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SECTION 5

ANALYTICAL SUPPORT OF DIGITAL TRANSFORMATIONS

AN ANALYTICAL SUPPORT METHODOLOGY FOR TRANSFORMATIONAL PROCESSES

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Abstract. *This article is devoted to the problems of the analytical support for digitalization of the modern economy and their impact on economic growth and social welfare. It is shown that businesses in the field of computer and information technologies, as well as the sharing businesses, are developing rapidly based on the widespread use of Internet services and cloud technologies. It is noted that for businesses that rely on Internet services, the analytical support system is simplified, which is reduced to managing the creation, processing and redistribution of information, rather than creating new products and industries, which also inhibits economic growth. The results of the study of the compliance of the methodology of analytical support of digital transformation processes with the modern conditions of the digital economy allow the author to state that the development of the methodology of the accounting and analytical process involves: first, the study of cause-and-effect relationships in the economy and the management and institutional sphere of regulation of this process; second, the establishment of an organic link between the state of the economic and institutional environment with the content of the accounting and analytical process; and third, the formation and establishment of such a link allows economic entities to develop in accordance with corporate interests, which are defined in the economic strategy.*

However, it has been proven that the practice of accounting and financial reporting has accumulated negative properties that make it difficult to update the concept of information support for setting and implementing management goals, the need for which is long overdue.

We believe that in order to improve the effectiveness of control measures, the accounting and analytical array should be supplemented with information from big data databases, which are formed from management, tax, and statistical reports, information summary reports of financial regulators, and sources of non-financial information.

Suggestions for improving the methodology of analytical support for digital transformation processes and specific practical recommendations will contribute to the acceleration of digital transformation accounting and analytical processes, and this will allow timely identification of risks of loss of stability and efficiency of economic entities, helping them to take into account measures to eliminate or mitigate negative consequences in formulating development strategies. Proper methodological support for any transformation processes of an economic entity reflects the level of its economic development, priorities, strategic guidelines, and opportunities to achieve them. In addition, it must be adequate to the industry specifics of those regulatory objects under the management of which the necessary regulations are created, otherwise these regulations will be useless.

Keywords: *digitalization of the modern economy, transformational processes, analytical support, IT platform, information technologies*

Introduction

The relevance of the topic of analytical support for digital transformations is due to the rapid and active penetration of digital information technologies into all spheres of the functioning and life of modern society. The governments and business structures of all countries of the world are aware of the vital need to accelerate the processes of digital transformation and digitalization of the economy in order to gain competitive positions in the changing digital space of the new world economy, which, of course, requires the necessary analytical and scientific-methodological study of the implementation of appropriate changes. The opening of an IT platform, the existence of cloud technologies, the introduction of a single international format for providing financial statements in XBRL electronic format, and many other innovations in the field of electronic information technologies significantly increase the requirements for the efficiency of accounting, review and analysis processes. At the same time, in modern conditions, the management of enterprises constantly solves complex adaptive tasks to reformat the systems of existing methodological support for accounting, control, and analytical processes and to prepare external and internal reports.

In today's conditions, all existing functional elements of the financial and economic management system of business structures proceed with state participation, namely: organization and motivation, planning and budgeting, accounting and reporting, analysis and regulation, and control and coordination. These elements are under pressure from quite serious disagreements – sometimes even direct contradictions of state and corporate interests. The problem of creating transparent financial statements has also not yet been solved.

Thus, the above-mentioned issues determine the relevance of the research topic and require further development of the methodology for the analytical support of digital transformations regarding the unity of their levels and types. At the same time, the significance of this study increases significantly in the current conditions of digitalization of the economy, which undoubtedly requires a clear interpretation of the main content provisions and the unambiguity of calculation algorithms.

The main accounting principles that determine the state of all accounting activities, as well as possible prospects for improving the accounting methodology in the context of the evolutionary development of economic life, are described in the works of a number of well-known scientists: J. Akerlof, H. Anderson, R. D. Barro, R. Boyer, H. G. Gadamer, R. Griffin, J. M. Keynes, D. Locke, J. S. Mill, B. Needles, A. Smith, J. Stiglitz, M. Friedman, Hayek von F. A., J. Schumpeter, and L. R. Emerson.

In the works of Iziri Yuji, L. I. Gomberg, and V. V. Leontiev, studies of the matrix form of providing accounting records and developing new reporting forms are presented. It should be noted that these studies are becoming particularly relevant and important in the context of digital transformations of the economy for the development of multi-level accounting records, which are objects of on-farm control.

The developments of scientists and practitioners from different periods of history confirm the relevance and complexity of the research topic. Scientific discussions on the institutionalization of analytical support for the entire management system of corporate structures make it necessary to develop a scientifically based concept of accounting and analytical processes that will meet the financial interests of all involved participants in expanded reproduction.

Therefore, the relevance of the formulated problems and the need to identify options for their elimination determined the choice of the research topic and its purpose and objectives.

The purpose of this study is to improve the methodology of modernization of accounting support for digital transformations in the context of institutional changes, aimed at supporting the implementation of economic strategies for the development of various corporate structures.

To ensure this goal, the following tasks were formed: 1) to justify the need for analytical support of digital transformations taking into account institutional changes in the system of regulation of the economic environment; 2) to analyze modern concepts of digitalization of accounting processes and prove the allocation of the concept that is most adapted to the conditions of the corporate environment in order to further improve it in relation to its practical application in economic activities; 3) to justify methods for choosing the priority objects and methods of accounting procedures in specific conditions; and 4) to propose a model of analytical support for digital transformations to achieve corporate development goals.

The object of this research is a set of corporate structures, and the subject of the research is a set of accounting and analytical measures of support for digital transformations.

To achieve this goal and solve problems, such general scientific methods as induction, deduction, classification, comparison, logical and statistical analysis, proofs, and generalization were used. Particular methods of cognition were also used, namely: observation, expert assessment, modeling, methods of cognitive analysis, economic, mathematical and statistical methods of data processing, as well as tools of organization theory and systems theory.

The theoretical basis of the research was formed by the scientific works of scientists of different times, which reveal the essence of accounting and analytical support of economic processes and mechanisms of their application.

The main body of the paper

The evolutionary path of development that is characteristic of many national systems of analytical support of economic processes has one common feature, the essence of which is to follow changes in the socioeconomic environment and institutions of its regulation, leading to constant changes in the methodological and legal bases of analytical support of economic processes in accordance with the needs of economic agents at all levels of economic life. The concept of evolutionary economy is interpreted by the author as the process of increasing the variety of factors of production, complicating the forms of their management (accounting, control and other information support) which occur due to changes in technologies, goods, organizations, institutions, which are periodically repeated (Kuter et al., 2011).

The methodological foundations of the evolutionary theory of T. Veblen (1899, 1904, 1914), D. North (1997), and many other foreign scientists are adopted as a basis by economists to ensure the continuity of the positive historical heritage of existing concepts of analytical support for economic development. This can be seen in the example of the new doctrine of the digital economy constantly being developed by scientists from different countries and institutional structures.

Thus, V. S. Sopin (2009) draws attention to the concept of further development of this relatively young direction of economic thought – the theory of evolutionary economics, the basis of which was formed thanks to the works of the following scientists: T. Veblen's *The Theory of the Leisure Class* (1899), *The Theory of Business Enterprise* (1904), and *The Instinct of Workmanship and the State of the Industrial Arts* (1914); *The Theory of Economic Development* by Joseph Alois Schumpeter (1928/2008); and *An Evolutionary Theory of Economic Change* (Nelson & Winter, 1982).

In the research of Professor N. L. Pyatov, this direction is referred to as the "evolving economy," in which the main paradigms of accounting continue to develop, and therefore the concept of analytical support (Pyatov, 2016).

The formation of a knowledge society in the period of the late 20th and early 21st centuries led to the emergence of technoscience, the transformation into a market product of scientific knowledge, and the large-scale transition to IT technologies of the entire accounting and analytical and reporting processes of economic entities.

The particularly important opinion of V. S. Stepin should also be noted: in the context of global crises, we need an updated concept of national economic policy – that is, a policy that does not suppress corporate management initiatives regarding the choice of management models, including accounting, control, analysis, and information support for the goals of economic strategizing. The latter, is "a prerequisite for the transition from one stage of System Integrity (homeostasis) to another stage, more complex integrity (a new type of homeostasis)" (Stepin, 2006, p. 14; 2012).

D. Bell's (2004) book also clearly states that there is a "decline in the role of material production and the development of the service and information sector" (pp. 241–242). Thus, it becomes clear that the fundamental changes that are taking place in socioeconomic relations in the new society require the development of new concepts for the implementation of the financial, technological, and social interests of its representatives. In this regard, a completely different model of analytical support for such interests is required. The basic foundations of development, namely the production and distribution of goods and, accordingly, built-in structures, including institutions with broad regulatory functions, are being rebuilt to meet the new interests of society. It should be noted that absolutely all systems of analytical support for regulatory institutions that need to manage society both vertically and horizontally in economic relations are being sharply rebuilt.

As Professor Pyatov (2014) appropriately noted, the need to study the causes and consequences of transformational changes in accounting and analytical processes is due to "looking at the development of accounting as part of the evolution of culture."

Consistent development of economic process management systems and their analytical support using the latest technical solutions determine the creation of an evolutionary development of accounting and analytical processes. It is these studies that we have taken as a basis in the search

for and identification of possible options for updating the provisions of the methodology of analytical support for digital transformations in modern economic conditions, except for the concept of information management. Thus, the term *information management* originates from the term *information resource management*, which means the company's purposeful use of information as a special resource. In addition to this interpretation, M. Attinger introduced the term *integrated information management*, a characteristic feature of which is the creation of an information infrastructure that provides the necessary level of coincidence and compliance of all components in the management system (Blatov, 1928, p. 273).

S. V. Kroshilin and E. I. Medvedev (2008, p. 485) define *information management* as information management for improving the effectiveness of management decisions. This includes planning, organizing, coordinating and controlling information activities and processes, as well as communications within the company aimed at improving the quality and efficiency of its activities. Thus, taking into account the opinions of the above-mentioned scientists, information management has been formed today as a special sphere of specific knowledge and a scientific and practical discipline, which embodies theoretical and practical foundations taken from various related fields and disciplines such as computer science, management, and systems methodology.

However, we understand information or analytical management as a set of models for managing analytical information. Due to its technological essence, this includes more practical foundations than theoretical. Thus, for the modern information society, it is quite important to develop the methodology of accounting and analytical processes, which allows us to meet the information needs of managers of various levels who already use modern high-tech tools, models, and methods of digitizing information and transmitting it through electronic communication channels.

In digital economic transformations, the temporality of analytical information takes on a new impetus – it becomes relevant. This means that information modified by various methods – such as sampling, correlation, and regression analysis, separation, application of coefficients, grouping – at the requests of managers becomes relevant, and the preparation of such a volume of analytical data for a specific time period makes this information temporal. We believe that relevance and temporality are very significant characteristics of the quality of analytical information, which is necessary for management structures of economic entities of horizontal-vertical chains (Gafarov, 2008).

Simultaneously with the constant increase in requests for relevant accounting and analytical information from various users, a completely new stakeholder segment of management theory and information theory has been formed (International framework for integrated reporting, 2017). This assumes that particularly important business stakeholders, such as investors, counterparties, and financial and credit institutions, receive accounting and analytical information on their first request (Skvortsov, n.d.).

At the International Congress of Accountants in 2018, emphasis was placed on the fact that "new information and digital complexes are able to quickly solve accounting, analytical and control and regulatory issues" (Pyatov, 2012, 2016). In this regard, there is a growing need for the rapid acceleration of the modernization of information support processes for managing the economic development of all large enterprises (Melnik, 2016). This also applies to companies with a state share, whose economy plays a decisive role in today's conditions of macroeconomic support for dynamics in general. For example, the corporate management system of Centrenergo can be described as a mirror of the Ukrainian economy, since it constitutes 20% of the country's thermal generation, and its state significantly determines the dynamics of the development of many other areas that form tariffs for services.

The analytical material available to managers, formed in accordance with internal corporate methods, is also necessary for evaluating the interaction of the directorate of an economic entity with various users. All other things being equal, when digitalizing communications of company managers with economic entities of the external environment – such as counterparties and regulators – the efficiency of using analytical data when checking the actual indicators of operational reports for the required reporting period and identifying deviations from indicators

structured in the strategy for the same period significantly increases due to the technological support of accounting and analytical processes. In addition, it is necessary to apply a set of methodological materials for analyzing the results of control procedures and implementing related actions, such as modeling improvements in economic tactics and implementing necessary strategy adjustments, the typical content of which is presented in Figure 1.

Experts call such procedures "IT control." According to Professor Bogopolsky (2011), in any large company, IT control is so important that at least one employee of the internal control system (ICS) must be a certified IT specialist. Failures in the operation of large IT systems, especially with self-written modules and improvements, can create significant risks of distortions in the process of forming an enterprise's financial statements. Therefore, the IT specialist of the ICS should be competent in conducting intensive testing of the controls of various IT systems used by the company. Such testing consists of running fictitious operations, various business scenarios, or fictitious clients through the tested IT system and then comparing the results obtained for such simulated transactions with expectations (Bogopolsky, 2011)

It is advisable to present the general majority of the above information in the form of graphic illustrations of the company's document flow. It should be noted that in practice, such graphs are drawn up as illustrations, that is: diagrams, maps, or a list of works on creating, checking and processing documents, which are performed by authorized persons of the company within a pre-set time limit.

According to the information received from interviewed specialists, "no illustrative form can be called predominant; it is best to have both illustrations of the document flow schedule and its text version, which indicates the list of works and responsible persons." It is important that before approval by management, the document flow schedule must be coordinated with the heads of economic services of the company, which determines its compliance with job descriptions, the provisions of the current accounting policy and other elements of the company's strategy management.

To implement practical analytical support for the digitalization of transformation processes, it is significant to meet conditions such as the presence in companies of various high-tech complexes of systems for collecting accounting and reporting information, followed by its processing into a relevant form which can be used by managers to manage tactics and development strategy.

For this purpose, companies should employ professional specialists who not only provide such complexes, but also freely navigate the current modern evaluation models based on complex mathematical calculations.

The ESG disclosure index provides that each company must put a hyperlink to the ESG disclosure index in its traditional annual financial report. This is due to ensure convenience for users of financial statements – investors who are dissatisfied with the fact that it is very difficult to find integrated information in company reports, and that this takes a lot of time.

Using this indicator will allow companies to attract much more unambiguity and consistency in their reporting practice. Keep in mind that the above-mentioned index can be compiled using the tools of the Global Reporting Initiative (GRI).

Digitalization and digital transformation are quite firmly established in the programs of the largest panel discussions at various economic forums and specialized conferences. It should be noted that students of higher educational institutions believe that information courses are necessary for studying since digitalization processes are accelerating in modern society (Ostenda et al., 2018).

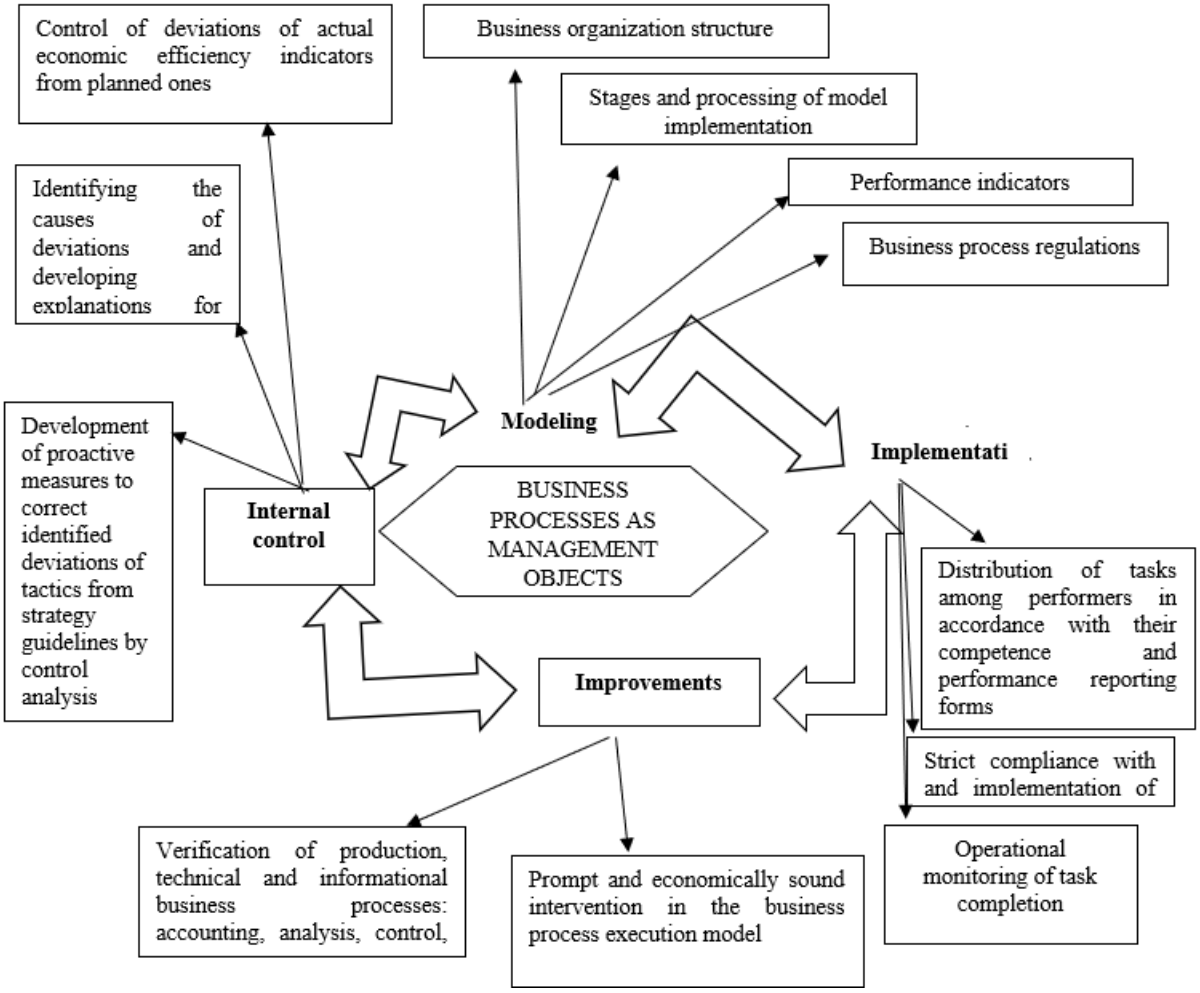

Figure 1. Model for maintaining consistency of economic tactics with the company's development strategy targets

Source: compiled by the author

The potential of this market is huge. According to Forbes magazine, more than 60% of the world's largest corporations will choose digital transformation as their strategy. Almost everywhere in IT technologies, open API (Application Programming Interface), SDK (Software development Kit), and other various integration tools are used. Companies do not need to program anything from scratch, because there are more than enough solutions on the market. All that is required is an understanding of the company's business and the developed digital transformation strategy (Ryzhkov, 2016).

In the conditions of the modern economic system, which is characterized by rapid changes, scientists and practitioners are constantly looking for ways to identify synergistic effects caused by the digitalization of corporate management systems processes. Thus, we can cite the opinion of L. Popovich et al. (2010) that "in the context of the global digital economy, it is necessary to create new mechanisms for the formation of synergistic effects in complex socioeconomic systems."

For a comprehensive solution to the tasks set, A. Koptelov (2007) suggests using the ARIS Audit Manager web product, which allows users to automate testing procedures and create reports on its results. This works working on the basis of ARIS – a market-leading business process management solution which provides the enterprise with all the necessary documentation to cover the life cycle of the on-farm control system, from documentation to monitoring (pp. 5–6).

In the author's opinion, the adaptive regression model proposed by Y. Novoselov (2011), which quantitatively describes the dependence of corporate activity indicators on the impact of a whole range of various factors on its results, is of research interest. This technique can be used to identify the results of any dynamic process. The initial point of this construction is the formation of groups

of analog objects, and for each individual company, an individual taxon is determined for the entire complex of factors (Novoselov, 2011). The developer of this methodology is convinced that it provides an objective comparative assessment of the activities of the structures that are part of the group, and, taking into account their territorial isolation and reproductive potential, consists in compiling all the resources that provide not only growth, that is, quantitative potential, but also qualitative potential, that is, progressive dynamics of development. Starting work on this methodology involves conducting a comparative assessment of the activities of the holding structures based on the construction of adaptive regression models that allow us to more objectively characterize the whole set of factors that determine the final results of the activities of separate structures and the holding company in general. It is recommended to determine the information set of data for evaluation by constructing a matrix of paired correlation coefficients and taking into account the professional judgment of experts and subsequent analysis of the information obtained. However, here it is doubtful whether experts should be involved in interpreting the content of the assessment matrix, since usually they have different profiles and levels of professional training. In order to receive the necessary response, in practice, the head of the group of supervisors should indicate this in advance.

In the context of large-scale digitization of accounting and analytical information, according to D. A. Piperkov, T. Nestorenko, and T. Pokusa (2021), computer assessment systems become the subject of the intellectual efforts of specialists in various fields of activity, and special emphasis is placed on the banking system.

Since 2017, business entities have somewhat intensified the systematization of existing reporting and management forms and their transfer entirely to digital platforms. In this regard, in order to facilitate control over the clarity and coherence of personnel work on the formation of information both in accounting and in other information systems, it is necessary to develop a standard regulation on structural divisions with document management rules and other analytical support measures.

The conducted research revealed the problem of non-compliance with the deadlines for transmitting information from production sites and workshops to the central accounting departments of all studied economic entities. After all, the consequence of violating deadlines is the need to adjust accounting and analytical data and clarify tax returns, and this leads to additional complexity of accounting work, time, and financial resources of the company to eliminate shortcomings in the work. The lack of information about internal reporting channels and ways to save it in the document flow regulations is a drawback. Therefore, for example, the provision by accounting departments of companies of reports on the cost of work to the financial and economic departments does not correspond to the procedure for collecting and deadlines for transferring documents from production sites.

In today's conditions, departments and services of complex economic entities are experiencing a significant shortage of information. On the one hand, there is a constantly growing need for detailing new ways to aggregate accounting information, maintain it digitally and control it more quickly. On the other hand, it is necessary to detail accounting and control information in an analytical context and expand the types of reporting. The managers of grassroots production structures of complex economic entities do not use complex digital platforms due to the lack of awareness of the rules of their application. As before, the main array of information is processed in the MS Excel program, and the order of movement of information flows is shown in Figure 2.

Scaling documents on digital platforms implies the growing need for managers to expand the capabilities of existing software products. The management of many complex economic entities have not developed a clear policy of information and software digitalization of document flow in all reporting formats, which is one of the reasons for using disparate programs for collecting and processing information, and this leads to unjustified dispersion of tasks solved for various software products. In this regard, control over the solution of tasks in such economic entities will not be productive.

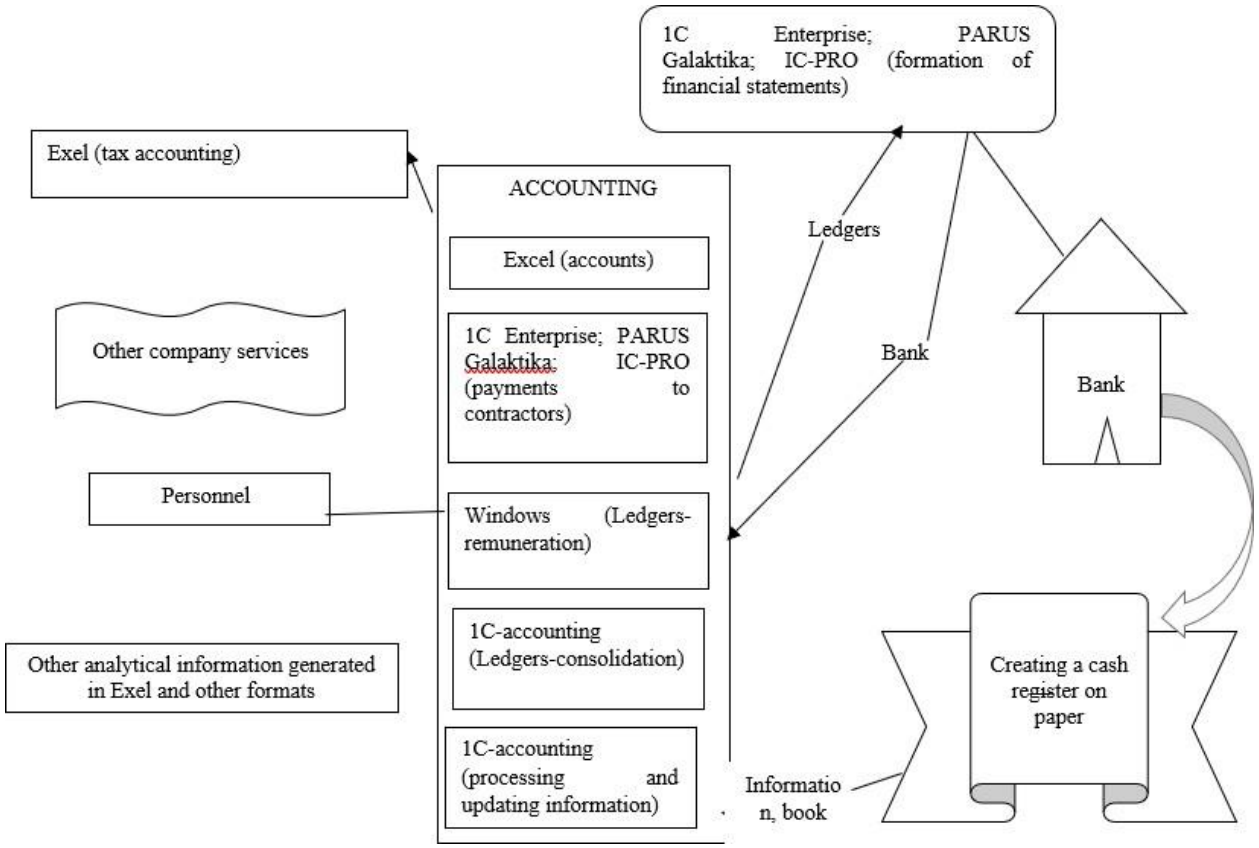

Figure 2. Information flows of accounting and analytical support for transformation processes
Source: compiled by the author

It should be noted that the information systems currently used are rather poorly integrated with each other, which leads to the problems of double input of information, irrational document flow and unjustified additional costs of labor and financial resources. The management of business entities do not make proper efforts to identify opportunities for integrating software products to create a corporate-wide system for collecting and processing accounting information on a digital basis, as required by the best system for implementing corporate law.

The accounting policies of many companies do not cover issues for which national accounting standards and the IFRS do not specify accounting methods. Furthermore, accounting methods that eliminate controversial tax issues and which, for example, are not regulated in the tax code of Ukraine, Russia, Belarus and many other countries are not reflected. This applies, for example, to: the procedure for accounting for special clothing; the procedure for reflecting and distributing transport and procurement costs, evaluating materials in analytical accounting and their storage locations (applying accounting prices); the procedure for accounting for income tax in accordance with the requirements of Accounting regulations 17; the procedure for reflecting certain specific income and expenses, and other nuances. As an undeniably negative factor that prevents the improvement of the accounting and analytical process in the company's financial and economic activity management system, we have identified a lack of analytics such as dictionaries and interpretations of important accounts. These lacking elements are summarized in full in Table 1.

To interpret the content and meaning of analytical data transmitted over digital communications, it is necessary to analyze the composition, size and dynamics of all data; the reasons that led to their composition, size and dynamics; and the consequences of the formed data array for current development and for strategizing.

Table 1. The incompleteness of analytical data in accounting registers

Source: compiled by the author

Account	**Analytical data**			
Account 10 "Fixed assets"	Analytical data on all types of fixed assets (production, non-production)	Analytical data by groups of fixed assets	Analytical data on the places of their operation, fixing	Analytical data on a materially responsible person
Account 15 "Capital investments"	Analytical data on types of capital investments (construction, acquisition)	Analytical data on types of construction (ground-based, other)	Analytical data on objects	-
Account 20 "Production stocks"	Analytical data for acquisition purposes	Analytical data on objects	-	-
Account 23 "Production"	Analytical data on production facilities	-	-	-
Account 31 "Bank accounts"	Analytical data on payment types (areas of activity)	Analytical data on accounts (on grounds)	-	-
Account 14 "Long-term financial investments"	Analytical data on types of financial investments	-	-	-
Account 63 "Calculations with suppliers and contractors"	Analytical data on settlements secured by the bill of exchange	Analytical data on contracts	Analytical data by type of acquisition	Analytical data on objects
Account 36 "Calculations with buyers and customers"	Analytical data on settlements secured by the bill of exchange	Analytical data on contracts	Analytical data on objects	Analytical data by type of work
Account 50 "Long-term loans" Account 60 "Short-term loans"	Analytical data on types of borrowing (credits/loan settlements, interest settlements)	-	-	-
Account 372 "Calculations with accountable persons"	Analytical data on types of business trips expenses			
Account 66 "Calculations of employee benefits"	Analytical data on calculations with employees (full name)			
Account 37 "Calculations with various debtors" Account 68 "Calculations on other transactions"	Analytical data on objects			
Account 39 "Deferred expenses"	Analytical data on types of expenses	Date of occurrence, write-off period, distribution base		

With proper addition – that is, an add-on of accounting information proposed above by analytics – it is necessary to completely redo the existing reference books in order to update them and bring them towards a single information structure.

Conclusions

The results of the study of the compliance of the methodology of analytical support of digital transformation processes with the modern conditions of the digital economy allow us to state that

the development of the methodology of the accounting and analytical process involves: first, the study of cause-and-effect relationships in the economy, management and the institutional sphere of regulation of this process; second, the establishment of an organic link between the state of the economic and institutional environment with the content of the accounting and analytical process; and third, the formation and establishment of such a link allows economic entities to develop in accordance with corporate interests, which are defined in the economic strategy.

Digital transformations are being achieved via the usual models of industry markets and their management, thereby increasing the competitiveness of their participants. Thus, digitalization determines the development prospects of companies, industries, and national economies in general. In today's conditions, the management of economic entities has at its disposal a powerful arsenal of advanced IT technologies and IT software systems and platforms, the download and application of which requires appropriate information support. This mission is always performed by accounting and analytical and regulatory processes. However, it has been proven that the practice of accounting and financial reporting has accumulated negative properties that make it difficult to update the concept of information support for setting and implementing management goals, the need for which is long overdue.

We believe that in order to improve the effectiveness of control measures, the accounting and analytical array should be supplemented with information from the big data databases, which are formed from management, tax, and statistical reports, information summary reports of financial regulators, and sources of non-financial information.

Suggestions for improving the methodology of analytical support for digital transformation processes and specific practical recommendations will contribute to the acceleration of the digital transformation of accounting and analytical processes, and this will allow the timely identification of risks of loss of stability and efficiency of economic entities and take into account measures to eliminate or mitigate negative consequences in formulating development strategies. Proper methodological support for any transformation processes of an economic entity reflects the level of its economic development, priorities, strategic guidelines, and opportunities to achieve them. In addition, it must be adequate to the industry specifics of those regulatory objects under the management of which the necessary regulations are created, otherwise these regulations will be useless.

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