

The impact of the development of the digital economy on the cost structure of cost value

Iurieva L.V.

Department of Accounting, Analysis and Audit
Ural Federal University
Ekaterinburg, Russia
l.v.iuryeva@urfu.ru

Sinianskaia E.R.

Department of Accounting, Analysis and Audit
Ural Federal University
Ekaterinburg, Russia
e.r.sinyanskaya@urfu.ru

Savostina O.V.

Department of Accounting, Analysis and Audit
Ural Federal University
Ekaterinburg, Russia
o.v.savostina@urfu.ru

Abstract — The rational planning of production costs and the problems of finding ways to optimally balance them, taking into account industry specifics of production, play an important role in the financial and economic activities of organizations in terms of technological transitivity.

Identification of the main directions of increasing the economic and social efficiency of organizations that meet the requirements of the development of the digital economy is becoming a serious problem, the solution of which is possible, including through the improvement of organizational and economic methods of cost management.

The article presents the results of the study of the cost structure of commercial organizations in various types of economic activity, where it was revealed that over the past four years, the ratio of cost components has generally not changed, but there are significant deviations from the general trend caused by industry specifics. The growth of activities related to the performance of work and the provision of services as opposed to the production sector was noted, which, in turn, differentiates the classification attributes of "material-intensive" and "salary-intensive" calculations in favor of the importance of labor resources. Further, the element "labor costs" was analyzed as the most susceptible to the influence of the digital economy in terms of quantitative and qualitative aspects, on the basis of which the main directions of improving the economic and social efficiency of management activities in this direction were formulated.

The author suggests a model of interaction of cost elements with components characterizing the development of digital technologies, which can be used for the purposes of strategic planning and analysis in organizations with regard to the requirements of the Digital Economy Development Program in the Russian Federation.

Keywords — cost, labor costs, digital economy, economic and social efficiency, managerial activities.

I. INTRODUCTION

The relevance of the research is related to identifying the impact of the development of the digital economy on the activities of industrial enterprises. The importance and features

of accounting and analytical support of various elements of production costs depend on the specifics of the cost structure. Methods of planning, regulation, accounting, control and cost analysis are determined by a set of provisions established by the legislation of the federal level, as well as by internal regulatory documents of organizations. The study of indicators characterizing the cost structure and the impact on performance, requires an integrated approach to the organization of accounting and analytical work in relation to the improvement of accounting policies and analytical support.

Digitization of the economy is not just the transfer of data and processes from the "analog" era to the digital form. Therefore, digitalization of industrial enterprises cannot be limited to creating a digital copy of accounting and analytical support for management activities, digitizing documents and providing all enterprises with access to high-speed Internet. In this regard, the identification of the features of accounting and analytical support for the individual elements of the cost of production and the development of directions for its improvement are of particular importance.

The development of the digital economy has an impact on different cost elements to varying degrees. The composition and cost of material and energy resources are most susceptible to external factors, which necessitates the search for the necessary information about external contractors through Internet sources. Labor costs are dependent on internal aspects, first of all, such as intellectual and qualification characteristics of personnel. At the same time, the use of modern technologies serves the task of not just finding the necessary information, but also increasing performance and productivity of labor. Therefore, this study focuses on the study of labor costs, combining both quantitative and qualitative changes that occur under the influence of the digital economy.

The constructions of economic models of the analysis of the cost structure were made by V. Govindarajan (1999), M.

Carrenbauer (1996), R. Mullendorf (1996), J.G. Siegel (1996), J. Schank (1999), J.K. Shim (1996) and others.

The main theoretical positions of cost accounting are investigated in the works of X. Anderson (2004), A. Upchurch (2002), E. Atkinson (2005), K. Drury (1998), R. Kaplan (2005), R. Needles (2004), T. Scone (1997), D. Khan (1997), Ch. Horngren (2001).

In the works of R. Kaplinsky, R. Kaplan (2003), D. Norton (2003), M. Porter (2005), A.A. Thompson, J. Strickland and others focus on cost management based on the value chain concept.

The review of scientific papers allowed us to summarize the accumulated experience, features of sectoral cost analysis in the digital economy and to note at present the lack of research on forecasting the needs of industrial enterprises, taking into account the impact of the development of the digital economy on the sectoral specifics of the cost structure, as well as the development of methodological approaches to the organization of accounting and analytical work in relation to the improvement of accounting policies and analytical support.

All of the above determines the relevance of the research topic.

II. THE RESEARCH METHOD

The study analyzed the dynamics of the overall cost structure of Russian enterprises and organizations (with the exception of small businesses, credit, insurance and budget organizations) for various types of economic activity for the period 2014-2017, according to data provided by Roskomstat.

In general, for the entire analyzed population, the proportion of the main elements of the cost is within the limits indicated in the Table 1.

There are no significant discrepancies in the outcome indicators over the years. With a more detailed comparison of the cost structure by type of activity, significant deviations from the general trend are already observed, which is caused by industry specifics. Summary of the most significant deviations are given in the Table 2.

TABLE I. COST STRUCTURE OF COMMERCIAL ENTERPRISES AND ORGANIZATIONS OF THE RUSSIAN FEDERATION FOR THE PERIOD FROM 2014 TILL 2017

Cost elements	2014 share, %	2015 share, %	2016 share, %	2017 share, %
Minimal costs	54.2	56.2	55.4	55.9
Labor costs	13.5	13.3	13.2	13.0
Insurance premiums	3.5	3.6	3.5	3.5
Depreciation of fixed assets	7.5	7.0	7.1	6.9
Other costs	21.3	19.9	20.7	20.7

TABLE II. THE PROPORTION OF THE ECONOMIC ACTIVITY COST ELEMENTS (SPECIFIED RANGE FOR THE PERIOD 2014-2017 YEARS)

Types of activity	Minimal costs %	Labor costs %	Insurance premiums %	Depreciation of fixed assets %	Other costs %
Agriculture, hunting, fishing	50-65	15-20	4-5	5-10	7-20
Mining	30-35	9	2	11-13	45
Production of petroleum products	64-80	1.5-2	0.5-1	3-4	15-30
Other production activities	68-77	10-20	3-5	2-7	6-11
Building	56-58	18-20	5	3	13-18
Trade	44-48	14-16	4	10	25-28
Transport and communication	40-44	17-18	5	9	24-30
Education	15	44	11	1	28
Health and social services	27-29	37-38	10	5	18-19
Utilities	21-73	11-28	3-7	1-4	12-40
Hotels, catering, real estate transactions	38-45	21-26	6	5-15	21-29
Public administration, military security	8-30	37-46	9-13	3-24	9-24
Scientific and technical activities (2017 only)	36	27	6	3	28
Activities in the field of culture, sports and leisure (only 2017)	12	37	6	4	41

The most stable cost structure for the four years analyzed is observed in education and health care, which is associated with government regulation of both the costs and the pricing policy. The situation is similar in the construction industry, where, despite the diversity of the types of work themselves, there are federal standards for budget planning.

The activities related to the provision of utilities, hotel business, catering and public administration were subject to

the greatest changes, which can be explained by the reforms carried out in these sectors.

Scientific activities, services in the field of culture, sports, recreation and entertainment as a separate object of observation arose only in 2017, which does not allow to follow the trend of changes.

In other activities, such as various types of production, mining, trade, transport and agriculture, deviations by year are

within 5%, which can be considered as relatively insufficient changes.

Among the five elements analyzed, two do not have a significant impact on the total costs. The share of depreciation (with the exception of government and military security) is on average between 1-10%. Insurance premiums have even lower quantitative indicators, as well as they are directly proportional to salary and do not have independent significance for analyzing their impact. These elements are also not directly related to the digital economy.

Material costs and labor costs are inversely proportional to the larger groups. These are the so-called classification signs of the allocation of "material-intensive" and "salary-intensive" types of economic activity, when material resources dominate in the production sphere, and labor resources dominate in the

provision of services. The predominance of one of these elements has a significant impact on the choice of methods and tools for calculation, as well as the corresponding accounting and analytical procedures.

Let us turn in more detail to the element of labor costs, as the most susceptible to the influence of the digital economy in the context of quantitative and qualitative aspects.

The labor process affects the interests of all participants in social and labor relations - workers, employers and the state. Therefore, improving the efficiency of labor in the digital economy should not be confined to the interests of entrepreneurs who use hired labor. Among the main directions of increasing economic and social efficiency, which are achieved through the optimization of labor processes, the following can be singled out (Table 3).

TABLE III. RATIO OF EFFICIENCY INDICATORS FOR THE MANAGEMENT OF HUMAN RESOURCES AND THE INTERESTS OF PARTICIPANTS IN SOCIAL AND LABOR RELATIONS (HUNDRED)

Category of SLR participants	Cost effectiveness	Social efficiency
Employer Interests	Rational cost-benefit ratio, productivity growth, adaptation to external conditions, stability and competitiveness	Reducing conflict, employee turnover, development of corporate human capital
The interests of employees	Improving the living standards of workers and their families	Realization of individual human capital, social guarantees and security, growth of labor potential, career growth
State Interests	The increase in tax revenues, the development of innovative processes in production and management, stabilization in the labor market and in matters of employment	Creation of new jobs, stabilization of the social security system

The interest implementation of all three groups of participants in social and labor relations is directly or indirectly connected with the development of digital technologies, the main ones of which are the collection, transmission and processing of data and innovation processes. Accordingly, an important role is played by the analysis of precisely the element of labor costs, which embodies the results of the productivity of a whole complex of managerial decisions regarding labor resources.

If we again refer to the above statistics, we can note the following trends. The smallest share of wages in the cost of production is observed in the production of petroleum products (1.5-2%) and mining. At the same time, in the production of petroleum products, the share of material costs is highest, while in the extraction of minerals, other (mainly transport) expenses and depreciation charges are high, which indicates a high degree of automation of these types of activities. The share of wages is also low compared with material costs also in production activities (10-20%), which is quite natural for this sphere.

In agriculture, construction, transport and trade, labor costs are in the same range, but they are already about half or one third of material costs, that is, there are no such significant differences.

In the field of public utilities, the largest range of indicators is observed in the entire analyzed population, which is also associated with the instability of the industry as a whole.

In addition to the formation of wage amounts included in direct and indirect costs, and related to the substantiation of fixed and variable costs, it is also necessary to substantiate other personnel costs that depend on the standard number (labor protection, training, social security). Therefore, the "labor costs" element is directly related to the "insurance

premiums" element, as well as other expenses, which reflect personnel costs that are also indirectly related to the digital economy (maintaining normal working conditions, training and advanced training, developing intellectual processes, purchase maintenance software).

The most "salary-intensive" are scientific activities, where labor costs make up 27%, culture and health care - 37-38%, public administration and military security, where the share of the corresponding costs is 44-46%. This aspect deserves special attention, since it is precisely this contingent of specialists that should not only be able to use software products, but constantly update their knowledge and adapt to the changing conditions of the external legislative and regulatory environment, as well as when working with information sources.

As can be seen from the above calculations, there are very significant differences in the cost structure, both according to industry characteristics, and within homogeneous activities. In addition, in 2017, compared to previous periods, state statistics bodies changed the principles of grouping activities, and the main focus of observations shifted from production to providing various types of services that are most related to the use of digital technologies.

III. RESULTS

Rational planning of production costs and the problems of finding ways to optimally balance them, taking into account the sectoral specifics of production, play an important role in the financial and business activities of organizations in the digital economy. The cost of production, as in the synthetic indicator, reflects all aspects of the production and financial-economic activities of the organization.

Based on a study of the relationship of cost elements and components that characterize the development of the digital economy in our country, it has been established that material resources in industry and labor in the provision of services dominate.

Material costs and energy resources used in production, as elements of production costs, are normalized by such external factors as federal, regional or industry standards for manufactured products and market prices. The cost of inventories and resources is also within the regional or industry tariffs. Consequently, these elements can be conditionally considered as normalized by external factors and

minimally dependent on the characteristics of the activity of a particular enterprise.

Labor costs, on the contrary, are exclusively individual for each enterprise or organization, depending on the number and qualification structure, the system of remuneration and labor incentives, geographical and technical and technological features of the labor process, and other factors not regulated by federal regulations.

In addition, they are the taxable base for insurance premiums, which also acts as an element of costs.

The figure shows the cost structure by elements in conjunction with components of digital technologies that can be used for these purposes.

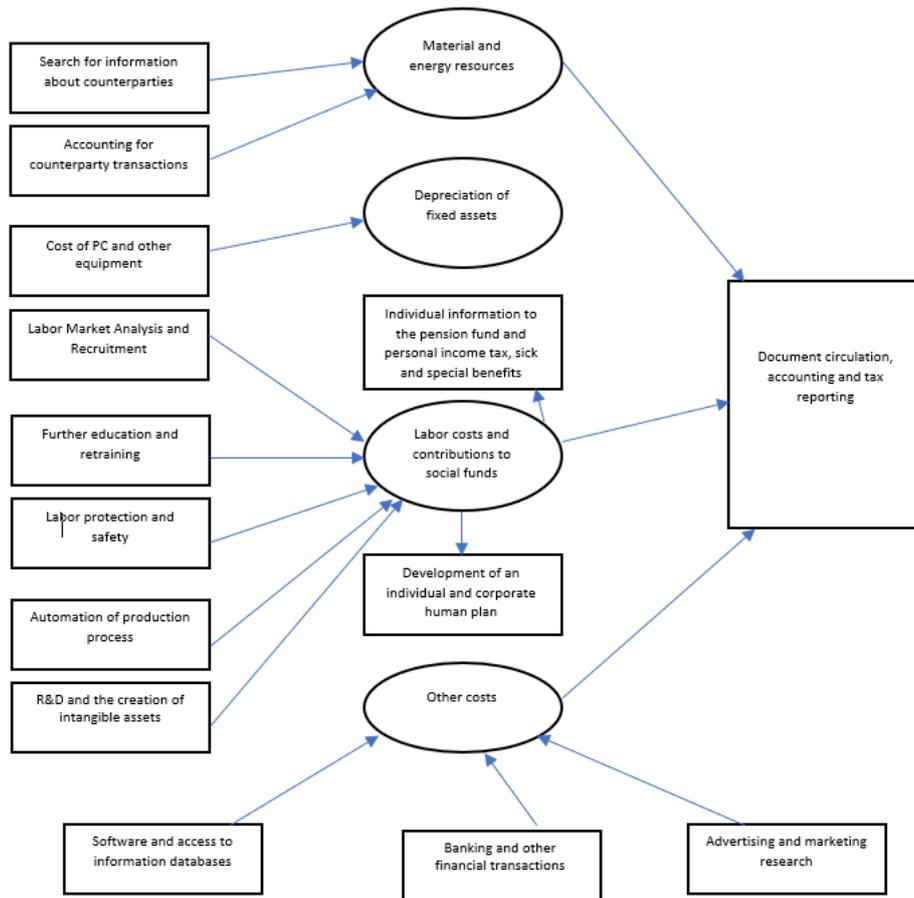


Fig. 1. Model of interaction of cost elements with components of digital technologies.

The greatest relationship is observed in the element “labor costs”, since it is the human factor that is directly related to the technological and intellectual components of the digital economy. In accordance with the Program for the Development of the Digital Economy in the Russian Federation until 2024, the main directions are harmonization of legal regulations, improvement of the personnel training system, formation of research competencies, information infrastructure and security. All these components are also directly related to the development of human capital at the level of the individual, the enterprise and the state as a whole, which underlines the importance of further research in the field of labor costs.

IV. CONCLUSION

The study results of the cost structure of commercial organizations in various industries revealed that over the past four years, the ratio of cost components as a whole has not changed, but there are significant deviations from the general trend caused by industry specifics. The most significant variability was noted between the two main elements, confirming the classification signs of the allocation of "material intensive" in the sphere of production and "salary-intensive" in the provision of services of economic activities.

On the basis of a more detailed analysis of the element “labor costs”, as the most susceptible to the influence of the

digital economy in the context of quantitative and qualitative aspects, the main directions of increasing the economic and social efficiency of management activities are formed. The author suggests a model of interaction of cost elements with components characterizing the development of digital technologies, which can be used for the purposes of strategic planning and analysis in organizations with regard to the requirements of the Digital Economy Development Program in the Russian Federation.

References

- [1] R. Adelstein, S. Peretz (1985) The competition of technologies in markets for ideas: copyright and fair use in evolutionary perspective. // *International Review of Law and Economics*, 1985 (5), – pp. 209–238.
- [2] G. Andreeva, S. Badalyants, T. Bogatyreva, V. Boroday, O. Dudkin, and others. The development of the digital economy in Russia as a key factor in economic growth and improving the quality of life of the population: monograph, Nizhny Novgorod: Publisher "Professional Science", 2018. - 131 p.
- [3] A. Upchurch, *Management Accounting: principles and practice*: per. from English; by ed. I. V. Sokolova, I. A. Smirnova. M.: Finance and Statistics, 2002. - 952 p.
- [4] E. Atkinson, R. Bunker, R. Kaplan, M. .. Young, *Management Accounting*: translation from English, M.: Publishing house "Williams", 2005. - 878 p.
- [5] O. Bazhenov, *Social Significance Of PLS-PM Modelling Of Copper Industry Enterprises (By The Example Of JSC "Uralelectromed")* // *Tsvetnye Metally* 2016(1), pp. 7-12.
- [6] V. Bauer, *Problems in the way of creating a unified digital platform of the digital economy*, M. : RANS, 2017, 39 p.
- [7] A. Bykov, *System of the regulatory framework of the digital economy in the Russian Federation*, M. : Prospectus, 2018 - 80 p.
- [8] K. Drury *Introduction to management and production accounting*: Textbook for universities M. : Audit, UNITI, 1998. - 783c.
- [9] K. Drury, *Management and Production Accounting*: translation from English, M.: UNITY-DANA, 2007. - 1423 p.
- [10] B. Gates, *Business at the Speed of Thought*, M. : Eksmo-Press, 2000.
- [11] C. Goddard, *Semantic analysis: A practical introduction*, Oxford University Press, 2011.
- [12] Hamilton Daniel S., *The Transatlantic Digital Economy 2017: How and Why it Matters for the United States, Europe and the World* Washington, DC: Center for Transatlantic Relations, 2017.
- [13] R. Kaplan, D. Norton, *Balanced Scorecard: from strategy to action*: translation from English, M.: Olimp-Business, CJSC , 2003. - 214 p.
- [14] L. Margherio et al, *The emerging digital economy*. Department of Commerce, Washington, DC, 1998.
- [15] T. Mesenbourg, *Measuring the digital economy*, United States Bureau of the Census, 2001.
- [16] R. Müllendorf, M. Carrenbauer, *Production Accounting for Reducing and Controlling Costs, Ensuring Their Rational Structure*; translation from German. M.: FBK-PRESS, 1996. - 160 p.
- [17] N. Negroponte *Being Digital* / N. Negroponte. – NY: Knopf, 1995 [Electronic resource].
- [18] B. Needles, X. Anderson, D. Caldwell, *Principles of Accounting*: translation from English, M.: Finance and Statistics, 2004. –496 p.
- [19] M. Porter, *Competition*: translation from English, M.: Williams, 2005. - 608 p.
- [20] Don Tapscott. *The Digital Economy* / McGraw-Hill, 1996. – 368 p.
- [21] *Trends in the development of the economy and industry in terms of digitalization* / ed. Dr. Econ. sciences, prof. A.V. Babkina, St. Petersburg: Publishing house Polytechnic. University, 2017. - 658 p.
- [22] T. Scone, *Management Accounting*; per. from English; by ed. N.D. Eriashvili. M.: Audit, UNITI, 1997. - 179 p.
- [23] P. Schueffel *Taming the Beast: A Scientific Definition of Fintech* // *Journal of Innovation Management*. – 2017. –T. 4.–No. 4. –C. 32-54.
- [24] Han Dietger. *Planning and control: controlling concept*; by ed. A.A. Tuchak, M.A. Golovoch, M.A. Lukashevich: translation from German M.: Finance and Statistics, 1997. - 800 p.
- [25] Ch. Horngren, J. Foster, *Accounting: management aspect*: Translation from English, ed. Y.V.Sokolova. M.: Finance and Statistics, 2001. - 416s.
- [26] J. Schank, V. Govindarajan *Strategic cost management*, translation from English. Saint-Petersburg: Business Micro, CJSC, 1999. - 288 p.
- [27] Jay k. Shim, Joel G. Siegel, *Methods of cost management and cost analysis*, M. : Info-ed. House "Filin", 1996. - 344c.
- [28] *Management accounting of expenses at industrial enterprises in the conditions of innovative economy*, Yuryeva L.V., Dolzhenkova E.V., Kazakova M.A. Moscow, 2017. - 290 p.