

Changing Paradigm in Economics & Management System



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PREFACE

The world around is a trinity of social, economic, ecological systems, the balance of which for humans has become the basis for the development and implementation of the concept of sustainable development. Accordingly, appropriate management turned out to be in demand, which is characterized by behavioral and technological innovations in economic development. Current trends of change associated with the processes of globalization, informatization, intellectualization of the economy and society have strengthened the role of information, digital and professional transformation tools, thus providing a management process at the micro and macro levels. Recently, scientists have not ignored the issue of modifying the economy and making proposals that contribute to innovations for the development of economic concepts.

The presented book is a scientific work, in which the authors posed the urgent task of innovative development of the economy and made proposals for its solution. A distinctive feature of this study is the availability of developments that contribute to the realization of the potential of the economic system, considering the latest methods, principles and procedures.

The authors have formulated a sufficient number of conclusions and ideas that are innovative in nature. Their position on innovation in economic development and the priority of ideas, knowledge, technologies, intelligence in conducting business and strengthening the business reputation of entrepreneurial structures has been convincingly proven. A number of authors' proposals are not limited only to the innovative aspect of the development of instruments of economic development, but are holistic in nature and relate to Inflation; Economic Growth; Economics of nature Management and Environmental Protection; Monetary Policy; Management; Human resource; Finance; Marketing; Information technology; Accounting and Taxation; Entrepreneurship; Sustainable Finance, HR, Marketing and other. In total, the results of scientific research have allowed to form a new concept of innovative development of the modern economy in all aspects of globalization, integration and technologicalization.

The material of the book is set forth clearly, contains interesting proposals and is characterized by a non-standard approach to solving the issue of developing the economic system and its components, for which theoretical and practical aspects

of innovation are involved. The results of the scientific research presented in the book will be of interest to everyone involved in the development of economic science, management practice, the relationship between formal and informal institutions. The book is equally useful for theorists and practitioners, leading and young scientists conducting research to achieve a common goal – the development of science, economic systems and society as a whole.

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6.

Theoretical Essence of Infocommunication Management of Agrarian Production Structures

**Soloviov Andrii*

In market conditions, agrarian units must take into account the requirements of effective market exchange, the purpose of which is to maximize the satisfaction of consumers' needs. In turn, this necessitates the expansion of the boundaries of production and functional interaction of enterprises in all industries, improving the quality level of structural, organizational and technological development, the formation of a set of scientifically grounded market relations, the extension of structural links in the agro-industrial complex as a whole production and economic.

A characteristic feature of the economic development of agriculture lies in the fact that it is increasingly linked to industries and product sales. It becomes multifunctional, its industries are combined by a set of socially important goals, new kinds of economic connections are filled with content.

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The proposed concept defines any form of agriculture as a system built on the interaction of natural and artificial ecosystems, as well as agricultural production structures, in this case, a system that directly produces the products of one or more industries. The main goal of the agricultural structure is to produce the final products to meet their own and public needs, to use natural resources rationally and to minimize the impact on the ecosystem. In accordance with its territorial, sectoral and organizational orientation, the agricultural production structure is designed to reconcile the sectoral and regional interests of industry and agriculture.

The development of new qualities of the agricultural production structure defines them as production systems, the peculiarities of which are due to the diversity of property and business relations, the formation of cooperative and integration relations, new parameters of concentration and specialization of production and capital, the creation of markets for resources, goods and services. At the heart of the complex structural relations of agricultural production in the modern economic system is the agricultural production structure as a production unit, and the market, as an institutional factor, connects producers and consumers, remaining the main condition for the integration of the objective function of agricultural production. as a result, groups of enterprises are formed that are structurally independent of one another, united by a common purpose, which reflects the integrative nature of economic sustainability of the agricultural production structure as a whole.

Management effectiveness of agricultural production structure involves the availability of information support on the forecast of climatic indicators, operational information on the state of agricultural land, fields, soils, phenological indicators of crops and their response to changes in external influence. all this underlies the calculations of various management technologies.

In today's information society, agriculture needs constant information from numerous external sources at any time, anywhere. Background information should be convenient for evaluating biological and production systems in order to produce knowledge about the current state of production, forecasting the results of management decisions and problem-solving scenarios. the knowledge that many years have accumulated in businesses should be used to retrieve useful information through database processing.

The main directions of influence of information processes on the agrarian economy:

- Activation of processes of market interaction on the basis of information technologies;
- Creation and development of information services market;
- Constant growth of information resources needs;
- Globalization processes in the world economy;
- Changes in organizational structures of enterprises ^[9].

Studies show that in the near future, in Ukraine, the use of resource-saving technologies will be increased, which will ensure the production of competitive products with minimal cost.

The organizational, economic and technological decisions that production will require should be based on a thorough analysis of the wide variety of technological, agro-climatic, economic, technical and other features of the region where the agricultural production is produced. It is impossible to carry out a deep analysis of such a set of diverse and difficult-to-measure indicators and to decide on the optimal, multi-criteria choice of the combination of technological process elements without the use of information technologies.

Market mechanisms of the economy, requirements to create the necessary conditions for the productive functioning of business entities in the agro-sphere, require an adequate business information environment that will provide information support to market mechanism entities.

The information economy influences management systems first of all by information flows, the volumes of which have increased in the last decades by tens and hundreds of times, which in turn led to the need for quick decision making in the highly competitive environment. The development of management technologies is associated with the development, implementation and use of new management tools as a set of methodological, organizational and instrumental measures. The main task of management is to increase the efficiency of the management system by increasing the professionalism and competence of managers, the speed of decision making, the ability to make non-standard decisions and implement management procedures caused by the transformation of tasks and functions of enterprise management in today's economy. In today's environment, the improvement of the management system should be based on efficient processes and technologies, links with information markets.

The management system of agricultural production today is far behind in comparison to other branches of the national economy in the use of information technologies. This is due to the lack of modern computer facilities, lack of preparedness or lack of specialists and appropriate software.

Methodological issues of management of production processes in the agro-industrial complex are largely resolved in the context of uncertainty due to the lack of current and forecast data on the state of agrocenosis, insufficient knowledge of biological systems, and the random nature of the processes occurring in them. Managing a system that operates under these conditions requires special attention, experience and qualifications. Developing a well-grounded set of management decisions for those cases where the outcome is not clearly defined is crucial and needs special attention. This, in turn, necessitates a detailed and in-depth analysis of complex situations. An experienced manager assesses the likelihood of future results based on economically justified decisions against the potential risks, which he then tries to reduce with the help of an available arsenal of funds.

Implementation of this sequence of actions requires stable provision of information on the features of biological and production systems, knowledge of their current state, which will allow to predict the results of implementation of management decisions. The use of information systems is one of the promising ways to improve the efficiency of management in general and the operation of the management system in particular. They help you choose the most informed decisions, tailored to the circumstances and based on the real information that has been accumulated in a particular industry. It is the volume of this information and its quality that determines the speed and optimality of the decisions taken.

The basis of management decisions in agriculture is information, traditions, experience and intuition. Increasing the weight of the first component may be the so-called infocommunication networks that provide infocommunication support (ICS) to the management process and, in combination with the rest of the factors, will allow for greater production efficiency.

Management should provide processes for the formation and movement of information flows to substantiate the requirement for the need to improve the system of information support for the process of development of management decisions. Not only should the ICS diagnose the situation, but also provide advice on changes in organization and management for best results.

It can be argued that all the activities in the first stage of computerization, which came down to the introduction of computer technology in the field of agriculture, were only the introduction to the next step - mass informatization related to network systems, the latest communications and geoinformation technologies. Processes of technological and infocommunication improvement in the industry have created preconditions for deep and systemic transformations in the sphere of management.

Recently, conditions have been created in agriculture and considerable efforts are being made to implement IT, primarily those implemented through computer software applications. These are programs for optimizing the placement of crops in crop rotation and animal feeding systems, calculating fertilizer volumes, land management and land management, developing technological maps, product quality, evaluating the economic efficiency of production and process management in industries, and more.

Over the last few decades, important theoretical and practical results have been obtained on issues such as defining forms of mapping the environment, designing knowledge bases, and more. The results of these studies are widely used in the organization of infocommunication management of agricultural enterprises. But there is no systematic generalization of experience in this field, which hinders its expansion. It is mainly this circumstance that determines the fact that the organization of ICPs of each enterprise is carried out individually. But in addition, one of the reasons for the current situation is the lack of a generally accepted concept of the essence and content of ICU. By the way, about the concept of information communications. This is a new term that characterizes the information and telecommunications infrastructure, which combines telecommunications with information, computer and radio technologies and is capable of providing information exchange of various types for providing users of local computer networks and the Internet with a wide range of services on the basis of convergence and interaction of technologies. . Therefore, the infocommunication support is the implementation and practical use of a set of technical means intended for processing, transmission and / or reception of information of any kind to the end consumer (manager) for making management decision.

The most informative indicator of the development of the intellectual potential of enterprises is the share of capital investments in intangible assets (the right to use natural resources,

property, the right to commercial designations, know-how, industrial designs, plant varieties, animal breeds, software, databases). Since the infocommunication support system of agricultural production structure has its value characteristics, it is important to consider it as an integral part of intangible assets, which reflects the tendencies to form value and increase the capitalization of the enterprise, increase its competitiveness.

Currently, there is a significant underestimation of intangible assets in the structure of the balance sheet of domestic enterprises, and hence the possibility of increasing the resource potential of the enterprise due to the knowledge factor. In Ukraine there is a stable imbalance of the ratio of investments in tangible and intangible assets.

The share of investments in intangible assets has slight fluctuations within 3-6% of the total capital investment. The trend is positive, but not very progressive, given the experience of leading countries in the world, which are increasing their capitalization through intangible assets.

In general, ICDs refer to a direction whose essence lies in the development of methods, sources, and organization of information that reflects the objects they manage and characterizes their external environment. The concept of ICZ combines two independent processes: information technology and communication.

The first is based on the concept of information technology, the second - on the interaction between economic entities through a mediated message. These processes are essential for improving the efficiency of the management system.

Some authors of ICS understand the totality of a single system of classification and coding of the technical and economic situation used in automated control systems [1]. Other authors, in definitions, emphasize the means and methods of organizing and managing data [2, 6].

The convergence of information technology and communication processes has resulted in this concept. When considering ICS management in the agrosphere, the main focus is not on the processes of obtaining, processing and storing information, but on communication processes that ensure user interaction. The multidimensionality of approaches, in turn, leads to heterogeneity in the definition of problems that cover the concept under study. In the literature on the organization of management of agricultural enterprises, ICS issues are highlighted as fragmentary, depending

on which element is considered ^[4, 7]. In the professional literature, when the term “security” in the field of infocommunication is used frequently enough, the essence of this concept is not disclosed. Most often, the understanding of the operation of the information system or the process of creating and maintaining regulatory documentation.

The most systematic and consistent content of ICS can be defined as the organization of information flows, the processes of its collection, storage, updating, processing and transfer in order to reflect the external environment and management object, the formation of knowledge base and databases for the development of management decisions that contribute to the achievement of goals enterprises.

Summarizing the most important management points with highlighting its features in agriculture provides grounds for such conclusions.

The essence of an ICS is to obtain, accumulate, introduce, store, update, control, process and provide the management system with knowledge and data about the state of the management object, the system as a whole and its individual parts, as well as the environment in which it operates.

Purpose of ICS:

- To provide each employee with the opportunity to replenish information resources of the enterprise;
- Retain corporate knowledge as an integral part of the enterprise information resources;
- To ensure that employees share corporate knowledge - both indirect and retrospective.

The ICS of any large system management system is a process that takes place on a systematic basis. From the point of view of technology in this process, the following operations can be distinguished: gathering information, presenting information in a formalized form, forming databases and correcting them, storing media, accessing stored information, issuing information.

The ICS organization aims to address the question of who, where and when should participate in the implementation of the process steps and their rational interconnection. This selects the location of the stage, justifies the need to enter into the management system of information specialists or the possibility and feasibility of extending the functions and responsibilities of specialists already working in the production system.

Establishing the start and end stages of the ICS process, the number of specialists required to complete the process within the scheduled timeframe are management tasks. By characterizing ICS as a process, we mean the activity of obtaining, processing and providing information management system aimed at achieving certain goals - ensuring optimal management of agricultural production structures. From this point of view, the ICZ is a work process that ensures that information links are maintained between the management system and the managed elements of the production structure, which ensures the conditions for its sustainable development.

As a process of ICS work, it represents the unity of labor, the means of labor (means of linguistic, mathematical, software and other types of support) and the objects of labor - proper information. In order to obtain and provide the management system with the necessary composition and quality of information, they must be combined. Man in production as well as in management is an active element that produces connections with other people, the means of working with information and the actual information itself. These links are realized through certain methods and tools, such as classification, coding, systematization, unification, programming, etc.

In order for ICS to be seen as a process and as a system, a certain condition must be fulfilled: providing its elements with the necessary technical, technological, infrastructural, social, economic and other communications that will be the object of organizational activity. Components of the ICS are all communications services and elements and components of the management system, including those responsible for the collection, storage, processing and promotion of information on the management vertical. Thus, the essence of the ICS management system of agricultural production structures can be defined as a rational combination in space and time of labor, information, means of working with information, which is achieved as a result of the application of certain methods and techniques in order to provide the subjects of management with the necessary, relevant, qualitative, reliable information.

Analyzing PPIs as a process provides an opportunity to identify several related issues. First, it is a question of defining and investigating the structure of the information and communication subsystem of the management system as a whole and the structure of its individual elements. First of all, it is the structure of its information bases, which depend on the principles of system construction and composition of tasks. On the other hand, from the

peculiarities of the content and structure of the information model of the enterprise, under which we will understand the totality of information characteristic of the production structure. It is this condition that raises the question of determining the composition and structure of the infocommunication subsystem, first of all the most important issues in the organization of the ICS management system. Second, it is a question of organizing the ICS process as a whole and its individual elements. Thus, the organization of the ICS management system generally means the fulfillment of tasks such as determining and justifying the composition of the elements of the infocommunication subsystem; substantiation of the composition and structure of the information base of the management system; definition and justification of the structure of the elements of the infocommunication subsystem that ensure the implementation of the ICS process; organization of promotion of information by stages of information process (identification of sources and consumers of information, sequence of its receipt, transmission, processing and delivery to consumers, etc.); the organization of the use of labor at all stages of the process, taking into account their capabilities, interchangeability and cost; establishing various links between the elements of the ICS management system through the development of appropriate provisions, instructions and other documentation, the approval of the ICS organization with the organization of production and management.

Information support is a set of tools and methods for building an information base that defines the ways and forms of displaying the state of a control object in the form of data documents, graphs, etc.

Mathematical software consists of algorithmic software - a set of mathematical methods, models and algorithms and software - testing, diagnostics and other software that ensure the efficiency of a complex of hardware.

The technical support consists of devices of measurement, transformation, transmission, storage, processing, display, registration, agreement of information output and execution.

Organizational support is a set of tools and methods of organizing relationships, determining the order and conditions of functioning of the ICS system, the distribution of tasks and powers, the development and selection of management tasks, the choice of specific management schemes and the sequence of procedures in making management decisions, the organization of management flows and interaction of staff.

Thus, analyzing the nature, significance and patterns of development of ICS, we can draw the following conclusions:

- Convergence (merger) of information technologies and communication processes led to the emergence of new concepts - infocommunication technologies and ICS management.
- The ICS is based on two independent processes - information technology and communication.
- In today's environment, ICT is becoming an effective tool for improving enterprise management. Its main purpose is to ensure efficient use of information resources.
- ICS defines the need to create fundamentally new infrastructure, the emergence of new sectors of the information market and fundamentally new activities, the growing need for information resources.
- Communication as a complex social phenomenon can be described as a process, a communication channel, a service, a function, a system, a sphere of activity, a culture of subjective relations.
- The ICS of the agricultural production structure management system necessitates the isolation of the information subsystem in the management system, which corresponds to the use of information resources by integrating integrated databases, telecommunication, computer, software within the agrarian sector, modern IT, facilitating the formation of information systems. agrarian production structures of information management system.

It can be stated that ICS is an effective tool for organizational change, which enables the enterprise to change its structure, communications, management methods and decision-making in accordance with modern management concepts.

The current status of ICS is characterized by the absence of a common methodology for solving the problem, the individual approach to the organization of ICS of each specific management system and the lack of economic justification of approaches.

These factors, as well as the continuous improvement of the technical and software base of the ICS associated with the creation of integrated management information systems and the emergence of a large number of typical projects for the development and implementation of management systems of agricultural production structures, make solving the problems of ICS management of urgent tasks.

Increasing the independence of businesses in the context of the globalization of the economy requires the creation of effective management systems for both the industry as a whole and enterprises. With the increase of the number of tasks solved in management, in direct proportion to them the number of information flows increases, which is caused by the influence on the enterprise of a large number of different factors by nature. In changing information-rich conditions, the functioning of management structures becomes possible with the use of a systematic approach to their development and analysis.

At all stages of the management process, the manager must be aware of the goals of the enterprise and the criteria for their achievement, have information about the intermediate and final results of production, the presence of natural resource potential of the managed object, the state of production, interaction with the environment, as well as the consequences of possible options for adoption management decisions. At the same time it should be able to receive any information from different sources and to process it quickly and qualitatively.

Effective management of agriculture requires improvement and development of the financial and economic and special information base, which requires a high degree of informatization at all levels of management, which in turn is associated with the constant development of modeling tools and the improvement of computer facilities.

The use of information technologies in agro-industrial production has been receiving a lot of attention lately both in Ukraine and abroad.

In the developed countries of the world, various information systems are widely used for ICS management in agricultural production structures at all levels:

- Monitoring of the state of agricultural resources and forecasting crop yields;
- Ensuring the quality control of agricultural products;
- Operational management and optimization of production processes;
- Information, marketing systems (market conditions, forecast information);
- Information-analytical systems aimed at tracking the prerequisites of emergencies that may affect the state of production.

Agro-resource monitoring and yield forecasting system (ARMYFS), as a multifaceted information system, is able to provide information on the current status and future crop yields in certain areas on-line.

Depending on the size of the system-controlled territories, the ARMYFSs are distinguished at the local, regional and national (or transnational) levels, but they usually consist of the following three blocks:

- Obtaining information;
- Information processing and analysis;
- Dissemination of information.

ARMYFS uses information and remote sensing technologies (RSE) to obtain information, geographic information systems (GIS) are used to process and analyze information, and Internet technologies are used to disseminate information.

Remote Sensing of Earth involves receiving information about objects on the Earth's surface, as well as processes and phenomena occurring on our planet in the absence of direct contact with objects of study, ie "from afar." Depending on the method of location of the recording devices, the methods of RSE are divided into terrestrial, aviation and space, but they all have one thing in common: obtaining information by registering electromagnetic radiation reflected or radiated by the earth's surface.

The advantages of RSE methods are that they receive information in a non-degradation manner, ie without any interference with the object of study. In addition, RSE methods are characterized by high visibility (the ability to simultaneously retrieve information from large areas), enabling the detection and investigation of phenomena and processes that cannot be observed from a short distance. Unlike the human eye, which detects electromagnetic radiation only in a very narrow range of wavelengths (the so-called visible range), the various sensors used in IR systems are able to detect it in many spectral ranges - visible, infrared, infrared, and infrared. significantly increases their information content and expands the range of tasks to be solved.

An important trend in the use of RSE technologies is the inventory of agricultural land and land management. First and foremost, this applies to Aeronautical RSE methods and high spatial resolution satellite imagery to create thematic plans and maps of varying scale for land use planning and land cadastre purposes.

Geographic Information System (Geographic Information System) is a modern computer technology for mapping and analysis of real-world objects and events that occur on our planet. This technology combines traditional database operations, such as querying and statistical analysis, and provides full visualization and geographic (spatial) analysis. These capabilities distinguish GIS from other information systems and provide unique opportunities for its application in solving a wide range of tasks related to the analysis and prediction of phenomena and events of the world, their possible consequences and the development of strategic decisions.

Precision Farming is an agricultural management system designed to minimize anthropogenic environmental load and increase productivity (maximize profits) by optimizing the production process. This system involves the use of many modern information technologies, including GIS and RSE, but the following technologies are essential in the implementation of precision agriculture:

- Estimation of distribution of productivity within a separate field (Crop Monitor Technology);
- Determining the exact coordinates of the location of agricultural machines and units within a single field - Global Positioning System;
- Variable Rate Technology, which involves adjusting seed rates, nutrients, plant protection products, or generally performing / failing to perform various agrotechnological operations, depending on the situation in each individual area of the field.

Theoretical and methodological approaches and organizational aspects of the application of GIS-technologies and remote sensing of the Earth (RSE) for the analysis and management of geospatial data in various spheres of economic activity are considered in the works of foreign and domestic scientists. The issues of soil fertility monitoring with the use of GIS-technologies and data of SBS are covered in the scientific works of S.A. Baluk ^[3], V.V. Medvedev ^[5], L. Yang ^[12], A.X. Zhu ^[13], L.F. Janssen ^[10, 11]; K. Asch ^[8] considered data quality analysis and evaluation approaches for geoinformation systems.

The analysis of the sources analyzed shows that the use of geoinformation systems and technologies is an urgent and insufficiently studied issue, especially regarding the different types of agro-monitoring and monitoring of the state of natural resources. Therefore, one of the most promising areas for improving the efficiency of operations and making operational rational decisions in

the management of agricultural production is the development and implementation of ICS based on modern powerful GIS technologies. This will allow for the prompt collection, processing, display, dissemination of spatially-coordinated data, integration of data and knowledge about the efficiency of operations and the current state of agricultural production using scientific and applied economic-mathematical, statistical and geographical methods and tools related to inventory, analysis, simulation modeling, forecasting, management and territorial organization of agricultural enterprises.

Local SMAPV Enables:

- To monitor changes in the condition of fields and crops in different sections of a single field and determine the sequence of their cultivation;
- To monitor for the prevention of emergencies (fires, flooding, hail fall);
- Control the use of technology through global positioning systems;
- Automatically generate reports for farm managers based on data collected through instrumental methods;
- Accumulate and store data to track the direction and dynamics of technological processes;
- To present the raw data in cartographic form;
- Perform multivariate analysis and visualization of the collected data, which makes it easy and fast to interpret them.

In Ukraine, some elements of SMAPV at the local level are used in the experimental farm of the corporation AGRO-UNION (Sinelnikov district of Dnipropetrovsk region).

An example of the RMSAP at the regional level is the KARS system developed by the Regional Center for the Use of Earth Sciences under the Kansas State University (USA) Data Use Program. Since 1996, this system has been providing, on a bi-weekly basis, information (called "GreenReport" ®) on vegetation status in some regions of the United States, based on operational data from the SBS and historical statistics analysis. The most well-known NAVAs at the national (or transnational) levels are the FAS / PECAD system established by the USDA's USDA and the MCYFS system to predict crop yields based on the MARS operating system. since 2002

It can be argued that in Ukraine the prerequisites for the creation and use of their own RLMPs in the interests of agriculture have been established. These include:

- Availability of own satellite data and an accessible (commercially available) global market for FDI data;
- The opportunity to take advantage of the worldwide experience of creating RMSAs at different levels;
- Possibility of attracting data of agro-hydrometeorological observations for the long-term period (based on 140 meteorological stations in the system of the Ukrainian Hydrometeorological Center);
- Availability of data on the potential yield of agricultural land, stocks of useful elements in the soil in the context of individual agrophones and regions of Ukraine (in the system of “Fertility” centers of the Ministry of Agrarian Policy and Food of Ukraine).

Some Ukrainian institutions and organizations have gained some experience in predicting crop yields and working with GIS and GIS data. It is first of all the State Hydrometeorological Center of Ukraine, the State Statistics Service of Ukraine and the Center for Aerospace Research of the Earth of the Institute of Geological Sciences of the National Academy of Sciences of Ukraine.

On the basis of domestic and foreign experience of using aeronautical surveying materials and GIS technologies, the State Statistics Service of Ukraine has developed methods of using space surveying materials for the rapid production of statistical indicators of agricultural objects. One of them is the sampling method of territorial survey based on space surveys and terrestrial observations to determine the true areas of crops, their productivity, gross fees and crop losses within the territorial units. The information thus obtained can be detailed to specific farms, settlements, districts and types of crops.

Therefore, the above proves the relevance of consideration of issues related to infocommunication technologies in agricultural production, which is the key to creating a highly efficient mechanism for collecting, processing, transmitting and using information without which no system can function and effective management decisions are not made.

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