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Maintaining the register of agricultural lands as a real step towards the implementation of the data management function for these lands by the state

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Abstract. Since 2022, the state register of agricultural lands has been maintained in our country. The article discusses the reasons for this decision, the key features of this register, the possibilities of interaction with other data sources on these lands, as well as the pace of formation of data systems on them at the regional level. At the same time, it was noted that the full use of the potential of such a register depends on the pace of digitalization of agricultural land management and land planning. The authors also note that measures to improve work with data on agricultural lands logically fit into the general practice of recent years, when the state (state agencies) started implementing a new database management function. At the same time, a qite obvious problem was identified, differences in the rates of the corresponding regional system development and saturation of the federal register with their data, its risk was assessed and experience in solving a similar problem of the 1990s was given.

1 Introduction

The introduction of digital technologies in various spheres of the economy causes a change in state role in relation to the digitized most diverse data characterizing the managed areas (the agro-industrial complex is such). At the same time, a qualitatively new phenomenon arises due to the fact that such data (databases) must be properly managed. In fact, the state (state agencies) assumes a new function to manage them.

In agricultural land management, this coincided with an important decision – from 2022, after quite a long discussion, the maintenance of a special state register of such lands (hereinafter – GRSHZ) began. Not only the efficiency of the agro-industrial complex (and this is the main thing), where land acts as the main means of production, but also the validity of a new register introduction along with the long-running unified state register of real estate (hereinafter - EGRN) depends on the correct solution of the question of which data will be used as GRSHZ sources, as well as on the technologies of its management.

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All this makes it expedient to comprehensively consider both universal issues related to the state's implementation of the management function of a wide variety of digital data, and purely applied aspects of a mechanism formation for interaction in GRSHZ management with other systems that already contain various data on agricultural land (some of such data has already been digitized, for the other - the relevant work has yet to be done). Such data sources are: 1) unified federal information system on agricultural lands (hereinafter – EFISZSN); 2) EGRN and other Rosreestr data; 3) reports of regional agricultural authorities; 4) results of monitoring of agricultural lands; and, definitely, 5) land management materials.

2 Materials and Methods

The article uses normative and methodological documents regulating land monitoring, maintaining the Unified State Register of Agricultural Sciences and other registers, reporting data of the Ministry of Agriculture of Russia and Rosreestr, as well as scientific papers on the subject under study. Abstract-logical, comparative-geographical, graphical and statistical methods are applied.

3 Results and Discussion

The functions that are carried out by the state (its bodies) undergo certain changes as certain relations become more complicated, new technical capabilities and ways to implement certain functions arise (for example, by 2024, about 300 public services will be provided online [1, p. 125]), the transfer of some previously exclusively state (governmental) powers to professional communities and businesses (for example, in the field of cadastral relations). The understanding of the evolutionary attitude to the managerial role of the state in various spheres is based on the thesis of Soviet times that "... the functions of the state are the direction of the necessary state activity, predetermined by objective factors, the needs of the established social life in terms of its internal and external conditions..." [2].

The formal consolidation of such functions (in relation to federal executive authorities) was carried out by the head of state, who in the relevant Decree [3] directly identified the following four as the main ones: 1) adoption of regulatory legal acts; 2) control and supervision 3) state property management; 4) provision of public services. All these functions embody the essence and social purpose of the state, the tasks it solves to manage society, which are expressed in socio-economic, control, law enforcement, fiscal, and other activities of state bodies [4].

Scientific and technological progress has repeatedly corrected the directions and forms of regulatory participation of the state in the economy. With regard to the current moment, it can be stated quite confidently that in the context of the introduction of digital technologies (digitalization), the organization of data management acts as a new important self-sufficient state function, without which both the formation of the digital economy and its regulation are impossible. It is the processes of digitalization that lead to the emergence of qualitatively new conditions for public administration, which include: 1) decision-making based on digital technologies and 2) expanding the possibilities of interdepartmental information exchange.

Now digital, information and telecommunication technologies, which seemed to be the sphere of exclusively scientific research 20-25 years ago, are being widely introduced into both production and management processes. This can be said about the housing and utility sector (there is "own" GIS ZhKH), healthcare (EMIAS), provision of public services and procurement (EIS). These areas, as well as a number of others, seem to be sufficiently studied, including the risks inherent in these areas in the digitalization process [5-10].

At the same time, agricultural production, which has such features as its seasonality and territorial dispersion, the relationship between production processes and the lifestyle of the workers involved in them – rural residents, etc. It is an area where digitalization is also relevant. In the agro-industrial complex there is a multiplicity of factors that determine its results. These are natural-climatic, soil, biological, economic, social, and a number of other circumstances. Moreover, most of them are very variable in time and space. Accordingly, the need to consider them in the management process entails significant management costs, both at the level of specific agricultural farms and for the industry as a whole. It is equally important that numerous economic entities are involved both directly in the production of products and in its processing, transportation, and subsequent consumption (distribution), they are diverse and geographically dispersed [11-21].

Expert assessments of the consequences of agricultural sector digitalization allow to expect at least a 25% reduction in cost due to the use of more flexible management models, making informed and operational decisions based on up-to-date and reliable data, cost optimization and more efficient allocation of funds [22]. There are technical possibilities therefor. After all, if in the middle of the "zero" years less than 13% of agricultural enterprises had access to the Internet, now it is more than 60%. At the same time, the spread of digital technologies is different for different categories of farms. Thus, among small agricultural enterprises, 55.4% use them to some extent; among microenterprises – 44.2%, among farmers – 24%; they are least common in a personal farmstead - 21.8% [22]. That is, the prevalence of modern technologies decreases as the size of farms decreases (but the fact that every fifth household in rural areas already uses these opportunities, independently tells volumes).

Land resources act as the main means of agricultural production, respectively, they determine the specialization and efficiency of this production, and sometimes its expediency.

The actual and legal condition of this factor is changing and not always for the better [23-26].

Thus, over 130 million hectares of farmland have been degraded in the country as a whole, with an increase of 1.5 to 2 million hectares of land per year. It is possible to estimate about 4 million tons of losses of agricultural products in grain equivalent. Erosion processes alone lead to an annual shortfall of about 30 billion rubles per year [27]. All this can and should be compensated by both the implementation of special anti-erosion measures (expensive), and thanks to better land management and the introduction of land management systems.

It is impossible to solve these tasks, as well as to carry out any management without information (V.I. Knorring characterized information as "an object, a means, and a product of managerial work" [28, p. 24]). Moreover, in the acts issued in recent years on the digital economy formation, instead of a fairly broad concept of "information", a stricter one, "data", has been applied. In particular, in the Strategy for the Development of the Information Society in the Russian Federation for 2017-2030 [29], the digital economy is defined as "economic activity in which digital data is the key production factor". Since 2020, the concept of "digital data" is constitutionally fixed [30].

This implies an important shift of emphasis, both at the theoretical level and in practical terms. If "information" in recent decades has been considered, first of all, as something to which access should be provided (to citizens, businesses), then "data", in contrast to it, becomes an object of management (the state's data management function). This, in particular, is indicated in the Concept of the creation and functioning of the national data management system, according to which "...state data management is a set of processes for collecting, storing, processing, providing, distributing, and destroying state data, ensuring state data quality, including their systematization and harmonization..." [31].

Since 2022, the GRSHZ [30] has become the main source of data on agricultural lands, which is maintained by the state approval subordinated to the Federal Ministry of Agriculture. The idea of such a data source focused on solving managerial and production tasks in the agro-industrial complex has been discussed for 5-6 years. The main doubts were related to the fact that this is, in fact, a double accounting of agricultural land – along with the EGRN; but the "inapplicability" of the latter's data to the needs of the agricultural sector still outweighed these doubts. As a vivid example of such "inapplicability" of the EGRN, we can cite the federal decisions of 2010-2012 (they were consistently adopted first by the legislator, and then by the Government) on the need to withdraw abandoned agricultural plots. In the rules that should have been followed when confirming the fact of their non-use, the differentiation of farmland was quite reasonably taken as a basis (whether arable land is cultivated, whether crops are cultivated on it, whether cattle are grazed on pastures, etc., in addition, different percentages of permissible overgrowth with small woodlands and shrubs were established for different lands) [32]. Nevertheless, there was no data on the composition of land plots in the EGRN (or somewhere else). It turned out that due to poorly organized agricultural land accounting, these decisions of the state power could not be executed - the courts did not satisfy claims for the seizure of plots, since there was no documented fact of the presence of certain lands on them [34]. Even after the change of these rules for recognizing lands as abandoned, the problem of incomplete data on agricultural lands, their insufficient orientation to the needs of production and management persists (and this is typical not only for agricultural lands [35, pp. 414-416]).

Currently, the process of GRSHZ formation is at the stage of active deployment both at the federal level and in the regions. At the same time, the information basis of the specified register became: 1) implemented back in 2018 EFISZSN, which data are published on a public portal and these lands, their fertility, and state of crops are characterized in spatial, attributive, and graphical form; 2) EGRN and other Rosreestr data; 3) reports of regional agricultural authorities; 4) results of monitoring of agricultural lands; 5) land management materials.

The modern EFISZSN contains information about the lands of 68 regions (1350 municipalities). This is 178.3 million hectares or 90.1% of the total area of farmland in the country; moreover, in relation to 42.3 million hectares, it already has data on crops growing on these lands as well.

An important source of information for EFISZSN was the data of Earth's remote sensing, currently coming from the State Corporation Roscosmos (a corresponding agreement has been in force between the Ministry of Agriculture of Russia and this corporation since 2016.

As for the monitoring of agricultural land, it should be borne in mind that as a component of the land use management system formed back in the Soviet period and land surveys that ensure it (land management, procedures for the seizure and provision of plots, establishment and modification of their intended purpose, cadastral registration of land, state control over their use, regular inventory, and some other tools; naturally, methods of both surveys and impacts on land users in post-Soviet Russia have changed) land monitoring has been conducted only since the 1990s. But only a quarter of a century later, two practice-oriented directions were identified for it [37]:

- the use of its data during state land monitoring, more precisely during the new form of its implementation introduced at that time – administrative surveys. For this purpose, the monitoring rules have been changed, and since 2015 it includes two types of observations: 1) condition of the lands and 2) their use. The first of them is the same system of observations introduced in the early 1990s, and the second one is special (targeted) observations of whether lands and individual plots are used for their intended purpose (its results are now used by state land monitoring);

- satisfying the requests of farmers ("we need a source of information about land and soils" [38, p. 58-59; 39, p. 5], a special monitoring of agricultural lands has been introduced, as their multi-aspect observations, for plots provided for rural needs, for crop rotation fields, (and, first of all, as the most important for this sphere by the production resource, including the condition of crops and soils).

At the same time, it should be borne in mind that land monitoring (especially agricultural purposes) ensures land management (even the "storage place" of its materials is the state fund of data obtained during land management [40]). In addition, land surveys, inventories, etc. can give a lot of information, quite in demand for managerial and economic purposes. An example of such information in cartographic form for the SEC "Collective farm named after Chapaev" (Kungur district of the Perm Territory) is shown in Fig. 1. It shows the degree of suitability of its arable land for agricultural production (according to the results of land surveys, the lands of this farm are assigned, respectively, to the 3rd, 4th, or 5th class (zone) of suitability).

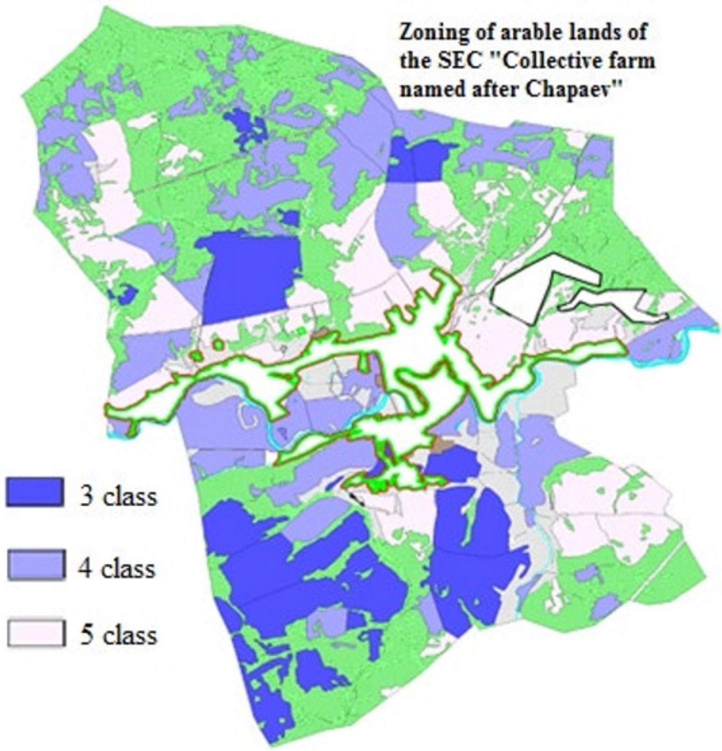

Fig. 1 Degree of fitness (classes) of arable lands of the SEC "Collective farm named after Chapaev" (Kungur district of the Perm Territory) for agricultural production; source [41, p. 186]

Moreover, land management, as well as the organization of management of agricultural production and agricultural lands, is now at the stage of introducing digital technologies that allow for spatial linking of modern agricultural production to the needs of precision farming based on adaptive landscape approaches, to constant monitoring of the condition of fields and crops [42; 43; 44]. This is possible by including digital solutions that have been implemented in land management for a long time, related to the use of GIS, SAPR, and information and communication technologies (ICT) and other methods of obtaining and processing data on a large number of factors important in the preparation of design and management decisions.

At the same time, the prospects for land management digitalization are associated with the creation of a single integrated information system that allows predicting the integrated use of land, automating design developments based on the SAZPR, performing expert analysis of land use based on neural network analysis, expert and intelligent systems, ICT, etc. It is important that such a system considers already existing mathematical models and allows integration with previously autonomous functional and software modules, such as:

– discrete models of the organization of optimal crop rotations and allocation of plots at the expense of land shares (which already allow "linking" the preferences of shareholders with the formation of optimal land masses suitable for the use of modern farming technologies);

– methodology for analyzing the spatial variability of crop yield characteristics depending on the conditions of the agricultural landscape;

– systematized database of field experiments of the agrochemical service of the Federal Ministry of Agriculture and the Agrogeos geonet;

– module for automated processing of cartographic information about agricultural lands and calculation of their cadastral value, etc.

If this condition is met, this system will allow creating full-fledged three-dimensional models of various territories and significantly facilitate and accelerate the processes of land management design, as well as ensure the required quality of results.

It should also be considered that along with the federal GRSHZ, the regions are actively developing "their" databases (mainly based on the results of agricultural land monitoring) [45, pp. 1616-1617; 46, pp. 900-901]. Now such systems are already functioning in 38 regions – the pace of formation of such regional systems over the past decade is shown in Figure 2 (data for 2021 are preliminary).

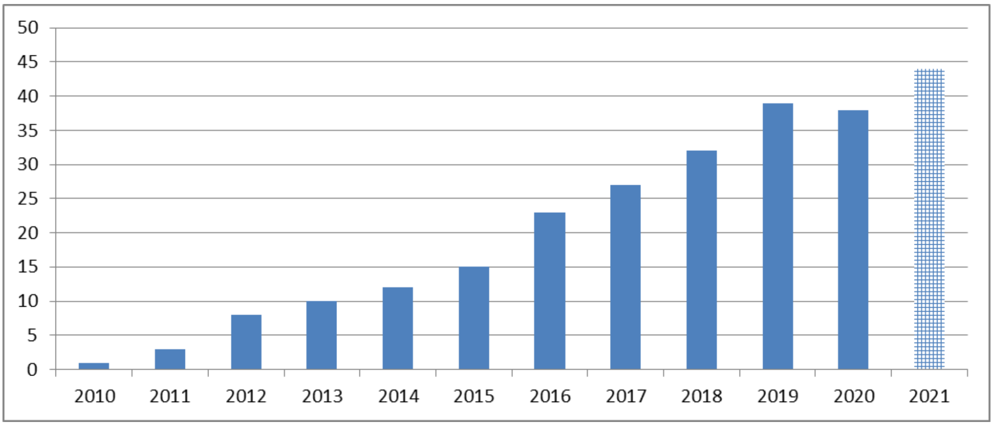

Fig. 2. Formation of regional ISZSNs for the country as a whole (the number of regions with active ISZSNs in 2010-2021; source [34, p. 160]

This gives rise to another possible problem related to the fact that when maintaining the GRSHZ, along with the need to organize interdepartmental data exchange at the federal level, differences in the rates of development of similar regional systems and saturation of the federal register with their data will inevitably be revealed. Moreover, this may well repeat the situation with the automation of the land cadastre in the mid-1990s, when the regional rates of both very drastic transformations in the land sphere and the introduction of new technical means (including programs and databases) were different. Moreover, local leaders of that time often independently implemented them, and even with the involvement of various foreign partners. Because of this, "their own", often incompatible developments and technological solutions were implemented in different regions, and the uniformity of cadastral accounting could be lost. Then, to preserve the unity of the national system of such accounting and guarantee its comparability and compatibility at different levels, the Government developed a special program [47], the implementation of which made it possible to preserve the unity, comparability, and consistency of data, both on the land fund and on specific plots. It must be said, most likely, there will be no negative development due to the fact that digitalization of interdepartmental exchange will first lead to the identification of facts of possible data incompatibility, and then to the adoption of measures to address it (i.e., the adoption of a similar nationwide program will not be required).

The scientific results presented in this article have previously been partially reported and published by its authors and received positive responses. Nevertheless, they were devoted more to agricultural land condition, applied aspects of digitalization of agriculture, and land management production. While in combination with the universal aspects of the state's implementation of the digital data management function, this was not considered. Also, previously there was no reason to analyze the process of GRSHZ integration and other sources of information about agricultural land, which, due to its novelty, has not yet found wide coverage in the scientific press.

4 Conclusion

The process of economy digitalization is developing and covers all new areas. A kind of late decision to start conducting the GRSHZ imposes additional requirements for the introduction of digital technologies in the field of agricultural land use and management. Moreover, we are talking both about the reliability of the data that will be included in the GRSHZ from other sources, and about the technologies of interaction between them. As the basic data sources for GRSHZ, we offer 1) EFISZSN; 2) EGRN and other Rosreestr data; 3) reports of regional agricultural authorities; 4) results of monitoring of agricultural lands; 5) land management materials. The priority of these sources is largely determined by the degree of introduction of digital technologies into the above-mentioned information systems. Also, there is some risk of incompatibility of data on agricultural lands due to the different rates of formation of the corresponding databases in the regions, but this risk is insignificant.

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