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Integrated Accounting, Control and Analysis System: Structural Conceptualization and Construction Logic

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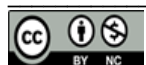
Abstract. Digitalization is actively penetrating various spheres of human life and affecting its quality. One of its greatest manifestations is the digitalization of accounting of business entities, as well as other equally important management functions, in particular analysis and control. The undoubted advantage of digitalization is the active use of information and communication systems, modern computer technologies and other means for transforming information data in order to increase the efficiency of their use for management purposes. The purpose of the article is to identify elements, relationships, specifics of the functioning and formation of data in an integrated accounting, control and analysis system. The study was carried out using general scientific and special research methods. Analysis and generalization were used to conduct a critical assessment of literary sources and substantiate the conclusion on the feasibility of forming an integrated accounting, control and analysis system in the activities of modern business entities. Logic, a systematic approach and structuring were used in the process of building a conceptual scheme of an integrated accounting, control and analysis system, identifying its main elements and their relationships. The graphical method, induction and observation served as the basis for proving the hypothesis that digitalization is the main stimulus and condition for the formation of modern information systems at enterprises. The descriptive method, structural analysis and synthesis made it possible to develop the structure and elements of an integrated accounting, control and analysis system, to develop proposals for improving the list of reporting forms and indicators as the final result of its use. A scheme of the concept of forming an integrated accounting, control and analysis system was built and the role of digitalization in this process was identified. The improved composition of reporting and its indicators was substantiated. The conclusion on the expediency of including data on the level of: use of automation (computerization); quality of management decisions; prevented risks; predictability of future performance results was substantiated and generalized. In addition, taking into account the socio-ecological context of modern human development, the feasibility of including in the reporting indicators (both managerial and financial) data on expenditures for these purposes and their effectiveness has been proven. The inclusion of digitalization indicators and socio-ecological data in reporting has a positive effect on its information content. This ensures the formation of an expanded management information base, as well as improving analytical management capabilities. The combination of accounting, control and analysis in an integrated system (ISACA) allows generating reporting generalized data in a new qualitative format and strengthening their focus on ensuring the sustainability of activities, which is especially relevant in conditions of instability. In the future, it is advisable to conduct research in the direction of detailing reporting indicators, clarifying their list, as well as developing approaches to assessing the impact of ISOKA on management decisions. In addition, it will be relevant to study the impact of new reporting information data on increasing the efficiency of activities in general.

Keywords: accounting; control; analysis; concept; integrated system; management reporting; financial reporting; digital economy; digitalization; integrated information and analytical platform.

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Інтегрована система обліку, контролю й аналізу: структурна концептуалізація та логіка побудови

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Анотація. Цифровізація активно проникає в різні сфери людського життя та впливає на його якість. Одним з її найбільших проявів є діджиталізація обліку суб'єктів господарювання, а також інших не менш вагомих функцій управління, зокрема аналізу та контролю. Безумовною перевагою діджиталізації є активне використання інформаційно-комунікаційних систем, сучасних комп'ютерних технологій та інших засобів для перетворення інформаційних даних з метою підвищення ефективності їхнього використання для цілей управління. Мета статті – ідентифікація елементів, взаємозв'язків, специфіки України щодо функціонування та формування даних в інтегрованій системі обліку, контролю та аналізу. Проведення дослідження здійснювалося з використанням загальнонаукових і спеціальних методів дослідження. Аналіз і узагальнення застосовано для проведення критичної оцінки літературних джерел і обґрунтування висновку щодо доцільності формування інтегрованої системи обліку, контролю та аналізу в діяльності сучасних суб'єктів господарювання. Логіка, системний підхід і структуризація використані в процесі побудови концептуальної схеми інтегрованої системи обліку, контролю та аналізу, ідентифікації основних її елементів і їхніх взаємозв'язків. Графічний метод, індукція та спостереження послужили основою доведення гіпотези, що цифровізація є основним стимулом і умовою формування сучасних інформаційних систем на підприємствах. Описовий метод, структурний аналіз і синтез уможливили розробку структури й елементів інтегрованої системи обліку, контролю та аналізу, виробити пропозиції щодо удосконалення переліку форм і показників звітності, як заключного результату її використання. Побудовано схему концепції формування інтегрованої системи обліку, контролю та аналізу та ідентифіковано роль цифровізації в цьому процесі. Обґрунтовано удосконалений склад звітності та її показників. Обґрунтовано й узагальнено висновок щодо доцільності включення до складу показників звітності даних щодо рівня: використання автоматизації (комп'ютеризації); якості управлінських рішень; попереджених ризиків; передбачуваності майбутніх результатів діяльності. Окрім того, зважаючи на соціально-екологічний контекст сучасного людського розвитку, доведена доцільність уведення в склад показників звітності (як управлінської, так і фінансової) даних щодо витрат на ці цілі та їхню ефективність. Включення показників цифровізації та соціально-екологічних даних до звітності позитивно впливає на її інформативність. Це забезпечує формування розширеної бази управлінської інформації, а також покращення аналітичних можливостей управління. Поєднання обліку, контролю та аналізу в інтегрованій системі (ISAKA) дозволяє формувати звітні узагальнені дані в новому якісному форматі та посилити їхню спрямованість на забезпечення сталості діяльності, що особливо актуально в умовах нестабільності.

Ключові слова: облік; контроль; аналіз; концепція; інтегрована система; управлінська звітність; фінансова звітність; цифрова економіка; діджиталізація; інтегрована інформаційно-аналітична платформа.

Problem statement. Digitalization is actively penetrating various spheres of human life and affecting its quality. One of its greatest manifestations is the digitalization of accounting of business entities, as well as other equally important management functions, in particular analysis and control. The undoubted advantage of digitalization is the active use of information and communication systems, modern computer technologies and other means for transforming information data in order to increase the efficiency of their use for management purposes. In today's dynamic time, when there is information redundancy, digitalization in business activities allows you to expand the vectors of making management decisions. Automation of business and operational, accounting and control and analytical processes, as well as the emergence of modern channels of interaction between structural institutional units and individuals (management) significantly accelerate data generation and lead to the transformation of traditional management tools.

In these conditions, accounting, control and analysis act as generators of synergistic data, which have slightly different characteristics and are more detailed. The complex combination of these systems enables qualitative transformation of information, as a result of which its essential content changes. The simplest example of transformational changes is the transformation of accounting from

a fixer of past facts into a system that generates data in real time. In turn, from a routine check of a large amount of data it becomes an automated tool for identifying deviations and preventing risks. And analysis becomes a risk- and forecast-oriented system that allows you to make decisions aimed at optimizing activities and increasing their efficiency. Thus, separate functional elements, such as accounting, control and analysis, in the conditions of the digital economy are transformed into a complex integrated system and at the output form data that are significantly different from traditional ones summarized in reporting. In this context, issues related not only to the specifics of the functioning of an integrated accounting, control and analysis system, but also to the features of the data that it generates, are becoming relevant.

Analysis of recent research and publications. In view of this, in modern conditions, scientists and practitioners pay much attention to the issues of active use of digitalization in accounting, analytical and control practice. In this context, the most discussed issues are the identification of the advantages and features of accounting, analysis and control in the digital economy. Tenyukh Z., Peleh U., studying the issue of digitalization of accounting, identify it as «the possibility of complex use of various types of software to reflect business transactions», note that «technological advances allow the accountant to interpret and process data faster and more efficiently than ever before, ... and the use of digital technologies allows ... to avoid errors and quickly find the information needed at a given time» [1, p. 3-4]. Holovchak Y., Holovchak O., Pysarchuk O., critically assessing the advantages and disadvantages of electronic document management, rightly summarize that «digitalization... makes it possible to automate the process of accounting and processing primary accounting documentation, facilitates the process of preparing financial statements and simplifies interaction with regulatory authorities» [2, p. 40].

Bilous O., Kundeus O. indirectly conclude about an integrated information system through digitalization, who consider such processes to be «a necessary prerequisite for increasing the efficiency of companies, ensuring the optimization of business processes, increasing mobility and improving the quality of management decision-making... and digital technologies (artificial intelligence, cloud technologies, blockchain technologies, Big Data, etc.) are a priority in the development of accounting, capable of transferring it to a qualitatively new level of functioning» [3, p. 60]. Synergy in the era of digitalization encompasses and comprehensively combines both related systems, such as accounting, reporting, taxation, and systems that use their data as an information source.

N. Brazily, A. Tkachenko, V. Zdir note that «digital technologies, such as cloud computing, ... have significant potential to facilitate the process of accounting, reporting, and taxation, ensuring greater accessibility and efficiency of data processing, but...at the same time, they allow for the quick and efficient exchange of financial data, which facilitates the detection of violations» [4, p. 103-104]. Thus, digitalization creates favorable conditions for control, but at the same time, as the above-mentioned authors rightly note, «electronic control systems and analytical tools help to detect potential violations....» [4, p. 103].

Such a combination, of course, has all the features of an integrated system, but this is a rather narrow understanding of it, since in modern conditions, the formation of reporting and taxation is not the ultimate goal of accounting. Its information is generally intended for use for management purposes, therefore, it can and should be brought to a state that is as suitable as possible for decision-making.

Godyuk I., Zabchuk V. in this regard rightly note that «thanks to the integration of accounting, analytics and reporting functions, digital tools make financial management more flexible and convenient» [5, p.239].

For management purposes, thus, it is not only important to have the advantages of accuracy, efficiency and real-time data generation for their control, which many scientists focus on. Lagodienko N., Sarkova A., Prosolov O., in particular, believe that «artificial intelligence has provided the

opportunity to quickly work with large volumes of data, analyze them relatively quickly, automatically classify cash flows, more accurately predict and make rational decisions at enterprises, but... at the same time it generates certain risks» [6, p. 71], in particular those related to the qualifications of specialists and their release.

This idea is also developed in their study by Zhigley I., Laichuk S. and Polishchuk I., who, noting the advantages of using IT in accounting, also point out the difficulties associated with security and the need for training and advanced training of accounting staff [7, p. 95, 99-100].

Formulation of research objectives. The purpose of conducting the research and writing the article is to identify the elements, relationships, specifics of the functioning and formation of data in an integrated accounting, control and analysis system.

Presentation of the main material of the study. Digitalization in the 21st century has become the main attribute of human development. It has spread rapidly and covered all spheres, including the economic one. Doing business in wartime is a complex and stressful process. To manage it, information is needed that would take into account the current state and risks that have a direct impact on business results. Therefore, there is a need to use complex information data that an integrated system that comprehensively combines accounting, analytical and control indicators is capable of generating.

Its formation should be based on weighty and convincing arguments regarding the elemental structure, taking into account management requests for data for decision-making, as well as a clear logic of supporting the basic conceptual principles of all components. Digitalization transforms the main source of information for management - accounting, changing its content and directing it from the plane of retrospective reflection of business operations and processes towards transforming it into a platform for managing future decisions. In this case, it is fair to conclude that in the digital economy, accounting, control and analysis become a single cycle, which is focused on strategic goals (forecasting) and timely adjustment of activities to ensure their effectiveness.

Thus, the issue of forming an integrated accounting, control and analysis system (ISACA) is closely related to ensuring management not only with reliable information, but also with creating a basis for building models and scenarios for the development of activities in the future based on the principles of taking into account the adaptability of the business entity to the changing operating environment.

The objective consequence of transformational changes and the development of ISACA is the emergence of a new type of reporting, which contains not only discrete data, but also predictive, risk-oriented indicators that are needed by modern management. Based on existing needs, the integration of accounting, control and analysis in one system can be identified as the concept of forming an integrated information and analytical platform.

This platform has a number of properties, in particular it:

- generates and collects data in real time (accounting function);
- assesses risks and development trends (analysis function);
- automatically signals threats and risks (control function);
- generates reporting that does not simply statically reflect data about the past, but shows predictive indicators (forecast of future states), the level of risks, contains indicators of optimal activity, efficiency, socio-ecological position.

From this, the logical conclusion follows that all three components work as a single intelligent system. This system is able not only to record discrete data and reflect past facts, but also to generate predictive indicators, assess risks, efficiency and optimality of activities. An important component and result of an integrated information system is transformed reporting, which contains such indicators.

In a structured form, the concept of forming an integrated information system as part of accounting, control and analysis includes a number of interconnected blocks, grouped according to the logic of establishing a cause-and-effect sequence of conceptualization: digital economy → big data → real-time accounting → digital analytics (+ forecasting) → automated control → data generalization with advanced analytics (transformed reporting) → management decisions (optimization measures). The logical thing here is feedback (Fig. 1).

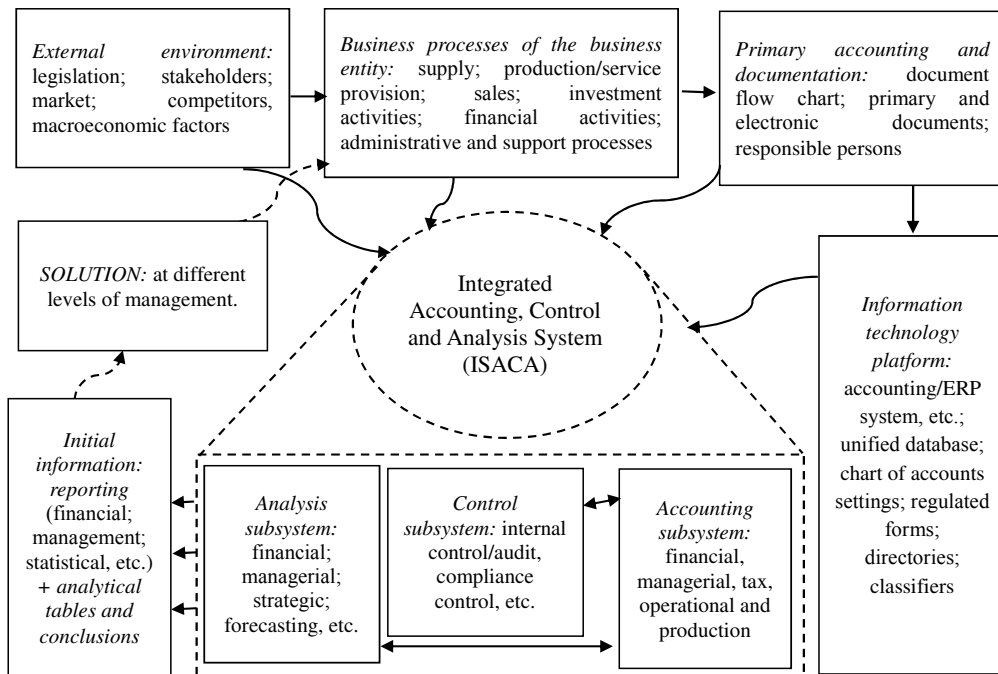


Fig. 1. Concept of formation of integrated accounting, control and analysis system.

Note: developed by the authors.

In addition to efficiency, which is always an attribute of using computerized systems, it is necessary to recall other benefits of their application in accounting, analytical and control practice. Gladchuk G. G., Zvirid N. V., Gladchuk M. V. rightly note that such «systems allow to avoid errors caused by the human factor..., simplify routine tasks, ... allowing employees to focus on strategic aspects of management» [8, p.12]. Resler M. V. emphasizes that digitalization «expands the capabilities of specialists and their competencies, ... forms modern innovative approaches to the integration of accounting and analytical systems, increases the efficiency and quality of information provision» [9, p. 444].

Among other arguments for the advantages, researchers and practitioners cite: «reduction in accounting, document management and administrative costs, as well as labor-intensive accounting processes by up to 30%» [10]; «better efficiency and fewer errors (in some enterprises by 50%)» (as indicated by 94% of the accountants surveyed) [11]; minimization of errors and release of personnel to work on more valuable activities, which in turn contributes to faster task completion without increasing the number of employees and thus reducing operating costs [12].

Official statistics of EU countries show that they actively use digitalization in various industries, including for business purposes. In particular, in the context of our study, it will be appropriate to consider the indicator of the level of digitalization of enterprises (Digital Intensity Index – DII). In

general, we are talking about achieving a basic level of digital intensity by business entities. For example, at the end of 2024: Finland had the highest enterprise digitalization index, and it was approximately 93% index ≈ 0.93 ; Denmark – 90% (0.9); the lowest this indicator was in Bulgaria – 50% (0.5) and Greece – 53% (0.53). The average indicator for EU countries was 73% (0.73) [13]. In Ukraine, the similar indicator in 2024 «was 55.7 out of 100 possible points (0.557 points), and the TOP-10 included companies with a ratio of service to production of 8:2 (service companies exceed production by 7 units or 13%)» [14] (Fig. 2).

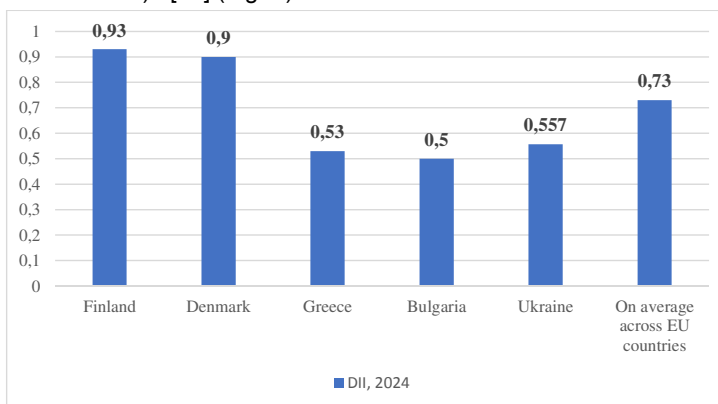


Fig. 2. Digitalization index of European and Ukrainian enterprises in 2024 (countries with maximum and minimum levels).

Note: generalized based on [13; 14].

Official figures published by the Ministry of Digital Transformation based on the results of the corresponding study conducted show that the Index within Ukraine is on average 0.497 points. Its highest value was recorded in Lviv (0.850), Dnipropetrovsk (0.844) and Odessa (0.805) regions [15].

Actually, the difference between the above indicators is associated with various objective factors, in particular, in the first case the study concerned business structures, and in the second a certain set of indicators with an emphasis on social and other state institutions was taken into account. Returning to the issue of the formation of ISACA, it should be noted that it is thanks to the acceleration of the pace of digitalization that the implementation of such a concept is possible.

One of the extremely important components of ISACA is the source information, which is summarized in various forms of reporting. The use of modern software products partially solves the issue of computerization of this process. However, in accordance with the development of management requests and thanks to the capabilities that can be implemented in an integrated system, a more expanded perspective appears for the formation of various types and forms of reporting based on obtaining data from subsystems of accounting, control and analysis.

Without going into detail about the issue of changing management requests for new accounting and analytical data for decision-making, it is worth pointing out the objectivity of such transformations. The main reasons for this were the growth of competition, instability and the number of influencing factors that should be taken into account in order to ensure effective management. As part of these factors, it is logical to consider digitalization and informatization, which, of course, have an impact on the effectiveness of the functioning of business entities.

In turn, thanks to these modern innovative tools, it is possible to obtain competitive advantages that can and should be assessed. A critical analysis and assessment of available sources allow us to summarize that in modern conditions it is appropriate to include in the reporting indicators data on the level of: the use of automation (computerization); the quality of management decisions; prevented

risks; future performance results. In addition, given the socio-ecological context of modern human development, it is appropriate to support the position on the inclusion in the reporting indicators (both managerial and financial) data on costs for these purposes and their effectiveness (Table 1).

Table 1

Recommended additional reporting indicators

Essential content	Indicator	Justification	Type of reporting or its form
Digitalization	Digitalization Index	To take into account competitive advantages	Management
Quality of management	Management Decision Quality Index	To identify the impact on strategic prospects	Financial (Notes)
Risks	Prevented Deviations from Plans Index	To assess the effectiveness of control	Management
Predictability	Financial Results Predictability Index	To assess the predictive ability of activities	Management
Social component	Social Orientation Index + Level of Spending on Social Activities (1)	To assess social orientation	Financial (Notes)
Environmental component	Environmental Orientation Index + Level of Spending on Environmental Goals (2)	To assess environmental orientation	Management

Note: developed by the authors.

Such innovations in reporting will significantly increase its information content, expand the range of evaluation indicators and analysis indicators. Thanks to the complex combination of accounting, control and analysis in one integrated information system, a new vision and logic of reporting is formed. It becomes not just a constant of past facts of activity, but turns into a high-quality source of forecasting future development, serves as the basis for building optimization models of management and ensuring effective management of the business entity.

Conclusions and prospects for further research. The inclusion of digitalization indicators and socio-ecological data in reporting has a positive effect on its information content. This ensures the formation of an expanded management information base, as well as improving analytical management capabilities.

The combination of accounting, control and analysis in an integrated system (ISACA) allows generating reporting generalized data in a new qualitative format and strengthening their focus on ensuring the sustainability of activities, which is especially relevant in conditions of instability. In the future, it is advisable to conduct research in the direction of detailing reporting indicators, clarifying their list, as well as developing approaches to assessing the impact of ISACA on management decisions. In addition, it will be relevant to study the impact of new reporting information data on increasing the efficiency of activities in general.

In general, due to the presence of various capabilities and tools, the proposed integrated system is able to perform a number of useful functions. But this requires a theoretical and applied basis for the development of software applications. Substantiation of the principles and tasks that should be implemented by programmers in computerization programs will allow to form a high-quality and effective ISACA. Also promising are programming of deviation control, development of models of optimization of activity and investment, as well as substantiation of directions of use of machine learning methods in accounting, control and analysis.

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