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PROBLEMATIC ASPECTS OF INFORMATION AND ANALYTICAL SUPPORT FOR THE MANAGEMENT OF INDUSTRIAL ENTERPRISES

Abstract

Introduction. *The experience of Ukrainian industrial enterprises and the results of scientific research highlight the need to establish a unified information and analytical system within the management structure. At the same time, there is no national concept that would ensure the effective implementation of management and control functions of information and analytical support. Existing contradictions between the interests of reporting data users, the absence of unified standards for the preparation and evaluation of reports, and the untimely provision of information reduce the practical value of current systems.*

Methods. *The study applies general scientific methodological approaches (historical and systems analysis, induction, deduction, scientific abstraction), as well as specialised methods (operations research theory and quantitative assessment methods).*

Results. *The inconsistency between the current state of methodology and organisation of information and analytical support and the requirements of effective management and economic growth of Ukrainian industrial enterprises is substantiated. The role and place of information and analytical support in the management cycle are identified. It is demonstrated that the existing system does not meet market conditions and requires improvement in the form of a*

computerised information and analytical system. Using the example of an industrial enterprise, the study shows the consequences of violating the principles of systematisation and hierarchy in the design of corporate information systems, which resulted in significant financial losses.

Discussion. *Further research should focus on developing the conceptual foundations of a new paradigm of information and analytical support, integrated into the management processes of industrial enterprises, taking into account international experience and the digital transformation of the economy.*

Keywords: *industrial enterprise, information and analytical support, management, management level, comprehensive assessment, computerised information system, business.*

Introduction.

The experience of Ukrainian industrial enterprises and scholarly publications indicate the necessity of creating a unified information and analytical system within the management structure. However, at present, there is no domestic concept that would allow the effective implementation of managerial and control functions of information and analytical support for management in the activities of industrial enterprises.

At the same time, differences in the interests of users of reporting data highlight the mutually exclusive nature of information and analytical tasks. On the one hand, the absence of generally accepted and mandatory rules for the preparation of reports, as well as their evaluation, makes information and analytical support unclear and therefore rarely used by users. The development of international business activities exacerbates this problem. On the other hand, it does not satisfy managers, as it lacks timeliness. The more accurate and reliable the information, "the more it is removed in time from the moment of the actual business operation and provides less benefit for enterprise management needs" [1, p. 18].

Analysis of recent research and publications.

Most researchers in the field of decision-making theory define the scheme and management procedures as a process of sequential performance of management functions: planning, accounting, analysis, and regulation (with varying degrees of detail) of certain production processes or activities. Accepting this as a basis, it should be taken into account that the functions of planning and regulation are considered directive or managerial, which are carried out before managing any processes, usually by the same responsible managerial staff. Meanwhile, the function of information and analytical support is necessary but auxiliary, i.e., it serves ongoing processes or functions as communication without possessing directive powers.

An important theoretical and methodological basis for constructing the conceptual framework of information and analytical support in the management system of industrial enterprises is the works of O. M. Bradul, F. F. Butynets, A. A. Mazaraki, Ye. V. Mnykh, and M. H. Chumachenko [2; 3; 4; 5; 6], who emphasize the need to develop a new concept of information and analytical support that would meet the requirements of the time and allow Ukrainian enterprises to compete in the global market. Therefore, this scientific study can be considered relevant.

Purpose.

The aim of the article is to study, taking into account Ukrainian traditions and international experience, the problematic aspects of information and analytical support for industrial enterprise management, their place in the overall management system, and the principles of their organization. This enables the identification of directions for further scientific research.

Research methodology.

The research methodology is based on a systemic and interdisciplinary approach to the study of information and analytical support in the management of industrial enterprises. The methodological framework combines both general scientific and specific methods of economic analysis, management theory, and systems engineering.

At the general scientific level, the study employs methods of historical analysis, systemic and structural-functional analysis, induction and deduction, and scientific abstraction. These methods made it possible to trace the evolution of information and analytical systems, identify contradictions in their practical implementation, and generalize conceptual provisions for their improvement.

At the special methodological level, the study applies methods of operations research, comparative and factor analysis, and quantitative assessment techniques to evaluate the efficiency of existing information and analytical systems at industrial enterprises. The logical-structural modelling method was used to determine the place and role of information and analytical support within the enterprise management system, as well as to establish interconnections among its elements.

Empirical verification was carried out using data from the industrial enterprise "Yeristivskyi Mining and Processing Plant" LLC, which served as a case study for assessing the consequences of methodological inconsistencies in the design of corporate information systems. The analysis involved studying financial statements, internal reports, and system architecture documentation to identify distortions in budgeting and management accounting modules.

The methodological basis of the study is further supported by theoretical provisions of economic cybernetics, decision theory, and enterprise information systems theory, which together form the conceptual paradigm for improving information and analytical support. The integration of these approaches ensured a comprehensive understanding of the multi-level management processes (strategic, tactical, operational, and real-time) and their interrelation with the information system's hierarchy.

The methodological consistency of the research lies in the combination of qualitative analysis – aimed at identifying conceptual and organizational problems – and quantitative evaluation, which substantiates the economic impact of inefficiencies in information flows and system design. This combination allows for a balanced assessment of theoretical and applied aspects of information and analytical support for industrial management.

Results.

The development of socio-economic relations, the formation of new business structures, and the transition to informatization and computerization in the process of expanded reproduction have formed a new subject-object field of scientific research regarding information and analytical support for management, for which no conceptual provisions based on the principles of systems thinking have yet been developed.

To date, in the economic analysis of industrial enterprises, research has not shifted from studying individual elements to studying complete sets of elements, subsystems, and systems as a whole in order to identify all significant interrelations among them [7].

The reason for changing the existing paradigm lies in the possibility of their use in studying development patterns. Representing the research object as a system and a detailed analysis of its structure facilitates the study and modeling of enterprise activity.

Thus, in the activities of industrial enterprises, the causes and effects of the influence of the system of reporting indicators on the management system have not been studied or established, since it has not been taken into account that this system is:

1) non-mediated, since each reporting indicator participates in the formation of the system;

2) restorative, because any reporting indicator is derived or emerges from another system;

3) disaggregated, since it consists of more than one element;

4) not entirely reliable, because an incomplete system of reporting indicators does not satisfy management in performing all managerial functions;

5) elementary, because any reporting form or indicator is not a system in the sense that the set of all reporting indicators is;

6) non-determinative, since there are no such relations by which the values of unknown components could be determined from existing elements;

7) non-centralized, since relations between all elements are not defined through a central indicator. If only reporting forms are taken as a basis, then the system is obviously centralized, because relations between forms are defined through enterprise reporting;

8) single-level, since reporting indicators are divided into separate groups with identical system-forming components;

9) primary, because reporting indicators form a system from the moment connections (relations) are established between them;

10) incomplete, since new indicators can always be additionally included in reporting during consolidation;

11) immanent, because only approved reporting indicators are included in the system;

12) stationary, since the characteristics of the system remain unchanged with quantitative or qualitative changes in individual reporting indicators;

13) non-autonomous in elements, because any reporting indicator does not possess all the properties characteristic of the system;

14) heterogeneous, since it consists of elements performing different tasks within the system;

15) cyclical, because qualitative changes periodically occur in its elements;

16) non-chain, since it may contain more system-forming relations than elements;

17) partial, because each reporting indicator enters the system through one attribute – reporting.

All this causes ambiguity in understanding the place and role of information and analytical support in the management system of an industrial enterprise.

In the generalized model of enterprise management, the following levels of management are present (see Fig. 1).

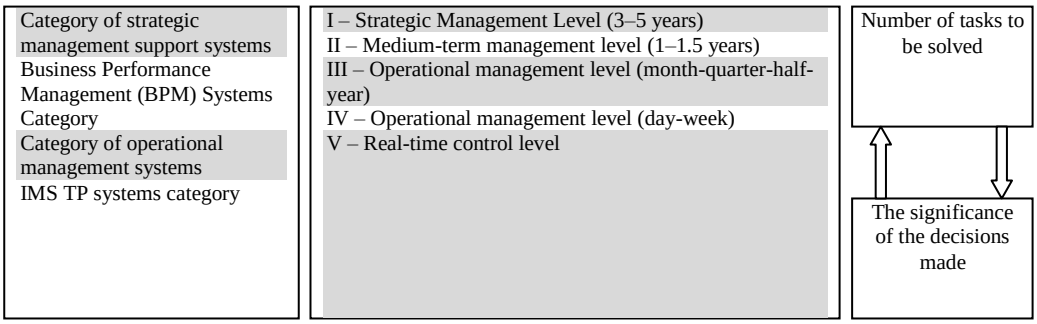

Figure 1. Levels of management in the generalized enterprise management system*

**Source: systematized by the authors.*

As a rule, industrial enterprises have all levels of management. The exception may be the level of real-time management, which is necessarily present in the management of technological processes of continuous production cycles (setting process parameters, allowable deviations, and monitoring the course of the process) or in the management of complex logistics systems, where unloading movements are calculated by minutes or even seconds.

However, while the tasks of strategic management and real-time management levels can be localized relatively easily, it is more difficult to do so with the tasks of levels ranging from operational to medium-term.

The vague correspondence of systems to management levels is explained by the fact that each level does not exist independently, i.e., separately from others. Decisions made at the upper level impose constraints on decisions at the lower level. For this reason, management systems must at least be able to take these constraints into account.

It should be noted that when it comes to information and analytical support of management, such a system must support managerial accounting – the recording of facts of economic activity. All other management functions are implemented outside the system. However, if information support is used to implement a managerial information system as a whole, then in this case not only managerial accounting must be ensured, but also analysis (i.e., evaluation of different plans according to given algorithms depending on changing external and internal conditions), monitoring the implementation of plans, analyzing deviations, and developing recommendations for managers' decision-making.

For effective management of an industrial enterprise, it is necessary to implement all functions of the management cycle. Another issue arises when some authors believe that it should be carried out in the following sequence: plan, organize, record, control, and analyze using one system, or plan in Excel, record in SAP, control and analyze again in Excel or in some other way [8].

This sequence does not correspond to the new paradigm of information and analytical support of management; it violates its principles and integrity within a specific economic system (industrial enterprise).

Practical and theoretical issues of organizing analytical support based on computers have been sufficiently covered in the specialized literature of recent decades. However, it unilaterally covers certain theoretical and methodological provisions of the practical organization of economic analysis under automated control systems [9].

The existence and functioning of a large number of industrial enterprises with varying levels of computerization of analytical information and equipment with computing technology and software require the development and application of various organizational forms and methods of computerization of information and analytical support.

A significant drawback of corporate systems for processing and generating information and analytical data is, firstly, the lack of a systemic, comprehensive approach to theoretical and methodological problems of information and analytical support of management; secondly, neglect of the specifics of the organizational and production structure of industrial enterprises.

Thus, the existing structure of the computer information system of the industrial enterprise LLC 'Yeristivskyi Mining and Processing Plant' is shown in Fig. 2.

Such a structure of building a computer information management system does not correspond to the methodology of their construction, for example, in terms of assigning budgeting issues to financial accounting, although this issue relates to managerial accounting. Also, financial accounting is a source of information for management, so assigning the management of fixed assets to the competence of financial accounting is incorrect.

That is, the principles of systemicity, hierarchy, and consistency of the structural design of the information system have been violated, which led to losses at this industrial enterprise amounting to UAH 32.924 million in 2023.

In addition, the economic literature identifies several other problems of existing information systems (technical, accounting, etc.) [10].

Technical problems. The number of users. This may become critical for the use of an information and analytical system. For example, if an industrial enterprise has 200–300 end users of a computer program, neither gigabit networks nor access to terminal servers prevent the system from 'freezing' and errors from occurring. The program cannot function properly with such a number of connections.

Architecture. In industrial enterprises, in most cases, the sources and users of information-analytical data are geographically distant from each other, especially during martial law. In such a situation, simple information systems become incapable of maintaining the relevance of data for managers and company owners. It should be noted that local installation with full synchronization of data is possible only within ERP systems.

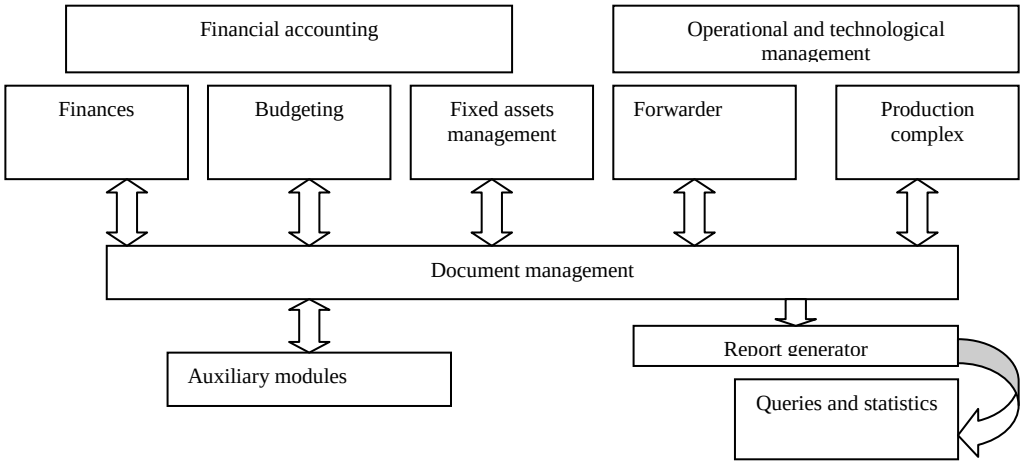

Figure 2. Existing structure of the computer-based information system for managing the activities of «Yeristivsky Mining and Processing Plant» LLC*

**Source: systematized by the authors.*

A significant influence on the informativeness of the financial results from the sale of all types of products is exerted by the choice of the method of inventory valuation and the calculation of the actual cost of materials released into production [11, p. 109].

When issuing inventories into production, sales, or other disposals, inventory can be valued:

– at weighted average cost – for raw materials, coke, coking coal, semi-finished products, work-in-progress, and finished products;

– at sales prices – for goods;

– at identified cost – for other types of inventories.

It is advisable not to recognize as an asset, not to depreciate, but to record as expenses of the reporting period the costs of research and development, training and retraining of personnel, advertising, and promotion of products in the market.

The amount of payments for the right to use (royalties) developments, patents should not be recognized as intangible assets but included in the expenses of the current period.

Thus, the decision on this element of accounting policy determines the amount of depreciation of intangible assets included in the cost of production and, accordingly, affects the size of financial results. The regulatory framework provides industrial enterprises with two options for allocating production costs:

Option with subdivision of the reporting period's costs into direct and indirect, with the latter included in the actual calculation of the unit of production (work, service) after allocation. The registers reflect the full actual production cost of the object of calculation.

Option with allocation of the reporting period's costs into production (variable) and period (fixed). The division of costs into variable and fixed is carried out on the basis of the corporation's calculation study:

– variable costs include all direct costs, as well as part of overhead costs, the amount of which fluctuates according to production volumes;

– fixed costs include those costs, the amount of which fluctuates insignificantly, regardless of production volumes.

At the end of the reporting period, fixed costs are fully written off against the reduction of revenue from product sales (work, services). These costs are not included in product costing. Thus, an incomplete (limited) actual production cost of the calculation object is formed.

For industrial enterprises, the second option is the most advisable, since the allocation of fixed costs by type of product makes it possible to clearly budget and control financial flows. Therefore, the mentioned aspects significantly affect the performance of an industrial enterprise, the reliability of information-analytical data, and the timeliness of management decisions, but this also depends on methodological support for analysis.

Adaptability difficulties. Changes in legislation require prompt changes in the existing software product and its adaptation. If the State Tax Service of Ukraine introduces electronic document management for VAT, then for an enterprise with an existing information system, this becomes impossible.

All this requires the inclusion of all business processes in a computer-based information-analytical system, in which it is necessary to change the formats and types of internal reporting data, ensure the timeliness of data receipt, and improve their reliability.

Timeliness of information receipt. It is associated with the use of different operating systems that are not integrated with each other and are not supported by a powerful server. In Ukrainian industrial enterprises, management accounting and economic analysis have traditionally been used mainly to generate summary and analytical data for relatively long reporting periods: month, quarter, year.

The practical processing of operations is mainly aimed at obtaining monthly reporting data and does not provide the timely information necessary for operational management decisions when certain deficiencies in operations are identified. Information-analytical support at industrial enterprises usually works with daily, and sometimes weekly, accuracy. Only in some information flows is accuracy achieved within a few hours, which applies to production operations.

Therefore, new methodological and organizational solutions are needed to provide operational indicators within shorter timeframes, while maintaining the fundamental system principles in the form of a computer-based information-analytical system for managing an industrial enterprise.

Conclusions and prospects.

Information-analytical support in the management of industrial enterprises does not meet the requirements of effective management, which involves the use of new approaches and methods in organizing analysis across all activities, business units, and business processes. In fact, only reporting assessment is carried out, not a comprehensive analysis within the management system, which does not provide complete information about the production process and cost reduction reserves.

The information-analytical data used in management should gradually move from general, multipurpose to targeted signal-reference information, necessary for decision-making of a specific type, sufficiently large-scale to evaluate plan implementation, use of production resources, and at the same time cost savings.

On the basis of the same initial data, it is necessary to obtain information for various management departments of an industrial enterprise, i.e., with different degrees of accuracy and frequency of generation. Such a system should ensure continuous information-reference readiness of analytical data to meet the requests of users at any level of industrial enterprise management.

Thus, the relationship between activity analysis and the management system of an industrial enterprise becomes an integral attribute of effective development. At the same time, management development and improvement of its methods imply the need to create new databases and further develop information-analytical support as a method for substantiating management decisions.

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