

# Information management reducing the risks of agricultural business in organic farming

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**Abstract.** The issue of management of the specialized agricultural information with the purpose to reduce risks of agricultural activities in organic farming has been discussed in the article. The aim of the paper is to study the applied aspects of management in the agricultural sector in conditions of digitalization and to identify the peculiarities of information management in the sphere of organic farming organizing being a potential to reduce risks of business' development and functioning in the agricultural sector. One of the main aspects in this direction is to change the role and methods of information management in the digital society in general, and in the sphere of organic food production in particular. Information and management schemes have been developed during the study that allow considering information in process interconnections. Such approach gives the opportunity to view the general management plan in conditions of digital transformation, and also makes it possible for maximum specialized detailing, which is aimed at the reduction of the number of managerial mistakes and increase of the business performance of the organic farming household.

## 1 Introduction

In conditions of the digital transformation of society, the ideas of sustainable development and change of the consumption paradigm from unrestrained to reasonable one acquire the new significance. One of the main aspects in this direction is to change the role and methods of information management in the digital society in general, and in the sphere of organic food production in particular. The Covid-19 pandemic has significantly accelerated the transition to a digital society and the creation of a new environment for the provision of high-quality food. The mass production of genetically modified products, at one time contributed to solving the problems of hunger, but in the new conditions, the task of providing organic farming products is urgent.

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## **2 Methods and review of research**

It should be noted that the issues related to management during the transition to new production structures have been studied repeatedly. So, to solve the issue of the features of management in the transition period, the papers [1-11]. The research methodology included a comparative analysis of information flows and quality management systems. The following methods and approaches were used:

1. Affinity diagrams are a management tool that allows you to organize information about the causes of something and to better understand the nature of these causes, after which you can make more solid decisions. In quality management, this method is used to analyze the raw material of questionnaires and all kinds of surveys. The affinity diagram can only be applied to non-numeric information because the associated method relies on associations of decision makers, not logical constructs.

2. A link diagram is a tool that allows you to identify logical connections between a main idea, problem or different data. The diagram is based on approximately the same approach as when building an affinity diagram. The central idea, issue or problem is taken and the links are determined that connect the individual factors related to the issue or problem.

3. Matrix diagram is a tool that allows you to identify logical connections between the main idea, problem or different data. This tool serves to organize a huge amount of data so that logical connections between different elements can be graphically illustrated. The purpose of a matrix diagram is to depict the contour of relationships and correlations between objectives, functions and characteristics, highlighting their relative importance.

Also, the study used observation and generalization methods, as well as materials from various fields of knowledge (information theory, management theory, agricultural science, cognitive science).

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## **3 Information and false connectivity**

Information is understood as an adaptive process of display and instruction for selection, reproduction, self-organization and fixation of system changes, which determines the degree of uncertainty and causes a different order. This complex definition, in fact, describes the systemic organizational connectivity, a kind of coherence, which ensures the interaction of objects with each other. Such connectivity also allows assuming the presence of negentropic processes in systems. This gives an opportunity to solve functional applied problems in society. It has sense to clarify that this definition can be used to describe a wide variety of processes: social, biological, mechanical, quantum, and, in fact, any others [12].

Information, as a kind of gap between the object and the operator who perceives it (it can be a structure, a person, a machine, etc.) is always in a mobile state, which implies also

a certain variability of interpretation. The more structured the information perception process is, the more controllable it is, the more unambiguous response it gives. So, a machine processing algorithm provides a certain (given) reading of information. At the same time, the machine reads and processes only the information that is prepared in a special way. The rest of the information is not read by the machine. A man, unlike a machine, gets different information and does it all the time. Human perception is more variable, and the interpretation is more diverse, which is associated with the characteristics of individual mental paradigms and background knowledge, spread in the society [13].

The very nature of information as a connectivity should make a stable effect: to create stable forms of perception of the surrounding world through the connectivity (coherence). Why doesn't it work?

We see the answer in the process of forming a huge amount of information that can be called "false connectivity". It does not allow a person to perceive information adequately, and, accordingly, the person in such state is not able to predict his future activity adequately. It should be emphasized here that organic farming depends to a large extent on the quality and accuracy of the future forecasting actions, and not in a short-term annual cycle, but in a long-term perspective of 5-10 years. One of the most acceptable technologies for such forecasting in the context of digital transformation is, for example, the Foresight technology [14], as well as a thorough study of climate changes.

In modern society, meanings, as such, are not formed properly during the information interpreting. A person often does not know what should be done, but simply iterates data sets, which situationally get convenient forms of interpretation. From these sets follow sets of actions that are used by a "hitting" method. It is interesting that, as a rule, in these sets of actions there is no reliance on actual knowledge about the reflecting objects of the living world. These sets consist of opinions, that is, by their essence, they are the objects of fictional reality. For example, a lot of materials on ecology (green wind generation, solar energy generation, etc.), in fact, turn out to be a kind of capital redistribution, and their impact on the environment is not so unambiguous (especially when it comes to the recycling of waste elements). And such examples can be found for almost any area of human life. Escape from verifiable meanings into slogans that propagate false connectivity of objects in the world lead finally to a crisis of everything: a crisis of the economy, ecology, society [15-16].

In fact, something similar can also now be observed in an attempt to transform agricultural activity into the organic one. On the one side, organic farming seems tempting and promising, on the other side, it cannot compete in terms of efficiency (including the financial one) with intensive production [17-18]. If goal-setting lies in the area of obtaining maximum income and prevails in society, then all promising prospects of tasty and healthy food of organic origin will face problems in the sphere of producing the same product and paying the cost of its production. As by its essence the organic farming is more labor-intensive, more risky than intensive, even though it is more necessary for people. In intensive farming you can fight weeds, pests, increase yields and change the characteristics of the obtained products with the help of various products of chemical industries. In organic farming, all these types of activities must be performed, but grounding on clear instructions for non-destructive actions in a strictly defined sequence according to given criteria. This means that the scheduling of all types of work should be carried out on a rather rigid basis, considering the situational and climatic characteristics of the year (period).

Thus, organic farming is based more on experience and knowledge. Moreover, knowledge should be related to the surrounding world and its laws [1]. In some sense, this knowledge has been lost and replaced from practice by the technologies of intensive agriculture.

## 4 Meaning of information and organic farming

Earlier a formula [19] of the “meaning of information” was suggested in the form of formula (1):

$$\text{Meaning} = \frac{\sum \text{forces of influences}}{N \text{ interpretations}} \quad (1)$$

« $\sum$  forces of influences» will be associated with the preliminary awareness of the manager, sets of paradigms, systemic associative connections, psycho-emotional state, situational characteristics, etc.

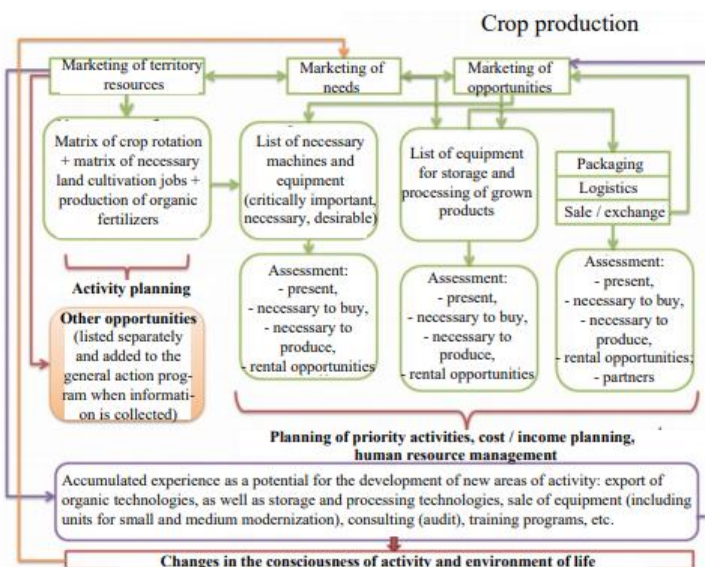
And «N interpretations» will also depend on a number of different factors. Such as the accuracy of terms and definitions, the flexibility of the text when transmitting instructions, the level of professionalism of the receiving party, the authority of sources and opinions, the number of embedded fictions, etc.

Thus, finding a common meaning will depend on a some kind of clearing « $\sum$  forces of influences» from false connections, landmarks and emotions. And also it will depend on the detailing and clarifying the specifics of «n interpretations», aimed at the identification of false content and deleting it from the process of the meaning formation. What does this mean for organic farming?!

If explained quite simply, it means that it is necessary to cut off the false information and to improve the quality of connectivity between objects.

Indeed, it is necessary to find a certain "entry point" into the understanding of the managed system. And this point should be clear and understandable enough for all participants in the controlled process.

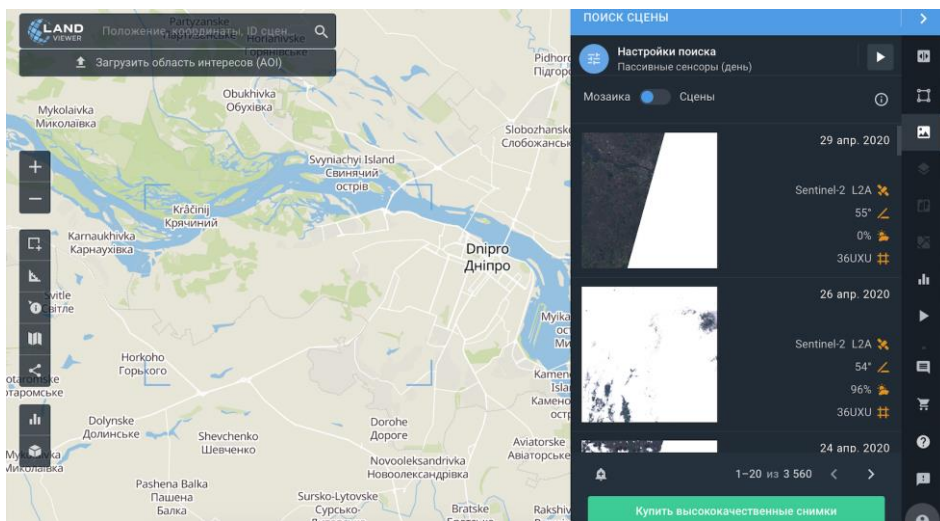
In the sphere of the organic farming, this entry point may be the crop rotation cycle. The rest of the data can be built from it. This will allow getting not a set of data, but a structured information picture that will represent a diagram of a specific activity. Presentation of information in the form of a model scheme will give the opportunity to form a more transparent understanding of all participants in the activity at the generalizing level of data transfer. The general scheme of the structured information can be represented in the following form (Fig. 1).



**Fig. 1.** Diagram of connections in the production of organic farming

First of all, about the fact that everything is interconnected in the production process. At the same time, the issues of crop rotation, land cultivation, the fertilization by the organic fertilizers at the planning stage will be performed, first of all, by an agronomist or a person with a certain qualification in this area. And while planning he will understand how his plans will affect the economy of the entire household, not only in the present time, but also in the future. Workers, who will make other types of jobs (preparation of equipment, work in the field, etc.) will also clearly understand what section of work they are doing and how the final results depend on their work. In addition, having before your eyes even an enlarged diagram of the interconnection of work and performers within the household, it is quite simply possible to determine the list (lists) and technical characteristics of the necessary machines and equipment and to plan the sequence of their acquisition, search for rental partners or perform any other preparatory and organizational activities. Actually, it is quite simple to determine the list (lists) of the necessary machines and equipment for storage, processing, packaging, logistics of products, etc. According to the same scheme, it is easy to add other types of activities in the production process, for example, animal husbandry, which will give the opportunity to almost fully close the issue with getting organic fertilizers. It is important in the management of systemic information of the household that all employees of the enterprise have a common understanding of the goals of this activity.

At the same time, the scheme of accumulating knowledge for each structural element is also understandable. So, for example, climatic and nature features will dictate the decision of a necessary number of fields (from three fields to twelve fields). The matrix (technical scheme) of the crop rotation will include a list of crops, as well as the sequence and volumes of necessary seasonal cultivation of land. It should be understood that the detailing by type of job will have the structure of databases and a scheme for managing them. Such activity supposes the calendar deployment of planned actions for each crop, taking into account the characteristics of the crop, the method of fertilization for the crop (green manure, organic matter), the types and timing of the necessary agricultural work. Thus, the calendar deployment has not only the planning function, but also the function of accumulating data on a specific territory and its features. Modern digital technologies, for example, the Landviewer program [20] allows monitoring territories and, accordingly, accumulating information about this territory (Fig. 2).



**Fig. 2.** Change detection interface: images of the river bank of Dniro river and the territory of the Dnipropetrovsk region (Ukraine), selected for tracking the events of recent years [20]

One of the main goals of the developers of this program was to make the difficult process of detecting changes in Earth's remote probing data equally accessible and easy for inexperienced users, who are not acquainted closely to digital geographic information systems. With the LandViewer change detection tool, farmers can quickly identify areas in their fields that were damaged by hail, storm or flooding. In forestry, the detecting of changes in a satellite image will be useful for assessing areas after a forest fire and identifying illegal logging, etc.

One of the main tasks of a modern manager in the sphere of organic farming is the skill to manage information about the territory in order to identify patterns that will improve forecasting and jobs planning. For this it is important to use digital land monitoring systems, which made available data provision services. Such services pay attention to the forms of activity that are carried out on the land. This task is very actual due to the climate change and the multitude of weather manifestations, unusual for the seasons. Figuratively speaking, the task is to update digitally the "popular signs", taking into account climate change. That is, to identify new patterns which affect agricultural activities. Naturally, such observations are important for agriculture in general, but they are critical for organic farming, as in it the main calculation is based on the maximum use of natural peculiarities in order to get stable positive production results.

Thus, the role of a modern manager of an organic farming household should transform actively into the sphere of studying nature and weather with the function of accumulating information about a specific territory using digital technologies. The aim of this is to master the technologies of quick finding of management solutions in non-standard situations in conditions of uncertainty and consideration of a large the number of factors and the amount of information [11]. Nowadays such opportunity is created by digital technologies for managing large databases, which make it possible to use the accumulated information and experience quickly.

Naturally, information, being a reflection of the connectivity of the elements of management [21], should be accumulated for all types of activities from marketing and management to logistics and product sales [22-24]. Finally such information will become the basis for new activities, such as the export-import of organic technologies, the export-import of specialized machines and equipment, the export-import of processing technologies, consulting, and, of course, will be the basis for a comprehensive training of all participants of this production activity. But, before teaching anyone, it is necessary to accumulate material, systematize it, find patterns, make experimental tests, and then offer it for others to master. In fact, it is possible and necessary to implement the approaches of a learning organization on the basis of organic farms, which will allow, on the one hand, to accumulate knowledge, and, on the other hand, to create a motivational field aimed at search and continuous improvement of activities [3, 25].

An additional effect of such work will be the cutting off falsely related objects in the activities of organic farms, and therefore the reduction of risks caused by the misunderstanding and activities caused by false ideas and goals. In general, reducing the amount of false connectivity will make it possible to decrease the number of delusions, and will also allow finding really significant points of influence on the system in order to prevent various crises. This approach will give the opportunity to "clear" gradually the picture of activity, will allow to understand the surrounding world better, its nature, weather and other factors. It will also help to "cleanse" activity from unnecessary "activities" and fuss, that is, it will bring a certain awareness and understanding of functional tasks, the implementation of which is necessary to achieve the goal. They all follow from one another, they all are elements of cross-checking each other. However, one must understand that deliberate work with information is a real work, which presupposes a person's discipline and a desire to learn the important and to apply it in future activities. Some



productive approaches to the work with information were described in the information science methodology [12, 26-27]. It should be understood that only structured information can be managed. Only structured information can be transferred with the expectation of understanding. It is possible to search for patterns only in structured and carefully prepared information. This can be practiced using information science approaches with a rather high efficiency.

## 4 Conclusions

Understanding the connectivity of all processes, a gradual ever deeper immersion in the specifics of activities, the accumulation and systematization of materials allows us to see the object of management in a greater number of interconnections with society, and therefore to notice new things (including weak signals from the system) and correct actions at the forecast level, which means to reduce risks. Naturally, such approach also makes it possible to form the common meanings among workers. Indeed, in the « $\Sigma$  forces of influences» general awareness on the activities of the household will be created, general sets of paradigms and systemic connections will be formed, a stable predictable psycho-emotional state will be formed, based on knowledge and understanding of the situation, etc. And «N interpretations» will also reduce its variability in interpretations with a single vision and understanding of the situation.

The main reason for managerial errors and crises arising from them lies in the area of careless, superficial work with information, which hasn't been perceived as an organic synthesizer of the connectivity of elements in the system for a long time, and which is not considered to be an environment of systems' coherence.

There is a rule in the systems approach: start changes from the simplest. By changing one object in the system, we automatically change the entire system. But it is also possible to change the system without changing the elements by simply changing the connections and the degree of connectivity of information within the system. Of course, it is not absolutely correct to say that changing the information field in a system called "organic farming" is the easiest way to change its effectiveness. But this approach does not require large material investments and the creation of new material objects. Basically, it is a mental practice that anyone of any income level can practice. In addition, we can assume that this is the most effective way to change the surrounding reality.

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