

# Digital Interactive Management Reporting: Key Module in Information Space Model of Digital Operating Environment of Agricultural Enterprises

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## ABSTRACT

The article proposes a study of issues concerned with improving the methodology of management reporting at agricultural enterprises in the context of digitalization of accounting and analytic data. The need for a digital interactive management reporting for agricultural enterprises has been justified; an information space model of the digital operating environment of an agricultural enterprise has been developed; the concept of digital interactive management reporting has been clarified and its role in managerial decision-making at agricultural enterprises has been determined; and a project of tabulated digital interactive management reporting indicators has been designed to provide information for preventive measures aimed at increasing the efficiency of agricultural production. The indicators of the projected digital interactive management reporting of agricultural enterprises have been recommended to be divided into four main groups focused on the goals of managerial decision-making, i.e., to make a profit; develop a resource potential; receive government support; and attract investment.

**Keywords:** *digital interactive management reporting, digital operating environment, agricultural enterprises, management reporting indicators, managerial decisions*

## 1. INTRODUCTION

The need for a digital interactive management reporting in the digital operating environment of an agricultural enterprise is driven by management personnel, requiring on-line and relevant information on agricultural production in the context of digitalization.

Management reporting set up at agricultural enterprises is a relevant matter for scientific inquiry. Main problems to be solved in current studies are user needs and their impact on reporting [1, 2], improving the composition of industry-specific management reporting [3, 4, 5, 6, 7], segmentation of activities [8, 9], creating of integrated financial and management reporting [10, 11], expansion of sub-accounts and analytical accounting with respect to the industry specifics [12, 13], and management reporting data used for effective managerial decision-making [14].

Scientific studies of management reporting determine its methodology and are a domain of non-numeric technologies of digitalization.

The priority area of the management reporting for managerial decision-making is modernization and improvement of the digital information platform [11].

To solve the tasks set by the Russian Ministry of Agriculture on digitalization of agriculture through digital technologies implemented and asset solutions of an agribusiness model, agricultural enterprises are required to take an active part

[15, 16] in creating an effective digital operating environment.

Studies of modernization and improvement of the digital information platform of an agricultural enterprise established positive effects of digitalization, i.e., potential of production growth and competitiveness of agricultural products [17], increase in labor productivity [18], fast retrieval of relevant information for agribusiness [19], and on-line production monitoring implemented in agriculture [20].

The digitalization goals to be achieved by agricultural enterprises need modeling of the information space of a digital operating environment, including interactive management reporting.

The purpose of the presented work is to develop a methodology for the management reporting of agricultural enterprises in the context of digitalization of accounting and analytical data.

The objectives of the research are

- to justify the need for digital interactive management reporting of agricultural enterprises;
- develop an information space model of the digital operating environment of an agricultural enterprise;
- clarify the concept of digital interactive management reporting and determine its role in managerial decision-making at agricultural enterprises; and
- tabulate digital interactive management reporting indicators to provide information for preventive measures aimed at increasing the efficiency of agricultural production.

## 2. RESEARCH RESULTS

The industry-specific features of agricultural enterprises determine the goals of modeling the information space of the digital operating environment of an agricultural enterprise.

The digital operating environment of an agricultural enterprise should comply with the principles of

- priority of sustainable development of agricultural production;
- digital information, including reporting, that enables interaction with government information systems;
- efficiency of high-quality information space to provide feedback between production and management; and
- flexible transformation of industry-specific application software for accounting and analytical management influenced by technological digital solutions for agricultural production.

The information space of the digital operating environment of an agricultural enterprise (Fig. 1) is intended to provide internal users with timely and relevant data on

- requirements for statutory industry-specific reporting, measures and areas of government support for the agricultural sector;

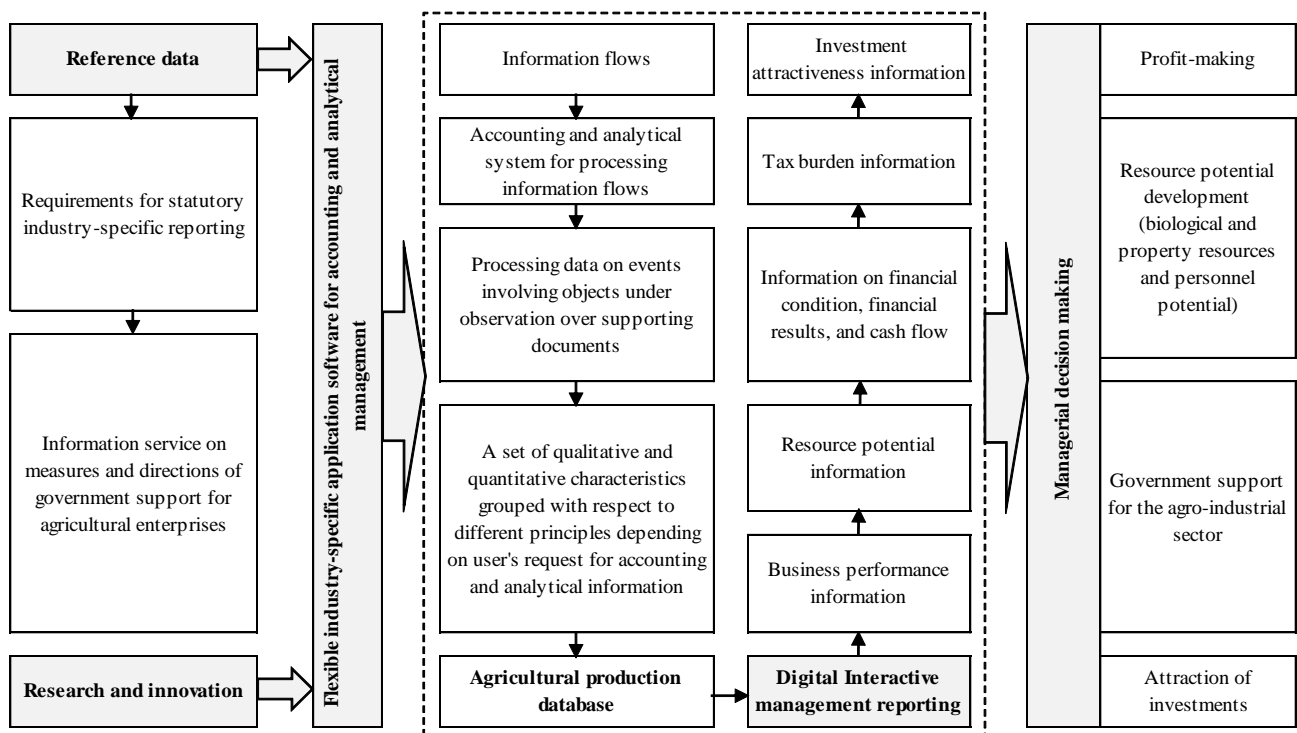
- research and innovation;
- effective business, resource potential, financial condition, financial results, and cash flow;
- tax burden; and
- investment attractiveness.

The key module of the information space model of the digital operating environment of an agricultural enterprise is digital interactive management reporting that is generated on the agricultural production database by flexible industry-specific software for accounting and analytical management.

Digital interactive management reporting we understand as a system that is intended for processing an accounting and analytical database to ensure the managerial decision-making and possesses permanent qualitative and quantitative indicators, depending on the purpose of the user's request.

Digital interactive management reporting is a final information product created in the information space of the digital operating environment of an agricultural enterprise.

The goal of the reporting format is the operational support for the managerial decision-making at agricultural enterprises.



**Figure 1** The information space model of the digital operating environment of an agricultural enterprise

Source: Authoring, based on [21]

The advantages of the digital interactive management reporting include

- variability of visualized qualitative and quantitative characteristics of the indicators requested (there is opportunity to choose a good way to represent the data in

the form of regulated external or internal reporting, a table, or a graph);

- processability of a large amount of data using tools for mathematical modeling of economic phenomena, statistical

analysis and forecasting tools, and methods of economic analysis; and

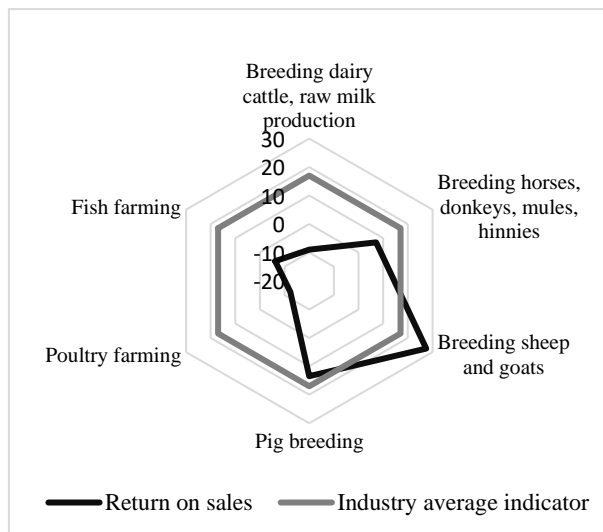
- ensured relevance of the requested information.

Despite the fact that digital technologies are of high priority in digital interactive management reporting, it is necessary to emphasize the importance of non-numeric technologies that determine the content and quality of reporting, i.e., a set of accounting and analytical information properties that satisfy the expected needs of users [22].

Non-numeric technologies for the digital interactive management reporting determine the industry aspect in the procedure of managerial accounting and analysis and provide scientifically proven cost classification, accounting treatment, cost accounting of agricultural products (works and services), effective budgeting policy, pricing and assortment policy, analysis of break-even production, goals of strategic management accounting and analysis, modeling forms of management reporting, etc.

Non-numeric technologies give conditions for software developers, as well as calculation formats for interpreting a set of management reporting indicators that are necessary for users of a particular agricultural enterprise.

Low profitability and sometimes unprofitability (Fig. 2) of agricultural production in the Volgograd region indicate the need to digitize the information base for managerial decision-making at agricultural enterprises.



**Figure 2** Profitability of sales of agricultural livestock enterprises in the Volgograd region, 2018

Source: Authoring, based on Rusprofile.ru

The negative profitability of the majority of agricultural livestock enterprises in the Volgograd region proves their unprofitability, inefficient pricing policy, misallocation of the resource potential, and investment unattractiveness.

In such a situation, management needs preventive measures aimed at making profit, increasing the efficiency of the

enterprise's resource potential, and investment attractiveness. The government support measures, i.e., soft loans, soft leasing, compensating and stimulating subsidies, and others, play an important role in improving the efficiency of agricultural production.

To establish preventive measures to increase the efficiency of agricultural production, we proposed the indicators of the projected digital interactive management reporting of agricultural enterprises to be divided into four main groups focused on the goals of managerial decision-making, i.e., to make a profit; develop resource potential; receive government support; and attract investment (Fig. 3).

The first group of interactive management reporting indicators will allow agricultural enterprises to monitor costs and affect profit – the ultimate goal of entrepreneurship. The targets of this digital management reporting group are marginal revenue, break-even point, financial safety margin, margin of safety, and operational leverage.

The first group indicators are based on the fixed and variable costs classification that is possible to obtain in two ways, i.e., by means of a separate analytical account of variable and fixed costs or special statistical methods applied.

Separate analytical accounting of variable and fixed costs at agricultural enterprises is not provided in standard accounting automation programs and, therefore, is not maintained.

Special statistical methods (least-squares procedure, reference cycle troughs and peaks, and others) without special programs to be applied do not enable separating the total value into variable and fixed costs.

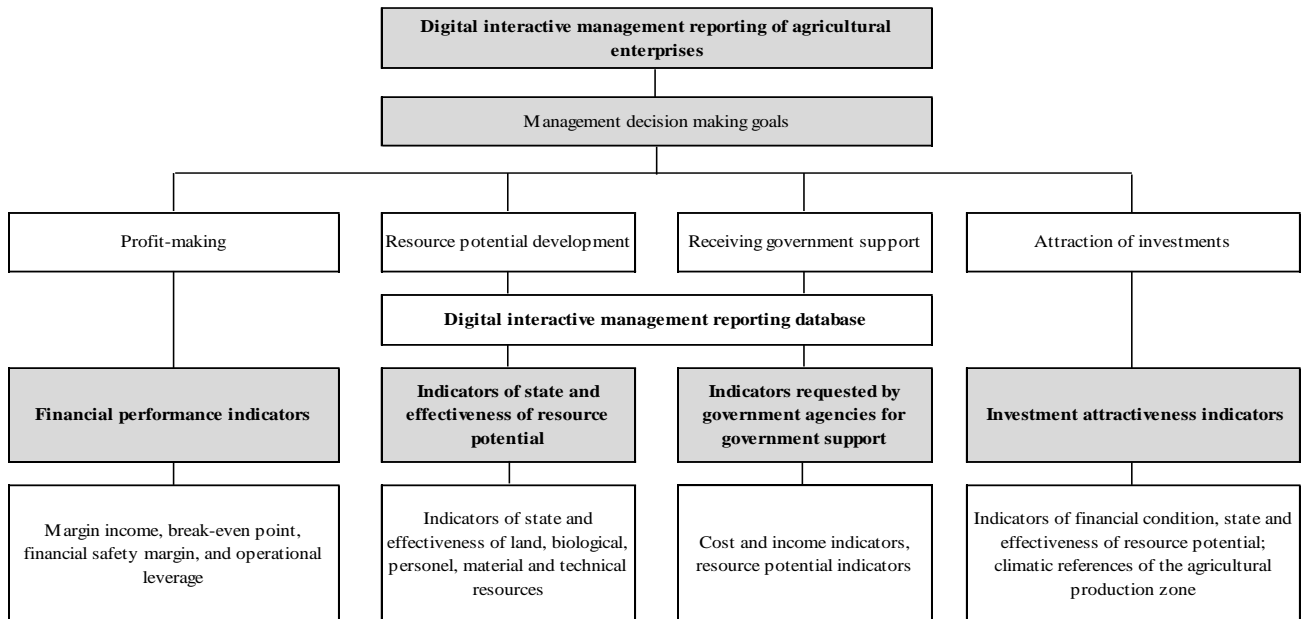
Flexible industry-specific software enables application of all these methods that should be described in the design specification for the architecture of the software product.

Operational monitoring the first group indicators due to digital interactive management reporting will allow operational decision-making to manage financial results at agricultural enterprises.

The second group indicators of digital interactive management reporting involve assessing the resource potential of an agricultural enterprise.

The resource potential of the agricultural enterprise includes land, biological, human, and property resources [23, 24].

The second group targets of digital interactive management reporting include indicators of the state of the resource potential and efficiency of its utilization, i.e., indicators of biological resources, agricultural output (gross yield and yield of crops, average milk yield per cow, average amount of wool shorn from one sheep, average daily weight gain in fattening, yield of honey per one bee family, etc.), condition, flows and utilization of fixed assets and stocks, payroll indices, efficiency of the working day planning and labour, etc.



**Figure 3** Digital interactive management reporting of agricultural enterprises to provide information for preventive measures aimed at increasing the efficiency of agricultural production  
Source: Authoring

The systematization of the third group indicators of digital interactive management reporting considers the requirements established for specific measures of government support. For example, in order to receive a subsidy for livestock produced and sold, agricultural entities must provide information on measures of the subsidy efficiency for livestock produced and sold, i.e., 1) accrued average monthly wage; 2) payroll budget or annual income minus expenses (for individual entrepreneurs and heads of farming enterprises that do not have hired workers; 3) breeding stock at the end of the current financial year; 4) total income from sale of goods (products, work, and services); 5) income from farm marketings – sale of farm produced and processed goods; and 6) share of the income from farm marketings in the total income [25].

The digital interactive management reporting, containing the fourth group indicators, enables assessing the investment attractiveness of the agricultural enterprise.

The investment attractiveness contributes to the investors' motivation to invest their own funds in the development of the economic entity. The higher the investment attractiveness is, the greater the interest of investors grows [26, 27].

Moreover, an investment attractive agricultural enterprise can obtain loans, additional contributions from founders, and funds from a strategic investor [27].

The fourth group targets of digital interactive management reporting of an agricultural enterprise are indicators of financial condition [26, 28], state of the resource potential and efficiency of its utilization, as well as climatic references of the agricultural production zone [29].

The proposed indicator groups of digital interactive management reporting with flexible industry-specific software products applied allow agricultural enterprises to

create a permanent accounting and analytical database with targets of maximum profit, given the enterprise's resource potential; development and modernization of resource potential; opportunities to obtain government support; and attract investments.

### 3. CONCLUSION

The requests of the managerial staff of agricultural enterprises cannot be a certain constant; they depend on economic behavior of the market, demand for agricultural products, national regulation of agricultural production, innovations, and properties. These conditions not only set goals, indicators, and composition of management reporting, but also require an increase in speed of retrieved data requested for the managerial decision-making.

To solve the problem of the proper database quality for the managerial decision-making at agricultural enterprises combined with high speed data retrieval, a digital interactive management reporting should be generated in a digital operating environment of an agricultural enterprise due to flexible industry-specific software products for processing accounting and analytical information.

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