processing and interpreting information that is determined by its functionality and precision of the actuators [Wiśniewska-Sałek, Sałek 2012, pp.143-152].

The utilization of the systems of precise techniques requires first and foremost the creation of a digital image of the resources and variability of the soil, thus the most significant element of precision agriculture is that of precise maps. These are created with the aid of the appropriate techniques of GPS and GIS[5], thus gaining an exact contour of the area and the variability of the resources of the soil (micro and macro-elements, pH) [Gozdowski, Samborski, Sioma 2007, pp. 45-50].

Adjusting the amounts of fertilizers and other means of protecting plants to the actual needs facilitates the rational application without the risk of reducing the crops. This solution consequently leads to the reduction of production costs, restriction of the threats to the environment, while simultaneously increasing the results from the production gained. It is also necessary to take account of the construction changes and modifications in agricultural equipment that are integral to the implementation of the techniques of precision agriculture. They facilitate the precise application of the means of protecting plants and fertilizers by computer-controlled mechanisms. Enhancing the production efficiency by means of mechanization enables the maintenance of the specified agro-technical deadlines, which in turn facilitates reducing or even avoiding losses during harvesting [Pawlak 2010, pp. 5-12].

[5] GPS – *Global Positioning System*, GIS – *Geographic Information System*.

Systems of satellite navigation in agricultural logistics

The current global positioning systems (GPS) took on their present shape and were made available for widespread civil use only in 2000. This allowed the users who did not have corrective systems at their disposal, to locate signals on the surface of the ground with a precision of between 3 and 12 meters. Gaining such locational possibilities facilitates navigation in land and sea transportation, however only in creating documentation of field work in agriculture and managing the fleet of transportation vehicles. A diagram of the functioning of the GPS system is illustrated in Fig.2a. Positioning of the automatic control of agricultural machines requires a precise system that allows for the acquisition of precision of even below one meter. This is possible by means of correcting the signals with the aid of external differentiated systems - DGPS (Differential GPS), which support the widely available navigational solutions. The functioning of the differential systems involves the transmission of additional signals to the receiver that include correcting the mistakes of the GPS positioning. The DGPS signals are sent by the base ground station of a known location or via geostationary satellites (Fig. 2b). The first solution enables the acquisition of the range that is restricted from several to umpteen kilometers, which is decided by the power of the transmitter in the ground station. With the application of the standard systems, the corrections of the differences sent with a delay, thus their precision of locating is the lowest and amounts to between 0.5 to 1 meter. A significantly more expansive solution is to utilize the geo-standard satellites and base stations, thus creating an integrated system. In these systems, the signal is emitted in two scopes, apart from satellites there are also ground reference stations, which render the possibility of enhancing precision to 10-15 cm. (Fig. 2c). The most advanced systems of positioning in real time RTK-DGPS (Real Time Kinematic DGPS) allow the acquisition of precision of between 1-3 cm. (Fig. 2d) in which there is also the possibility of strengthening the position with precision of below a meter of precision, however it is important in these cases to apply a correction of all the objective errors of the GPS, but subjectively as interference or reflection of a VHF wave [Doruchowski 2008, pp. 21-23].

Likewise, it is also worth paying attention to the other systems applied, which may include the systems of a local LPS wave. It is possible to divide them into two parts as follows: remote positioning or self-positioning. The former involves the location of an object moving around a given order with the aid of stationery equipment, however the latter allows the mobile equipment to determine its own position with the aid of equipment placed on it. This includes the decisively differentiating autonomous systems, which do not require additional instrumentation that is installed on the machine. The solutions applied in these video systems facilitate running machines by means of scanning the area in front of the vehicle and identifying elements of a constant structure. Their precision amounts to 3-5 cm, whereas the wide availability

of the solutions offered by producers and the ease of installation translates to their popularity [Fischer, Pracherstorfer, Stelzer, Soeser 2003, pp. 128-135].

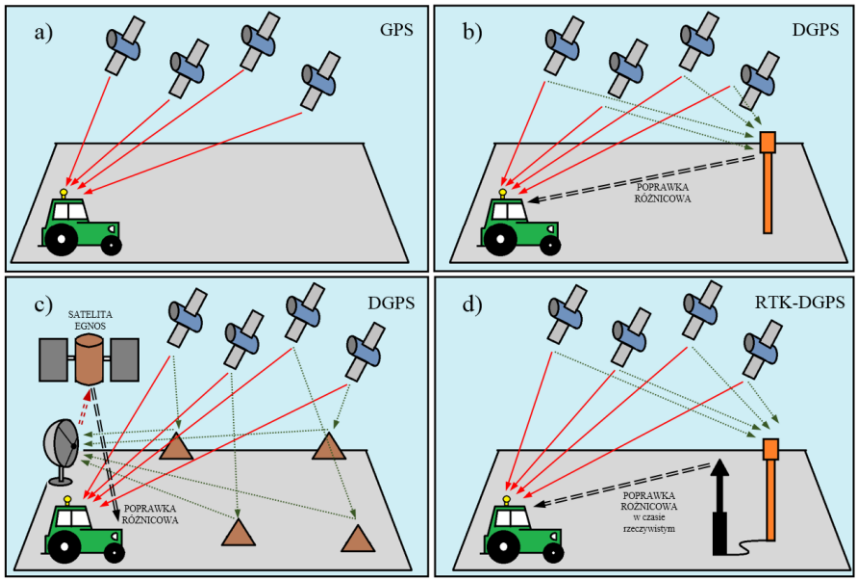

Figure 2. Types of systems of satellite navigation

Source: [Doruchowski 2008, p. 23].

In the case of the optimization of the positioning, it is possible to connect the LPS systems with other available solutions. GPS systems enable global positioning without the need to calibrate the transponders of the system of local positioning. Thanks to global systems, it is possible to establish the location and movement of machines for further distances, whereas for the purpose of more exact movements, it is possible to also switch on the local systems. Additionally, LPS may be integrated with laser or supersonic equipment, thus gaining precision down to millimeters. Thanks to such combinations, it is possible to carry out the tasks of very precise positioning (laser), while less demanding measurements are carried out with the use of local systems, which are sufficient in a given operation. Connecting more than two systems is also possible [Wendebaum, Fliedner, Marx, Horn 2008, pp. 71-78].

Development of Polish agricultural farms

For over 25 years, Poland has been realizing operations in pursuit of development in various economic areas. Accession into the European Union enabled the additional integration with highly developed countries, by means of which the incoming flow of technology and innovations became efficient. The changes occurring, together with the

political and economic transformation are perceived by the majority of society as positive. Nevertheless, it is essential to remember that for a large group of people, these are changes that are synonymous with worrying phenomena, particularly the oldest age group and communities from rural areas.

Rural areas are of huge economic, social and environmental importance as they constitute 93.2% of the surface of the entire country of Poland. Indeed, rural areas are defined as "terrain that is located outside the administrative borders of cities", signifies that it includes rural communities and parts of urban-rural communities. [6]

The division applied with regard to a city and rural area in urban-rural administrative districts characterized by separate identifiers facilitates the accumulation of the appropriate statistical data in terms of the division into cities and villages. There is the possibility of expanding the definition of rural areas to include small urban centers that are closely connected with rural areas. This definition based on the administrative division in Polish conditions is very similar to the methods of defining rural areas applied by the OECD[7] and Eurostat[8]. In accordance with these organizations, rural areas in Poland would constitute 91% and 85.7% respectively. In spite of the multitude of programs supporting the development of Polish agriculture [SAPARD, PROW 2007-2013], further needs for investment are visible that first and foremost relate to the technical infrastructure utilized in agriculture. By implementing the appropriate instruments of financial aid, it is possible to enhance the level of competitiveness of agricultural farms by way of the following:

- modernization of technical-production infrastructure,
- adjustment of the profile, quality and scale of production to the market needs,
- increasing the safety of food,
- improvement of the conditions of animal housing and care,
- environmental protection,
- work safety.

Polish agriculture is not only characterized by the high level of impact on the socio-economic area, but also the biological differentiation, landscape and entire natural environment. However, it is also featured by a slight impact on the macro-economic indicators, particularly GDP. The share of agriculture in GDP is decreasing systematically, as in the years 2010-2012 it amounted to an average of 3.9%, whereas in the years 2001-2003 it was ranked at the level of 4.6%. This phenomenon is characteristic of highly developed economies and gross added value is growing. In the period of 2001-2012, the average annual dynamics of growth for added value

[6] Criterion of extraction, made on the base of territorial division by National Official Register of Country Territorial Division (TERYT)

[7] Criterion of OECD – rural areas are considered as areas with a population density up to 150 people/km^2.

[8] Criterion of Eurostat – classifying an area as rural when the density of its population is up to 100 people/km^2.

amounted to 1.4%, while in the case of the remaining market sectors it totalled 4% [https://www.minrol.gov.pl/content/download/47180/259708/version/3/file/Rolnictwo%20i%20obszary%20wiejskie_10%20lat%20w%20UE_v5.pdf]

Modernization of rural areas within the framework of (PROW) Rural Development Program

The most significant action undertaken by the Polish parliament, particularly the Ministry of Agriculture and Rural Development was the implementation of the Rural Development Program 2007-2013. The appropriately directed EU funds have facilitated the rapid growth of both innovativeness and competitiveness of agricultural farms in rural areas. Actions undertaken within the framework of the Rural Development Program were of a multi-task aspect and concentrated on the problematic issues of the economic development of agricultural regions. At present, the Ministry of Agriculture is taking all action within the framework of continuing support for rural areas. A new detailed Rural Development Program 2014-2020 that is supported by the European Agricultural Fund on behalf of the Rural Development Program (European Agricultural Fund for Rural Development) has been prepared for this purpose.

According to the directive of the European Parliament and the EU Council no. 1305/2013 dated 17 December 2013 relating to support for rural areas by means of EAFRD, the Rural Development Program 2014-2020 was prepared. EU regulations define the implementation of programs in detail (by means of the appropriate partnership agreements), which must be integrated with the entire system of the policy of development for Poland. The utilization of the financial resources granted must be cohesive with the aims of the EU according to the guidelines stipulated in the strategy entitled "Europe 2020 – Strategy of smart, sustainable and inclusive growth", by taking account of the development needs for a given member state [Brzozowska 2013, pp. 121].

The principal aim of the Rural Development Program 2014-2020 is the improvement of the level of competitiveness in the agricultural sector, while simultaneously realizing the six priorities of EU policies for the development of rural areas [http://www.minrol.gov.pl/pol/Wsparcie-rolnictwa-i-rybolowstwa/PROW-2014-2020]:

- streamlining the transfer of knowledge and innovations in agriculture, forestry and rural areas,
- improvement of the level of competitiveness of all types of agriculture and increasing the level of profitability of agricultural farms,
- improvement of the organization of the food chain and promoting risk management in agriculture,
- recreating, protecting and strengthening the ecosystems dependent on agriculture and forestry,

– supporting the effective management of resources and moving towards a low-emission economy that is resistant to climate change in the following sectors: agricultural, food and forestry,
– increasing social inclusion, restricting poverty and advocating economic development in rural areas.

The planned public resources in total that were designated for the realization of the program amounted to 13.5 bn Euros, including 8.6 bn Euros from z EAFRD, as well as 4.9 bn Euros from the state budget. The entire financing is to be directed towards the agricultural sector that possesses a particular significance in the context of sustainable development of rural areas. Additionally, actions shall be taken to develop entrepreneurship and technical infrastructure in rural areas, as well as a continuation of the implementation of the Local Development Strategies.

Conclusions

Polish agricultural sector is a vital component of the national economy. Through adequate funding and undertaking development activities it is possible to strengthen the economic position as well as improving the quality of agricultural products. Nowadays we observed increasing use of modern technologies not only in everyday life but also in the broadly understood concept of the economy. The article focuses on the application of new information technologies in agriculture, with an emphasis on precision agriculture as a new trend of development. Precision engineering tools are widely used in logistic activities of farms. It highlights the particular use and adaptability of satellite positioning systems for agricultural machines and equipment, through which it is possible to increase production efficiency. Modern information technologies are often a key factor deciding about performance of businesses. Similarly, in case of agricultural farms, which need to open for new solutions enabling increase their competitiveness. However, implementation of new technologies is very often associated with high costs of their purchase and maintenance. The wide availability of specialized agricultural systems allows you to select the technology appropriate for your needs. A very important issue for the development of agricultural farms is help from the EU in funding from and national programs for agriculture development. These programs enable to obtain financial support for purchases of appropriate measures, including new technologies, through which agriculture in Poland has a good chance to compete with the western highly developed agricultural economy.

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Chapter 23

TELEMATICS IN AGRICULTURAL MACHINERY

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Introduction

The 21st century as the century of information on the one hand creates new opportunities, and on the other hand, forces entrepreneurs mainly on the continuous optimization in terms of information flows within the company and outside because of increasing competition, increasing requirements for manufacturers, distributors and retailers by potential customers or by state or local authorities [Starostka-Patyk, 2012]. There are a number of hardware and software to facilitate the collection, transmission, storing and presenting information. Smart-phones, computers and tablets have become in addition to "traditional phone, fax or photocopying" normalcy in the daily life of every human being. The use of these modern devices makes life easier, creates new, previously unavailable opportunities in every field of life and makes access to information is as easy as never before. Weather information, access to data encyclopedias, and dictionaries online facilitate the work of people in all professions, and access to wireless information technology dispenses with the need to return to the offices to work. Easier access to information is also to agricultural enterprises an opportunity to improve the functioning, optimize processes and the possibility of obtaining more and better work results with less investment. Of particular interest here can enjoy the technologies that facilitate access to the data from their own vehicles, tractors, reapers and other machines working in the field. Understanding the essence of this technology and learning opportunities that it offers the modern farmer can facilitate decision for entry and choosing the right information system for your farm.

Telematics, transport-telematics and agriculture-telematics

Telematics as a field of connecting systems, telecommunications and information technology is nowadays used in almost every area of human life. The concept is close to concepts telemetry (remote measurement systems) and telemechanics (remote control systems). In a technical look telematics is a cooperation of systems and telecommunication systems for transferring, sharing and presenting information from external devices in the database, information from the database to external devices and between external devices [Müller, Eymann, Kreutzer 2003].

Telematics can include a whole range of devices, hardware and software solutions. Usually the term telematics is used in conjunction with the field in which it is used, for example, transport telematics, medical telematics, traffic telematics. Telematic systems

are offered on one hand by independent producers who specialize in these systems, on the other hand also by the manufacturers of vehicles or machinery as a supplement to the offer to the customer. Systems from independent producers usually allow for installation in any vehicle or machine, have a set of built-in sensors and often the ability to connect additional input signals from the computer systems of the vehicle or machine or additional sensors. This solution has the advantage of transferability of independent systems to other vehicles or machines as needed. The disadvantage of such solutions is usually less number of the data obtained and the standardization of software and the danger of inadequate adaptation of telematics to the machine on which it is installed. Telematics offered by the vehicle or machine manufacturer is usually closely aligned to the product of what is sold. This means that on the one hand, it is optimized to work with the product: it is placed in optimal position, equipped with an interface designed specifically for the type of machine and offering good, direct access to data according to the logic of the machine, on the other hand, the telematics is an integral part of the machine and can not be freely installed in other kinds of machines.

Interesting from the point of view of the user is the range of the obtainable information with the telematics. This information can be obtained from various sources:

a) directly from sensors mounted in the telematics device, for example:
   - GPS position,
   - acceleration,
   - tilt of the machine,
   - temperature,
   - image from the camera inside the device;
b) from additional sensors, for example:
   - thermometers,
   - humidity sensors,
   - IR cut signal beam;
c) from computer systems of the vehicle, for example:
   - speed,
   - engine rpm,
   - the position of the accelerator brake or clutch pedal,
   - steering wheel position,
   - the amount of fluids,
   - fuel level;
d) from semi-trailers, trailers, for example:
   - signal the opening or closing of valves,
   - the position of the hydraulic lift cylinder,
   - Information from flow meters at the tanks,

- Information about the status of supplies for example brakes,
- Information about the proper clinging to the towing vehicle;

e) from sensors of working machine, for example:
   - the position of working tools,
   - the state of mounted devices:
   - at the mobile machine signals such as speed, fuel level, etc.,

f) Information entered by the driver or operator of a machine, for example:
   - work time,
   - information about current activity,
   - the quantity of loaded or unloaded goods,
   - additional information for example about the damage,
   - completing the forms sent from the central system with missing data.

In addition to information collected by telematics, these devices allow the visualization of data transmitted from the central systems as for example:

- Information about further orders,
- Text information,
- navigation information,
- information about made level of labor standards, etc.

Telematic systems available on the market can also be divided according to the degree they expand and sophistication and the functions available.

We can distinguish here:

- simple telematics device with no user interface (so-called black boxes),
- devices having an interface with a fixed set of the information provided and solid forms for entering information,
- equipment allowing access to public Internet resources.

Data have been collected by the device is transmitted to the base system by using wireless communication. Because of the general availability and the increasingly weakening prices, supports communication between external devices and the database using a mobile telephone network. (data transmission via SMS, or via GPRS (General Packet Radio Service), or more modern like UMTS (Universal Mobile Telecommunication System) [Patil 2003], LTE(Long Term Evolution) [Kreher, Gaenger 2011]. Transmission of information via SMS is rarely used due to the small number of possible to transmit at once information, and the relatively high price of the information transmission. Communication via mobile telephone network means that a necessary component in telematics devices is the telephone module and SIM card with the appropriate tariff for the transmission of data.

Choosing the right system to use will depend on the desired function, area of using the device, available financial resources, compatibility of the device with the vehicle or machine.

Information from telematics systems for agriculture

The modern farmer has to choose from a whole range of facilities information to optimize processes and information flows on the farm.

In terms of the origin and the direction of flow of information can be divided into:

a) External information (internet, external databases, directories)
   Access to such information provide computers, tablets, apps for mobile phones. Easy acces to Internet communication solutions, development of social media and Web 2.0 stimulates customer`s activity [Jelonek 2015]. The usefulness of telematics access to such information is limited. It is possible in some telematics devices to allow access to the Internet fully or providing only selected addresses that are useful at work. Such a solution could pose a risk for the employee entrance to unwanted websites and for infection of the device with viruses.
b) Information from the farm to workers and machines working in the field
   This information can include work orders, parameter settings of working machines, text information to employees, dosing of fertilizers or pesticides. Transmission of this information may be assisted by telematics systems, and their quality and speed of transmission will be much better than existing solutions like telephone or SMS. The main advantage compared to telephonic communication is the accuracy of transmitted information (no possible interference with telephone conversations), the ability to archive and documentation sent messages (in the form of log data transmitted and received), an opportunity to confirm receipt of the information and in the case of orders – to confirm their execution. With advanced telematics systems, telematics devices can connect them through appropriate interfaces with the electronics, equipment and control their parameters remotely from the base of the farm.
c) Information coming to the farm from staff and machines working in the field
   Information coming from the field can be very diverse. This information can be divided into: information about the vehicle, information about an employee, information about the treated product (the planting / sowing, harvesting, or general work in the field).
   Information about the vehicle may be: its speed, direction and trail ride, acceleration, braking, fuel level and fluids, engine RPM.
   An interesting aspect of the use of telematics is to collect employee data. Telematics systems can be used to automate processes, control and accounting of working time of employees. These data can also be used to control the work efficiency. In this aspect may be of interest to take a look on downtime data of the machine, and employee. Such data in conjunction with their associated additional information, as the state of the machine, the position on the map or fill levels of trays can be the basis to seek solutions to reduce downtime.

Telematics systems can also collect data about the state refill the machine when sowing or harvest, time remaining to fill or empty the tray, settings parameters of working tools, product parameters (for example humidity of cereals).

d) Information about the vehicles and machines flowing to producers and technicians of these devices

Telematic systems installed directly by the manufacturer may also gather useful information about the operating condition of the vehicle or machine and send them to the manufacturer's service units. Doing so can improve the quality of maintenance, accelerate service procedures by allowing better planning of repair individual vehicles by different customers. Having better information on the state of wear and vehicle service and regeneration can be planed well in advance to prevent of greater damages and downtimes.

Information resources processed by telematics can be seen also in terms of time.

They will then: real time information, historical information (for example data from the previous day, reports, records) and forecasts or proposals (for example navigation route).

Telematics solutions supporting agricultural machinery

When choosing the system, you can refer to public transport telematics systems, or consider the purchase of tractors and agricultural machinery immediately equipped or retrofitted telematics systems owned machines for telematics components, if available for the type.

Simple systems make it possible to obtain basic data about:

- position of the vehicle or machine,
- driving route,
- stops,
- deviation from the planned route,
- sudden braking and acceleration.

Standard systems can be divided into:

- "black box" – device that is consisting only of data collection device without a user's screen in a vehicle,
- User screen device that allows the visualization of data and additional input by the user in the field.

Systems "black box" collect information from sensors onboard and optionally from additional sensors connected to the device. Systems "black box" can automatically collect information about the parameters of the vehicle or machine and send them to the base system at set intervals. A person who is i headquarters is able to access the data and response to possible deviations from the norm.

Systems accessed by an employee in the area are offered as special equipment telematics and as software installed on smart-phone or tablet.

An example of the application on the phone or tablet supporting the work of the farm can be a system of "farmpilot" that offers both solutions, installed as an application on the phone, as well as installation on terminals of working machines. This system can be installed on devices of many manufacturers. By the installation on a terminal is needed a function of mobile data transfer. This means that installation is possible only on machines equipped with terminals having a mobile communications module.

The option of using the terminal having a connection to the interface ISOBUS (interface data transfer used in agricultural machinery in accordance with ISO 11783) allows acquisition of data such as: fuel level, machined surface of the field and other information depending on the sensors of the machine who transmitting data to the ISOBUS. Option mobile app allows the collection of data of the working time machine and worker, registration of the vehicle or machine journeys, transmit work orders and their documentation by an employee in the field. The system also offers fleet management capabilities with the ability to define groups and assigning them for example to common tasks. Through the visualization of work planned and performed on the maps of fields errors of disposal of individual machines are avoided [http://www.farmpilot.de/de/farmpilot.html,10.01.2016].

Another telematic system dedicated to agriculture is a system „CCI.Control Mobile" [http://www.cc-isobus.de, 10.01.2016] created by manufacturers of agricultural machinery: Grimme, Amazone, Kuhn, Krone, Lemken i Rauch, offering data acquisition system with ISOBUS interface, visualization and communication of further data processing systems.

Systems developed by vehicle manufacturers and agricultural machines designed for proprietary products offer a much wider range of data optimized for machines with which they are collected. This allows you to get to more detailed information from more sensors. Such a solution can be optionally limited by subsequent investments in the products of other brands because those systems are are suited to machines where they work and offer a wide range of specialist information on the work of this machine, machine parameter control capabilities, communication between the machine, the worker and the base of the farm.

An example might be here telematics from a company "Claas" - a manufacturer of tractors, reapers, presses for hay and other agricultural machinery.

Product „Telematics" is a complete fleet management system of various vehicles and machinery [https://claas-telematics.com/Telematics/goDashboard.app, 10.01.2016]. From the machines is collected dozens of kinds of data as: productive working time, stops, trips, surface-treated fields, fuel level, fuel consumption, throughput, the total amount of product in the tank, the position of the various working tools, own weight and moisture of the product. These data are presented on a computer screen with the possibility of revision: the entire fleet, the details of individual vehicles and machines, position and vehicle routes on the map. The system also offers analysis process times,

work journal of the employees and machines, documentation of the history of the machine [Holtman 2011]. A complete overview of the entire fleet enables to easily and quickly compare the productivity of individual elements of the fleet in real time and historical data. TONI module enables comprehensive approach to fleet management. It collects and transmits data also from attached equipment for agricultural machinery. Thanks to this system information provided to the farm are fuller. Trailed machines need for cooperation with the module TONI to have ISOBUS interface for data exchange.

Development of telematics in the company Claas is a farm management system that uses data coming from telematics devices of individual machines and vehicles, machine control systems and devices attached and linking them with a central system supporting the planning and organizing activities on the farm.

Another example of telematics offered by the manufacturer of agricultural equipment is a system Steyr S-Fleet. It enables the transfer of data from vehicles and machines to the base. It has a feature of a geofencing - marking on a map the area in which the machine can move. When the position of the vehicle is outside the designated area, an anti-theft alarm is triggered and the positioning of the vehicle remains active. This system offers also monitors for vehicles enabling two-way communication, and application base enable summary information about individual machines, as well as about definable groups [http://www.steyr-traktoren.com/pl_pl/Documents/13S8002POL_S-Tech_BRO_low.pdf, 10.01.2016].

One of the functions offered by the telematics modules is a system to manage belts fields. There are established tracks of the combine in the field - the data are sent to vehicles who is using these routes and GPS to support uniform treatment of the field.

Summary

A possibility of quick and comfortable access to data on individual areas of household moves farm management to a new level. The data that have not been obtainable, are now available in real time and historical data can be seen in databases. This allows on the one hand, keep your finger on the pulse of current activities and the rapid and efficient encroachment by observing undesirable trends (such as an increase in fuel consumption, work in undesirable speed range of the engine or other components of the vehicle) and on the other hand, management at the tactical level. There is also a possible comparative analysis of various periods, which is characterized by clarity of the message (universal intelligibility), clarity, purposefulness and effectiveness [Skowron-Grabowska, Krzeczkowski 2012]. Planning of work orders for the fleet and controlling operations of the machinery, efficiency, operating parameters, or consumables is also important in the processes of environmental management [Bajdur 2005].

Working with telematics systems can be a good beginning of the process of farm management, because the features offered by these systems support decision-making processes and controls.

For a farm entrance into the world of telematics usually occurs at the time of purchase of new tractors or self-propelled agricultural machinery, which offer basic functions of telematics as standard. For farmers with an older fleet of vehicles may be beneficial to purchase a simple standard telematics systems to obtain information about the position of vehicles and machinery. A good solution would be to falling back to standard solutions but dedicated to agriculture, when vehicles and farm machinery have ISOBUS interface. This solution enables immediate access to all the data more structured and presented in a way that supports an agricultural farm management.

Using the solutions available to computer control and fleet management of vehicles and machines is an opportunity to better exploit the potential of machines, and consequently improve the competitiveness of agricultural farms on the market.

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V Международной научно-практической конференции при участии молодых ученых и студентов «Эколого-правовые и экономические аспекты техногенной безопасности регионов», ХНАДУ, Харьков, 2010, с. 162-166.
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