

MANAGEMENT IN ECONOMIC SECTORS AND ENTERPRISES

Khalleefah Ahmed Mohammed Saed

Simon Kuznets Kharkiv National University of Economics, Ukraine

THE PROJECT APPROACH TO THE ORGANIZATION OF THE ENTERPRISE STRATEGIC MANAGEMENT ACCOUNTING IN THE FACE OF THE FOURTH INDUSTRIAL REVOLUTION'S CHALLENGES

The necessity of using strategic management accounting for an industrial enterprise has been proved based on changes that the fourth industrial revolution has brought to the modern world. The project structure and the implementation scheme for strategic management accounting organizing have been substantiated. The stakeholder approach was used as the basis for the development and implementation of the mentioned project. The possibility of using the concept of enterprise digital twin as a basis for organizing the strategic management accounting process has been discovered. The article made an emphasis on expanding the analytical and predictive capabilities of strategic management accounting. That is why these capabilities have been represented as a basis for accounting organization project meaningful filling. The methodical approach to create a list of accounting nomenclatures based on the use of the enterprise architectural model has been substantiated. The reference structure and list of primary requirements for technical specification for accounting information system implementation have been defined.

Keywords: strategic management accounting, accounting organizing, project management, enterprise digital twin, accounting information system, technical specification, balanced scorecard.

Introduction. One of the most significant discussions in the modern accounting society is establishing the new role of accounting and analytical information in the enterprise's strategic decision-making system. In point of the fact that the auspicious and useful enterprise's business activity is only possible if reliable information is available and integrated with the management system. Nowadays, in the vast majority of cases, the relevant information for strategic decision-making is received from the accounting and financial reporting systems. However, it is becoming difficult to ignore the fact of tremendous increasing the number and quality of challenges to business from the environment and innovative technology. Considering these challenges has become significantly relevant through the development of information technology and artificial intelligence involvements in the wide variety of manufacturing and management processes. Respectively, providing new quality for the accounting information and targeting it to the needs of a broader range of stakeholders are getting peculiar attention and require additional research.

Literature review and problem statement. There is a large volume of published studies describing the role of accounting for business decision-making and representing the way for gathering this kind of information. For example, the V. Sower and H. Sower¹ research far too little attention had paid to long-term cost prediction in connection with companies' strategic goals. R. Hilton and D. Platt² represented the accounting process in connection with the logistics principle and with the providing market value. These authors have written about financial planning, management reporting, and various indicators calculation, which is necessary for a short-term decision-making system. Although these researchers^{1,2} described in sufficient detail the solutions for accounting information adaptation for solving enterprise management problems, the strategic component of accounting information has remained insufficiently disclosed.

¹ Sower, V. E., Sower, H. C. (2015). *Better Business Decisions Using Cost Modeling*. New York: Business Expert Press.

² Hilton, R. W., Platt, D. E. (2014). *Managerial Accounting. Creating Value in a Dynamic Business Environment*. New York: McGraw-Hill.

Speaking of enterprise strategy, an illustrative example is the K. Braun¹ work, which reveals the setting long-term goals only through the balanced scorecard (BSC) framework. It must be emphasized that in many cases, BSC is the only connection between accounting researches and strategic management. However, BSC is not enough for modern strategic management that requires presenting KPI (key performance indicator) in close connection with the full company's architecture, and not only in terms of responsibility centers. It also could be useful to expand management accounting to OKR (Objectives and Key Results) concept. This concept has shown in P. Niven with B. Lamorte² research and firstly has no direct connection with accounting. The same problem could be found in K. Warren³ survey, who made an essential emphasis on accounting information prediction. However, his research is more about system dynamics and not about collecting and processing accounting information. The confirmation for increasing the role of accounting information for the strategic enterprise management was given in one of the Chartered Institute of Management Accountants (CIMA)⁴ by interviewing financial directors of large international companies. This research⁶ also gives the list of possible strategic management accounting techniques, which could be used in the process of accounting organizing. Unfortunately, this list could be used only as of the direction for management accounting improvement because of the absence of recommendation of mentioned techniques usage.

Therefore, it is crucial for developing an effective strategic management accounting system to consider modern trends in economics and technology development. In recent years, the scientific literature emphasizes the fourth industrial revolution beginning, which is associated with the mass implementation of cyber-physical systems in the production and maintenance of human needs. In E. Popkova's⁵ and M. Skilton's⁶ terminology, such an industrial revolution is treated as «Industry 4.0». It is quite understandable that the accounting process requires specific changes related to the development of information technology. Many researchers, such as for example B. Romney and P. Steinbart⁷, have already covered the prospects of the accounting profession development and represented the direction of accounting and information technology integration.

In general, it should be accepted the B. Aslanertik and B. Yardımcı⁸ proposal about implementing the term «Accounting 4.0», which is in line with the calls of the fourth technological revolution. In this case, accounting became the basis for combining strategic and operational aspects of value creation for the primary consumers. Although a vast amount of researches in financial and managerial accounting has been conducted, the issue of using accounting information in strategic enterprise management still requires many improvements. The primary causal relationships between the level of accounting organization and the areas of the vital enterprise activity are presented in Fig. 1.

Considering the presented in fig. 1 correlation between the stakeholders' requests for accounting information and the financial accounting capabilities, it became possible to set the article objectives and goal.

The aim and objectives of the study. The purpose of the article is to determine the way of using the project management approach for organizing the strategic management accounting system, which oriented on enterprise stockholders' informational request satisfying by using the modern information system capabilities.

Main results. Achieving the article goal is only possible if all persons who interested in accounting information will be involved in the development of the project of accounting organizing. At least the interest of all types of stakeholders should deserve attention, which is hard to do because of their interests' diversity. It is impossible, from the strategic perspective view, that the way of how enterprise gathers and uses the accounting

¹ Braun, K. W., Tietz, W. M. (n.d.). *Managerial Accounting*. New York: Pearson.

² Niven, P. R., Lamorte, B. (2017). *Objectives and key results: Driving focus, alignment, and engagement with OKRs*. New Jersey: Wiley.

³ Warren, K. (2018). Why every accountant should use Living Business Models <<https://www.csd.lipsma.com>> (2020, January, 15).

⁴ Management Accounting in Support of the Strategic Management Process. (2015). Retrieved from <<https://www.cimaglobal.com/Research--Insight/Management-accounting-in-support-of-the-strategic-management-process/>> (2020, January, 15).

⁵ Popkova, E. G., Ragulina, Y. V., Bogoviz, A. V. (2019). *Industry 4.0: Industrial Revolution of the 21st Century*. Switzerland: Springer.

⁶ Skilton, M., Hovsepian, M. (2018). *The 4th Industrial Revolution. Responding to the Impact of Artificial Intelligence on Business*. United Kingdom: Palgrave Macmillan.

⁷ Romney, B. M., Steinbart, P. J. (2018). *Accounting Information Systems*. USA: Pearson.

⁸ Aslanertik, B. A., Yardımcı, B. (2019). A Comprehensive Framework for Accounting 4.0: Implications of Industry 4.0 in Digital Era. *Blockchain Economics and Financial Market Innovation Financial Innovations in the Digital Age* (pp. 549-563). Switzerland: Springer.

information just like the set of accounting process remain unchanged for an extended time. However, the changes in the way of how accountants do the records could have different natures and different influences on the decision-making system. Thus, the project of accounting organizing has to distinguish the changes zones represented on Fig. 2. Moreover, understanding of the constancy and cyclical nature of given on Fig. 2 changes is the main criteria for the project of strategic accounting organizing successful development.

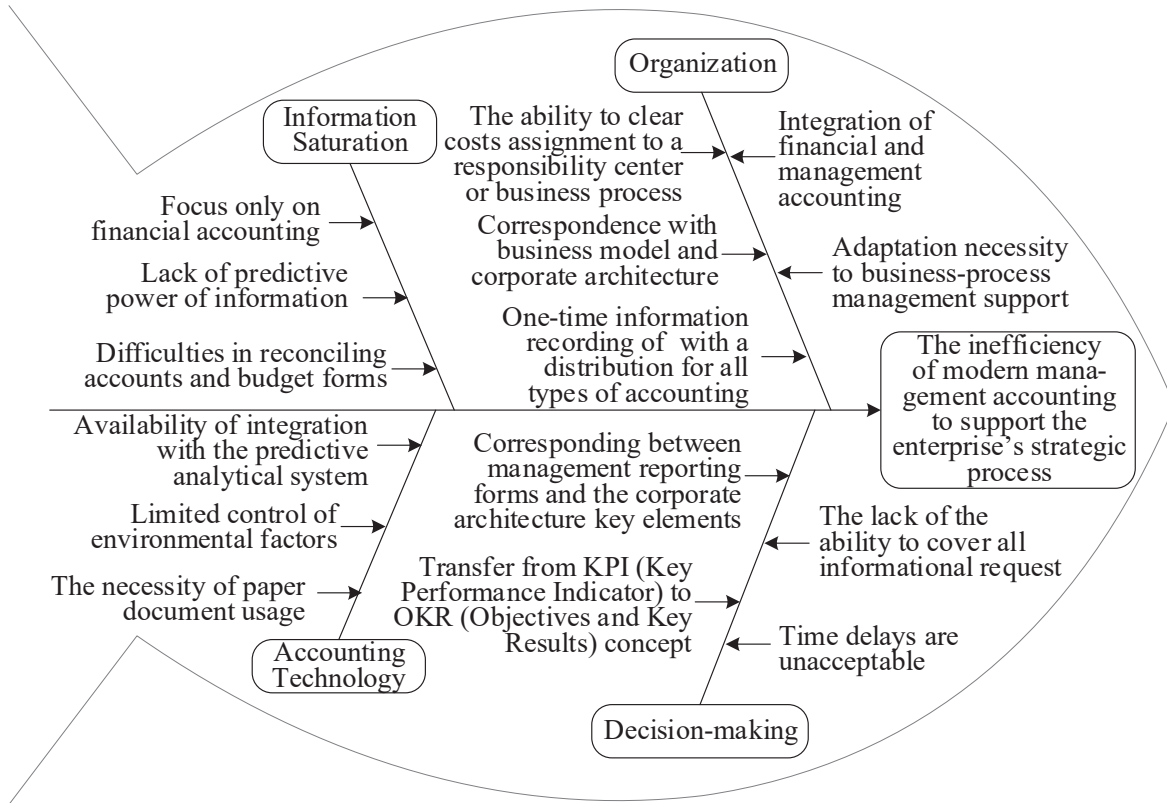


Fig. 1. The necessity of management accounting expanding to the strategic arias of enterprise activities representation

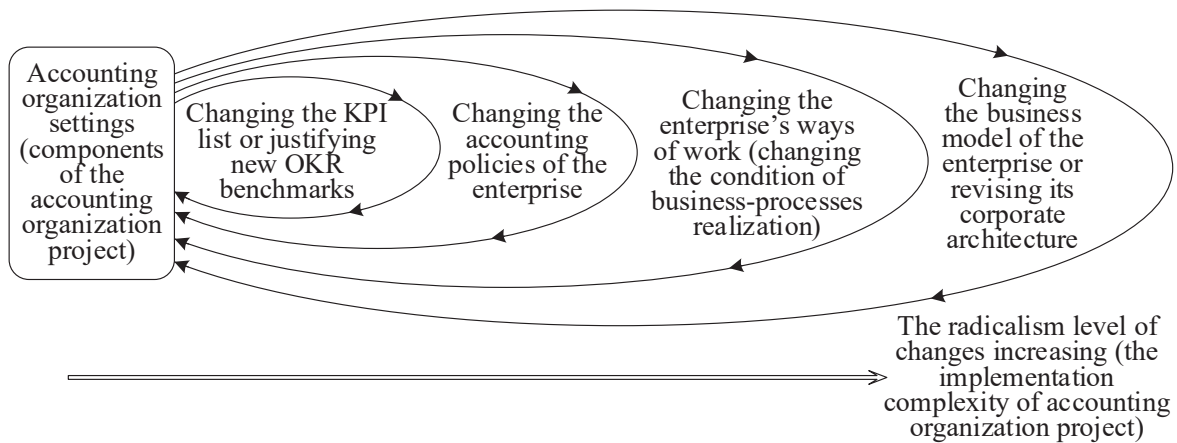


Fig. 2. The cumulative accumulation of changes in the parameters of accounting and analytical support for enterprise strategic decision-making system

The main idea of Fig. 2 is presenting the connection between accounting and enterprise strategy changes. Nowadays, researches have proved that enterprise strategy should be continuously revised. Changing of strategy cause changing in the accounting process organization with different scale according to Fig. 2. In this case, it is necessary to mention about two things. Firstly, any change in the accounting organization must be well prepared, which can only be accomplished by developing an appropriate project. Secondly, the project of organizing (or of reorganizing) of strategic management accounting has to be considered as an important part of the enterprise's corporate architecture. Mostly researcher uses the corporate architecture concept for the enterprise's information system development, but never for distinguishing the role of management accounting as an essential part of corporate architecture. As an exception, the J. Hoogervorst¹ research has to be mentioned, where the influence from corporate architecture principle on the enterprise management system was presented. Fig. 3, which is based of J. Hoogervorst's¹¹ research, shows the way of possibly changing the meaning of strategic management accounting.

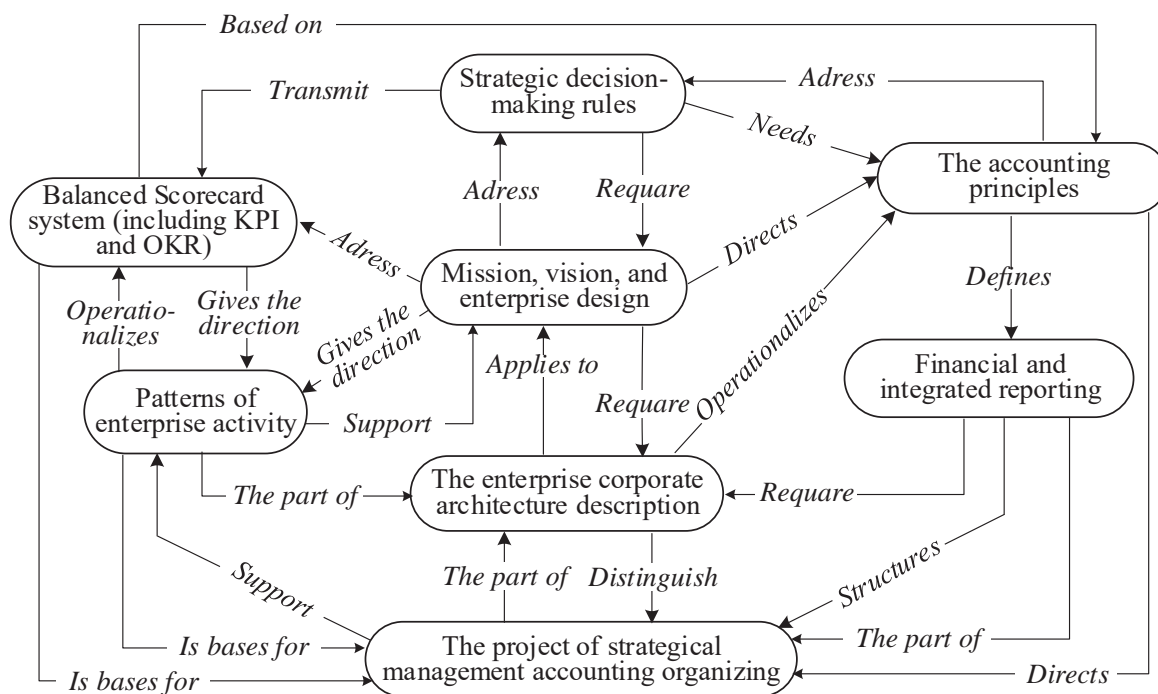


Fig. 3. The interconnection between the accounting principle and corporate governance system

According to Fig. 3, to accomplish the full correspondence of strategic management accounting to stakeholders' informational requests, it is necessary to make a model of enterprise development. In this case, the additional author's hypothesis that reveals the article purpose is to use the digital twins' concept (the «virtual factory replication» in the interpretation that given by M. Grieves², the founder of this concept) as a basis for building an accounting information system. Usually scientists interpret the digital twins concept as «a virtual copy of a system in operation»³, «digital representations of actual physical products»¹² and «the information model of operations, stakeholders' activities and regarding transactions»⁴. The usage of the digital twins' concept has to be a central part of developing the project of strategic management accounting organizing. The author's view of this kind of digital twins' concept usage is represented in Fig. 4.

¹ Hoogervorst, J. (2009). *Enterprise Governance and Enterprise Engineering*. The Netherlands: Springer.

² Grieves, M. W. (2014). *Digital Twin: Manufacturing Excellence through Virtual Factory Replication*. Whitepaper. LLC.

³ Auer, M. E., Ram, K. B. (2020). *Cyber-physical Systems and Digital Twins*. Switzerland: Springer.

⁴ Kanak, A., Ugur, N., Ergun, S. (2019). A Visionary Model on Blockchain-based Accountability for Secure and Collaborative Digital Twin Environments. *IEEE International Conference on Systems, Man and Cybernetics (SMC)*, 3512-3517.

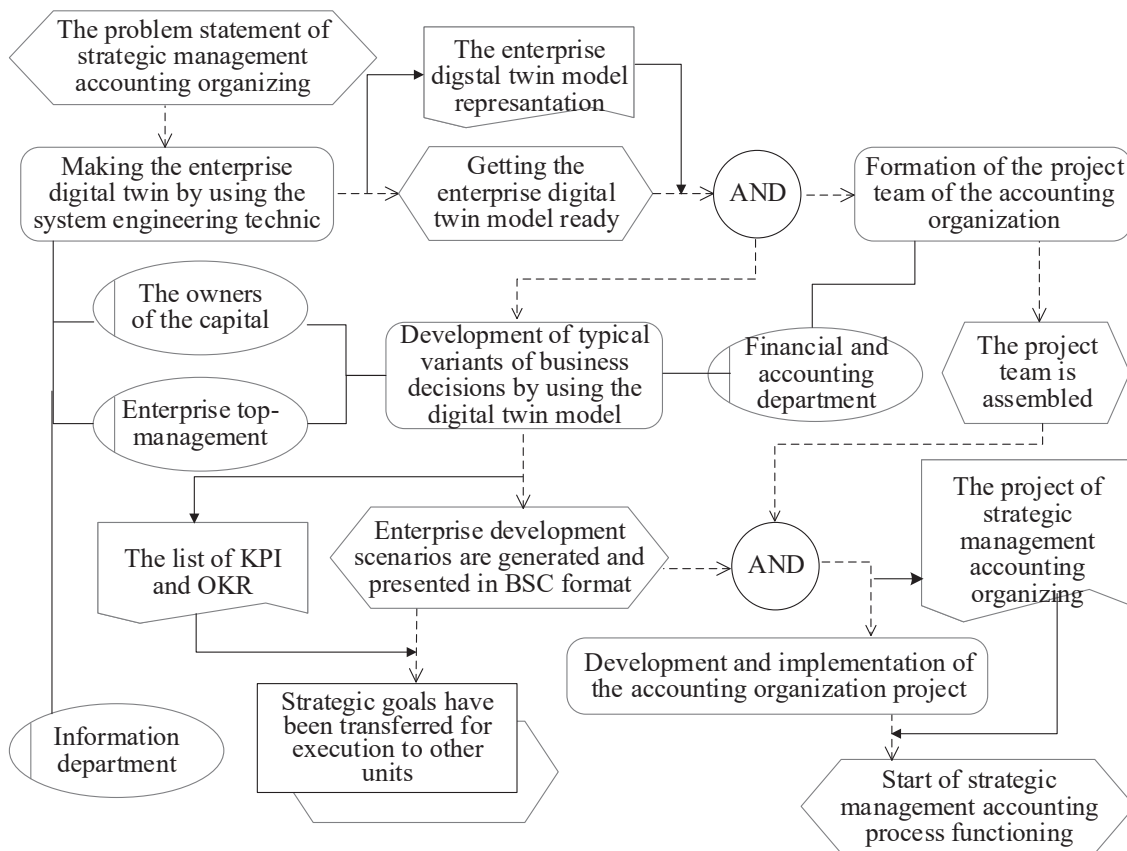


Fig. 4. The description of the organizing process for strategic management accounting using the EPC-notation

Presented in Fig. 4 organizational sequences of the project of strategic management accounting developing is based on the Event-Driven Process Chain (EPC) Diagram. Because this diagram was made for modeling the business process improvement, it gives the possibility to represent in Fig. 4 the interconnection among the enterprise department during the accounting organizing process. The advantage of the article proposal is the involvement of the digital twins' concept into the mentioned organizational process. The main advantage of making a digital twin model is to get the possibility of deciding without any damage to real objects. From the first view, this part of making enterprise digital twin has no connection with accounting. However, making the final decision requires measuring, monitoring, and collecting a massive amount of real-time data. Such a data collection is the primary purpose of the accounting system. On the other hand, the digital twin concept closely connected with enterprise architecture frameworks, like TOGAF (The Open Group Architecture Framework)¹ and DoDAF (Department of Defense Architecture Framework)², by adding the operational information to the corporate architecture elements. The configuration of these elements imposes requirements for the accounting system organization.

It has to be mentioned the correlation between Fig. 2 and Fig. 4. The process of accounting organizing, which presented in Fig. 4, corresponds with the cycles from Fig. 2. Therefore, the proposed process of making a project of accounting organizing could be launched as many times as possible. During every launch, the project management team will develop the specification for strategic management accounting. The author's proposal gives the possibility to test the effectiveness of this proposal on the enterprise digital twin model.

One more point to considering – the concept of digital twins is applied mainly to complex industries. Its main advantage is the transfer of decision points from real space to the enterprise model. There are several options for applying this concept to the accounting organization. In the classical sense, the digital twin

¹ The TOGAF Standard (2018). *Version 9.2*. U.S.: The Open Group.

² The Department of Defense Architecture Framework (DoDAF) (2010). *Version 2.02*

<https://odcio.defense.gov/Portals/0/Documents/DoDAF/DoDAF_v2-02_web.pdf> (2020, January, 15).

involves the information gathering that later can be used for real-world decision-making. In view of this, the process of accounting organizing should be focused on the list of decisions that could be made by the enterprise management system. The enterprise digital twin presence consequently will establish the possibility to determine the composition of main managerial decisions and to align these decisions with the key performance indicators (KPI), which in turn related to forms of management reporting. The main challenge here is to formulate the list of performance indicators and to invent the criteria that help to make management decisions. Management decisions should be formed around certain leverage that could cause change system behavior change under getting some influence. Therefore, the presence of the digital twin can predict the production system's response to the management impact. The enterprise digital twin can be represented as a system dynamics model, or as a TOGAF architecture disclosure.

Conclusion. This paper has shown that enterprises facing the fourth industrial revolution challenges must change not only their business-process but also the way of their strategic thinking. The mentioned changing of strategic thinking requires proper information and analytical support that could be received from the management accounting system if this system organized according to the article proposal. The crucial issue here is the usage of digital twins' concept for structuring the project of accounting organizing. It was proved that the main tasks of the digital twin is: to determine the ways of enterprise development, to find new ways of customer involvement, to optimize the enterprise production parameters, to change enterprise organizational structure, to determine the characteristics of the production cooperation network, etc. From the management accountant's point of view, the digital twin helps to compose the list and make the structure of the enterprise responsibility centers. These centers will eventually determine the parameters of the accounting transaction and the approach to the production costs calculation. There are also areas for improvement. It was noted that the relevance of the digital twins' concept is seen only in its implementation with complex systems such as business integration or supply chains with a large number of participants. Subsequent works of the author will be aimed at adapting the proposal for use in all types of enterprises. Also seems necessary to expand the EPC-description of the organizing process for strategic management accounting.

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