UDC 004:[331.103:001.895] **DOI: 10.37332/2309-1533.2021.1-2.7**
JEL Classification: M 15, M 54, O 30

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FUNCTIONS AND PRINCIPLES OF STANDARDIZATION OF INNOVATIVE LABOUR FOR IT INDUSTRY PROJECTS

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ФУНКЦІЇ ТА ПРИНЦИПИ НОРМУВАННЯ ІННОВАЦІЙНОЇ ПРАЦІ ДЛЯ ПРОЄКТІВ ІТ-ГАЛУЗІ

Formulation of the problem. In modern conditions of development of innovative and investment model of development of economy of Ukraine the question of rationing of innovative work is not finally solved and demands further development, especially in the field of information technologies and communications according to process of digitalization. The new economy with information and innovation dominants, which replaces the industrial one, creates, on the one hand, new opportunities for economic growth and positive social dynamics, and on the other – produces new requirements for resource provision of high-tech and innovative activities.

Innovative labour becomes a strategically important asset at the macro-, meso- and micro-level as the embodiment of intellectual and creative abilities of employees, which are manifested in the generation of new ideas, application of creative approaches and search for non-standard solutions. Rationalization of labour processes based on innovative work can be ensured in the case of using an effective management tool, which is rationing.

Analysis of recent research and publications. The current state of social and economic processes necessitates a detailed study of innovative processes. Innovations and innovative work in particular are the basic categories of modernity. The theoretical and methodological basis of the study are the works of B. Henkin, L. Dovhan, H. Kots, N. Tymoshenko, A. Shestakova, S. Kucherenko, L. Levaieva, M. Akulova, O. Yevtukh, L. Syniaieva, I. Rukhliada, V. Krainii and others.

In their research, researchers consider the features of labour regulation in the IT industry and highlight proposals for enhancing the innovative work of employees. Innovations and innovative work deserve special attention, because innovative development is a weak link in Ukraine's economy. Domestic scientists are actively exploring the essence of innovation, innovative potential both at the level of individual enterprises and at the state level. It is fair to say that in publications on innovation and intensification of innovative activities of enterprises, in the background is the place and human activity in the innovative process.

Theoretical and practical issues of rationing of innovative work, taking into account the specifics of the industry, features and characteristics of innovative work remain underdeveloped. The issue of innovative work is considered through the formation of innovative activity of staff, methods and mechanisms for its provision with an emphasis on improving the mechanisms of intensification of innovative work in Ukraine [1]; analysis of innovative work in terms of the life cycle of innovation and positioning of innovative work as a tool that ensures the continuous operation of the enterprise [2]; formation of a new segment of the labour market, with its specifics and trends in Ukraine [3].

Setting objectives. The purpose of the article is to study current trends in the rationing of labour in the IT industry; defining the functions of standardization of innovative work of IT specialists at three levels of management – macro-, meso- (level of IT industry) and micro- (the enterprise level of IT industry); substantiation of the principles of standardization of innovative work in the IT industry. The following tasks are set to achieve this goal: research of the main problems related to the IT industry; analysis and generalization of the main functions performed by the rationing of innovative IT-work at the macro-, meso- and micro-economic levels; research of principles of labour rationing and features of rationing of innovative work of specialists in the IT industry; substantiation of the principles of standardization of innovative work in the IT industry.

Presentation of the main research material. Based on the analysis of the works of scientists and the conceptual and categorical apparatus of the social and economic phenomenon "innovative work", we see that there is no common understanding of the distinctive characteristics of the latter. To clarify the definition of "innovative work" was considered and identified its features, which led to the conclusion that "innovative work is a special type of work, which is characterized by such features as intellectual capacity, creativity and independence in decision-making, complexity and multifacetedness, increased psychological load, lack of proportional relationship between labour costs and results, dependence of the possibility of rationing on the stage of the innovation process and the type of innovation as the end result of work, which is aimed not only at creating and improving, but also at the effective commercialization of a new product in any field" [4].

The need to pay special attention to the regulation of innovative work in the IT industry is evidenced by the fact that the Verkhovna Rada of Ukraine on March 14, 2019 registered a Draft Law on Amendments to the Tax Code of Ukraine on the peculiarities of taxation of software industry [5]. This indicates the relevance of this issue and that this industry (or software industry) has certain features and needs further study. Within the framework of this bill, the subjects of the software industry include those engaged in [5]:

1) software publication; 2) computer programming and all types of activities for writing, modifying, testing and providing technical support, document management for software; customizing software and adapting software packages to user needs; writing software accompanying instructions for users; 3) consulting on the issues of informatization; 4) management of computer equipment, data processing and other related services, operation on a long-term basis of data processing facilities owned by other users;

5) creation and implementation of information and technical complexes, systems and networks; development of cryptographic means of information protection; granting rights to use software that includes the transfer of intellectual property rights to software and programs; 6) data processing, posting of information on web sites and related activities, including activities related to databases.

The term "IT industry" is used in the works of modern scientists. In the Table 1 presents works that are devoted to various aspects of the development of the IT industry and a brief description of their essence.

Table 1

Scientific works devoted to solving problems of IT industry development (industry of information technology)

Author	Title of the work	The main problems related to the IT industry, which are considered in the paper
Voloshyn V. I., Shekhlovych A. M. [1]	Financial and economic instruments to stimulate the development of the IT sphere of Ukraine	The modern tendencies of development of IT sphere in Ukraine are defined and the financial and economic tools of stimulation of its development are proved.
Kots H. P., Havrylova A. A. [6]	Analysis of the activity of IT clusters by leading regions of the IT industry of Ukraine	Peculiarities of creation of IT clusters by regions of Ukraine are considered
Tymoshenko N. Yu., Ronskyi B. Yu. [7]	Problems and prospects of development of the IT industry in Ukraine	The peculiarities of the macro- and micro-environment in which the IT industry operates are analysed; the main tendencies and problems of its functioning are highlighted
Bilovska O. A. [8]	Competitiveness of the IT industry and IT outsourcing in Ukraine	The state of competitiveness of the IT industry and IT outsourcing in Ukraine in the context of European integration is considered
Katrenko A. V., Pasternak O. V. [9]	Systemic aspects of investing in the field of information technology	System aspects and features of investing in the field of IT, the state of the IT market in Ukraine and trends in its development are considered
Dovhan L. Ye., Malyk I. P. [10]	Trends and problems of information technology development in Ukraine: personnel aspects	The main problems of staffing of the IT industry that affect the further development and competitiveness of domestic professionals are identified
Shestakova A. V. [11]	Trends and problems of IT industry development: personnel aspect	The management of human resources in the field of information technology, requirements for knowledge and skills, as well as professional self-determination of IT specialists

Source: compiled by the author on the basis [1; 6–11]

Listed data in Table 1 show that the concept of IT industry (in its understanding as an industry of information technology) is widely used in scientific works.

According to the action plan developed within the Concept of development of the digital economy and society of Ukraine for 2018-2020, one of the first stages is the introduction of modern terminology in the digital sphere in accordance with European practices [12]. This means that it is advisable to analyse not only

national but also European and global approaches to defining the essence of the IT industry and the terminology used to define it.

The World Standard for Industrial Classification identifies a sector such as information technology. This sector includes: software and services, hardware and equipment, semiconductors and semiconductor equipment [13]. Thus, the IT sector stands out among all these. According to the statistical classification of economic activities in the European Economic Community, a separate field includes "information and communication", which includes: publishing; software production; activities of film and sound recording companies, radio and television companies, telecommunication services; information technology activities; other information services [14].

Thus, in the regulatory documents of the national and international level, as well as in the reports of government agencies, there are different names of the industry, which includes software development and various activities related to information technology and systems. In this paper, to describe the field of information technology, it is proposed to use the term "IT industry", which, as mentioned above, is widely used in national bills and in official reports of international organizations, as well as in the works of modern scientists.

The need for further development of approaches to the rationing of innovative work in the IT industry is due to its important functions in the development of the national economy at the macro-, meso- and micro-economic levels. The specificity of such functions is determined by the role of innovative work in the development of the national economy, which was highlighted above.

Thus, O.T. Yevtukh notes that "correctly established standards, which are derived from the norms, harmonize the functioning of the entire economic system and promote the efficient circulation of capital at both the macro- and micro-levels. If the norms are not defined, the norms are not set, or set incorrectly, or they are not observed, then there are significant losses, which in turn lead to crises in a particular industry and in the economy as a whole" [15, p. 45].

Considering the functions of labour rationing at the macro-economic level, it should be noted its leading role in such processes as regulating the use of working time, duration of leave, working week, working conditions, ensuring the rights of workers to maintain a certain level of health, rest, i.e. performs social and legal function.

According to L.V. Syniaieva, the application of a scientifically substantiation approach to rationing provides the following advantages to social partners:

– maintenance of normal labour intensity of employees, preservation of working capacity, ensuring fair remuneration for work and job satisfaction, formation of motives for improving labour activity and quality of work;

– provides enterprises with increased production efficiency, efficient use of labour, rational use of funds to pay staff, reduce social tensions in the team, optimize the relationship between employer and employee, increase the competitiveness of the enterprise and its investment attractiveness;

– allows the state to effectively use labour potential, increase the welfare of citizens, reduce the number of social and labour conflicts, ensure the development of various sectors of the economy and economic growth in the country [16, p. 255].

These advantages reflect the functions of rationing at the micro- and macro-economic levels.

Additionally, rationing is an effective tool for managing production costs, which is important for the industry, i.e. the meso-level, as it contributes to the invention of new approaches to the organization of labour not only within the enterprise, but also within individual industries. Thus, for the IT industry, rationing performs a regulatory function to establish the level of remuneration of IT professionals, because in the market of IT products there are many differences in the definition of labour costs, which will be discussed below. Industry standards allow for conducting a comparative analysis of enterprises in one industry, to predict the development of the industry based on the definition of reserves to increase productivity. The development of industry standards is also based on labour rationing. The role of standardization in the IT industry is indisputable, as this industry is one of the most complexes in terms of developing standards "de jure".

Standards of the International Organization for Standardization (ISO), the Institute of Electrical and Electronic Engineers – IEEE (Institute of Electrical and Electronic Engineers), the Software Engineering Institute – SEI (Software Engineering Institute), the Consortium for Technology Manipulation of OMG (Object Management Group) projects play a significant role in the development of the IT industry, and the basis of their creation is the rationing of the work of IT professionals.

Modern authors also define the following functions of labour rationing:

– establishment of a scientifically substantiated basis for internal production planning and labour organization;

– assistance in identifying and using reserves to increase labour productivity and reduce production costs;

– encouragement to improve the skills of employees on the basis of scientific generalization and mass dissemination of advanced production experience;

– promoting an increase in wages, determining a more complete correspondence between the measure of labour and the measure of remuneration for work [17].

Some of these functions are relevant for both micro- and meso-economic levels.

Regarding the microeconomic level, M.H. Akulov and others give the following main functions of labour rationing:

– formation of an information base for calculations of the basic technical and economic indicators of activity of the enterprise;

– creation of an objective basis for improving the organization of wages in the conditions of accelerated STP;

– determination of the labour contribution of all employees of the enterprise and the share of each of them in the collectively earned wage fund;

– identification of reserves of living labour and the formation of organizational and technical measures, the implementation of which will ensure their use [18].

From the point of view of Kucherenko S.Yu. and Levaieva L.Yu., "the main purpose of rationing is to establish the amount of labour in market relations at each enterprise, reduce production costs by maximizing and streamlining the use of working time, exemption from its unproductive use. Maximizing the usefulness of the use of time is a very important issue in the conditions in the formation of a market economy" [19, p. 98-99].

Other authors consider labour rationing as a tool for managing the quality of working life [20], planned costing of products [21], as a factor of innovative development [22].

At the micro level, the essence of labour rationing is to establish a rate of time to perform specific production operations, calculate the required number of staff, determine the intensity of labour and pace of work and calculate the wages of employees. Thus, rationing can also be a tool to stimulate labour, as it ensures the interest of employees in reducing labour intensity, the rational use of resources.

Among the functions of labour rationing, most scholars call the following: planning, organizational, economic, technical, managerial, social, legal, regulatory and others. At different economic levels, the names of most of these functions are duplicated, but their content has some differences.

In the IT industry, the peculiarities of the rationing of innovative work will be manifested mainly at the meso- and micro-economic level. At the macro-level, they are the same for all sectors of the economy.

The main functions performed by the rationing of innovative IT-work at the macro-, meso- and micro-economic levels are shown in Fig. 1−3.

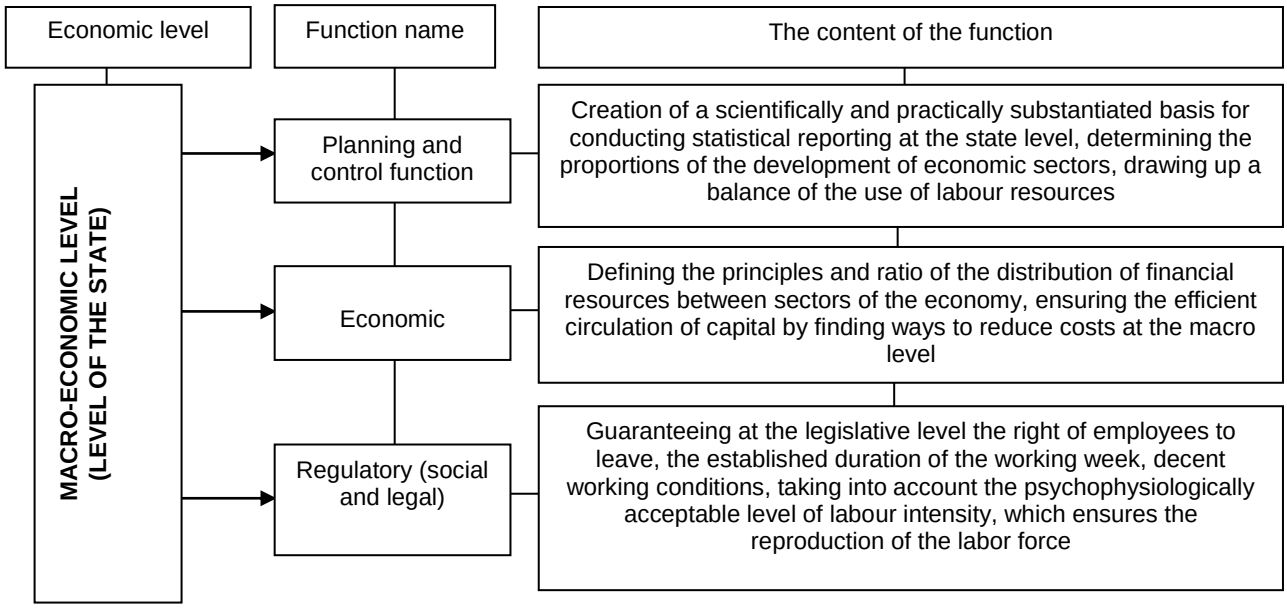

Fig. 1. Functions of rationing of innovative work at the macro-economic level

Source: author's development

The main principles of labour rationing according to the results of research by various authors are:

– progressiveness, optimality, objectivity, dynamism and scientificity [18];

– complexity, system, efficiency, progressiveness, specificity, dynamism [23];

– expansion of the scope of labour rationing, which provides optimization of labour costs for production; assessment of the labour contribution of each employee in the results of the team; establishment of uniform labour standards for the same work; ensuring the validity of labour standards, taking into account organizational and technical, economic, psychophysiological and social factors; use of scientific and practical achievements in the rationing of labour costs; change of labour standards in connection with the improvement of technology, organization of labour and production, improvement of working conditions [24];

– systematization, efficiency, expediency [25].

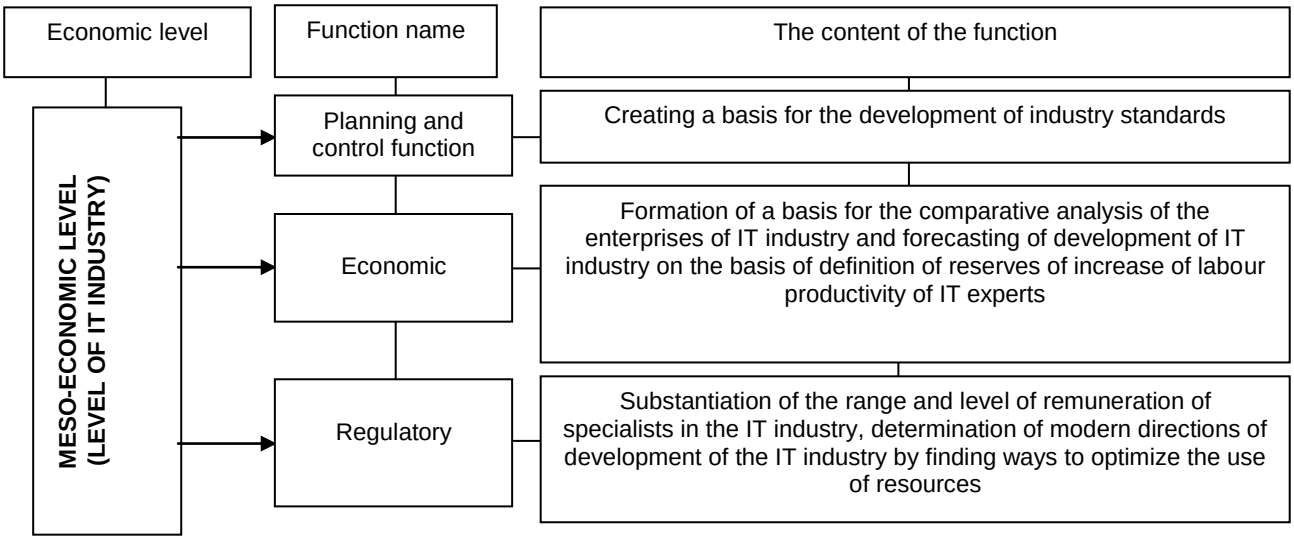

Fig. 2. Functions of rationing of innovative work at the meso-economic level (levels of the IT industry)

Source: author's development

According to Krainii V.O., the main principles of labour rationing are: efficiency, complexity, system, objectivity, specificity, dynamism, legitimacy, a positive attitude of employees to the enterprise (the principle of job satisfaction) [26].

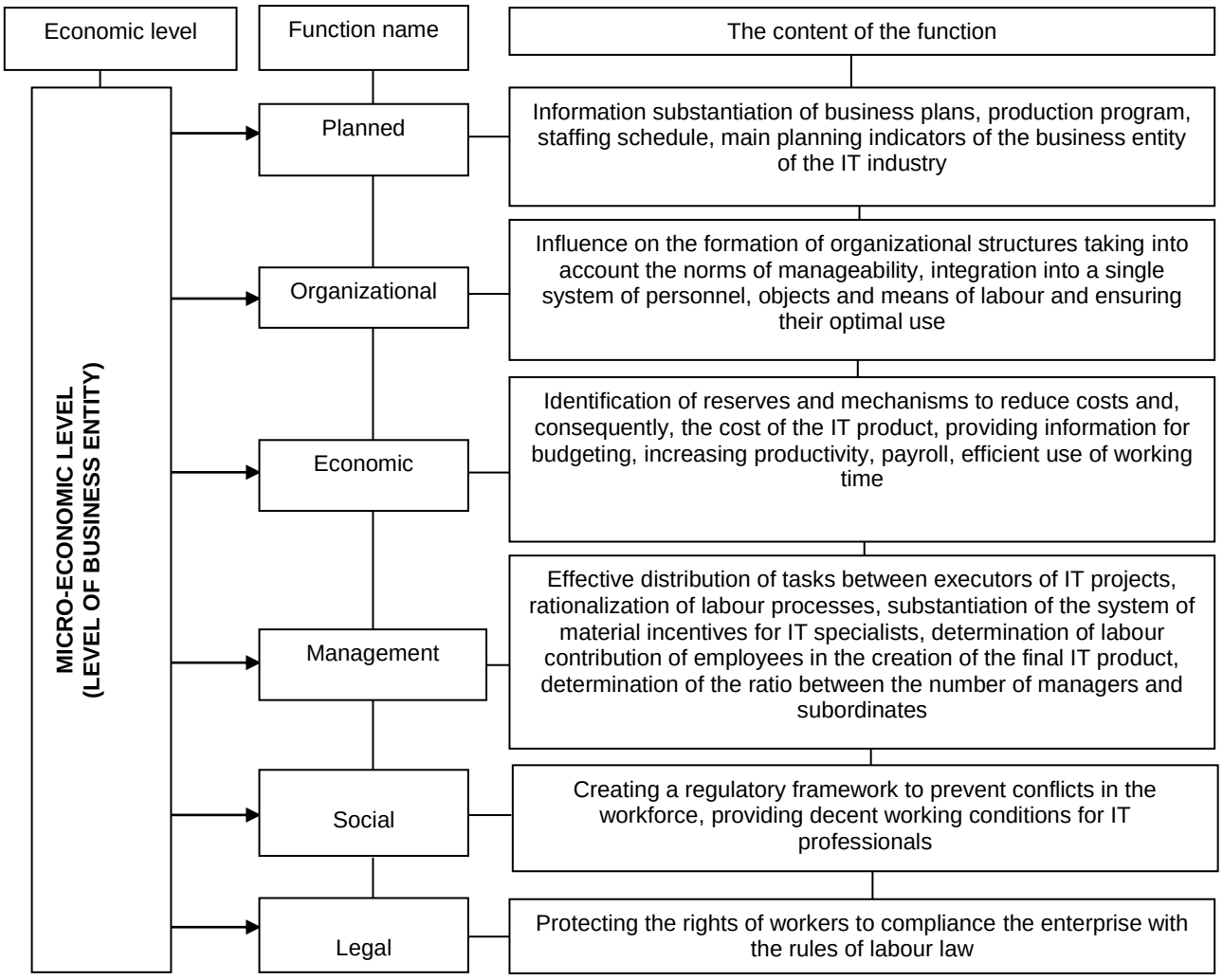

Fig. 3. Functions of standardization of innovative work at the microeconomic level (level of the business entity of the IT industry)

Source: author's development

According to I.V. Rukhliada, "the work of specialists in the field of information technology in the information society is intellectual. It is based on the consumption, processing and provision of information to consumers. The work of software development specialists is a partial case of such work, as the subject, means and product of the work of these specialists are special types of information in digital form. It requires special knowledge and skills…In terms of content, the work of software developers has a high degree of intellectualization, a high share of elements of mental work, as well as the qualification complexity of labour functions in terms of composition and number of its elements, diversity, novelty and penetration into other activities (scientific, engineering, business, innovation, etc.)" [27, pp. 12-13].

The peculiarities of IT work are due to the fact that specialists in this field often work remotely, on a flexible schedule, the most popular model of the relationship is the model "customer-performer" under a civil contract. Often the payment is based on the work performed. The main features of the work of specialists in the IT industry are shown in Fig. 4.

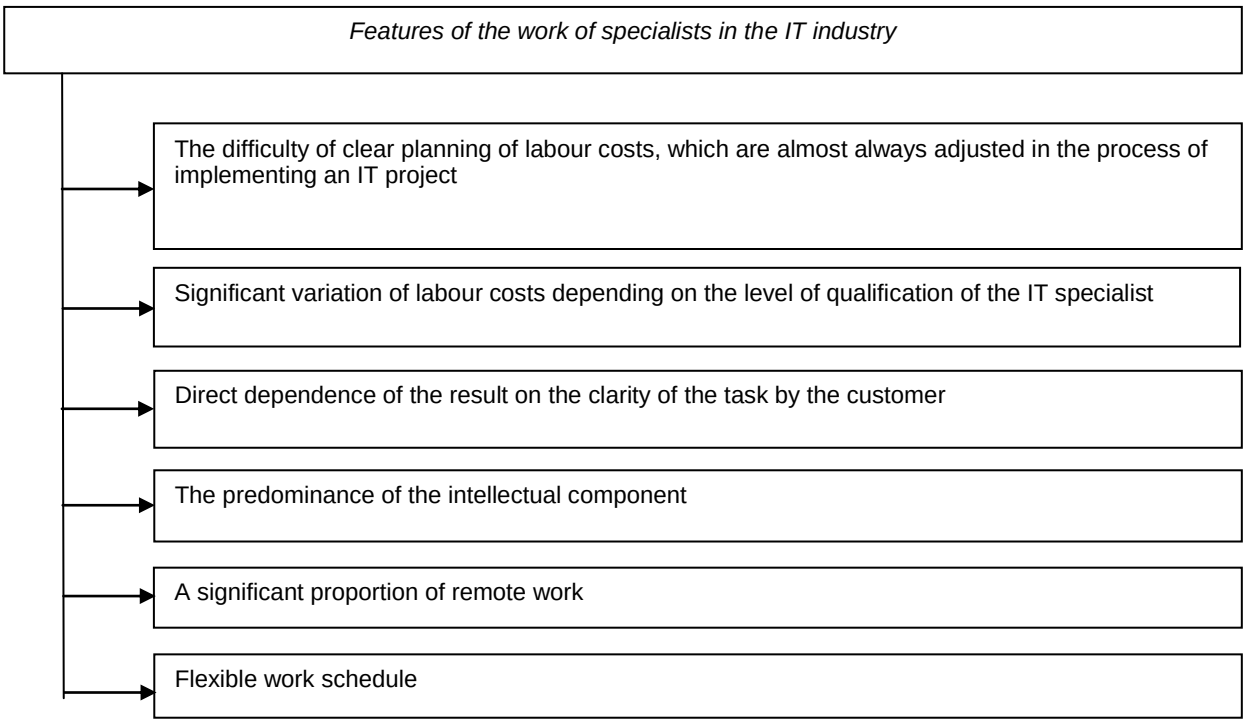

Fig. 4. Features of the work of specialists in the IT industry

Source: author's development

Based on the above principles of labour rationing, taking into account the peculiarities of rationing of innovative work and the peculiarities of the work of specialists in the IT industry, it is advisable to formulate the principles of rationing of innovative work in the IT industry (Fig. 5).

These principles can be divided into two groups:

1) general principles of labour rationing, which are the same for all industries, regardless of the type of economic activity;

2) specific principles that take into account the peculiarities of the rationing of innovative work and the characteristics of the work of specialists in the IT industry.

At present, the norms and standards of time spent by employees of the IT industry, developed several decades ago, are no longer relevant, and the development of new ones is complicated by significant variations in software complexity, professional qualifications, programming languages, etc.

Thus, the consolidated time norms for software development proposed many years ago were calculated depending on the volume of software, their complexity, the degree of novelty of the developed software, the use of standard or non-standard approaches, etc. [28]. Due to the rapid changes and development of the IT industry, these rules have lost their relevance.

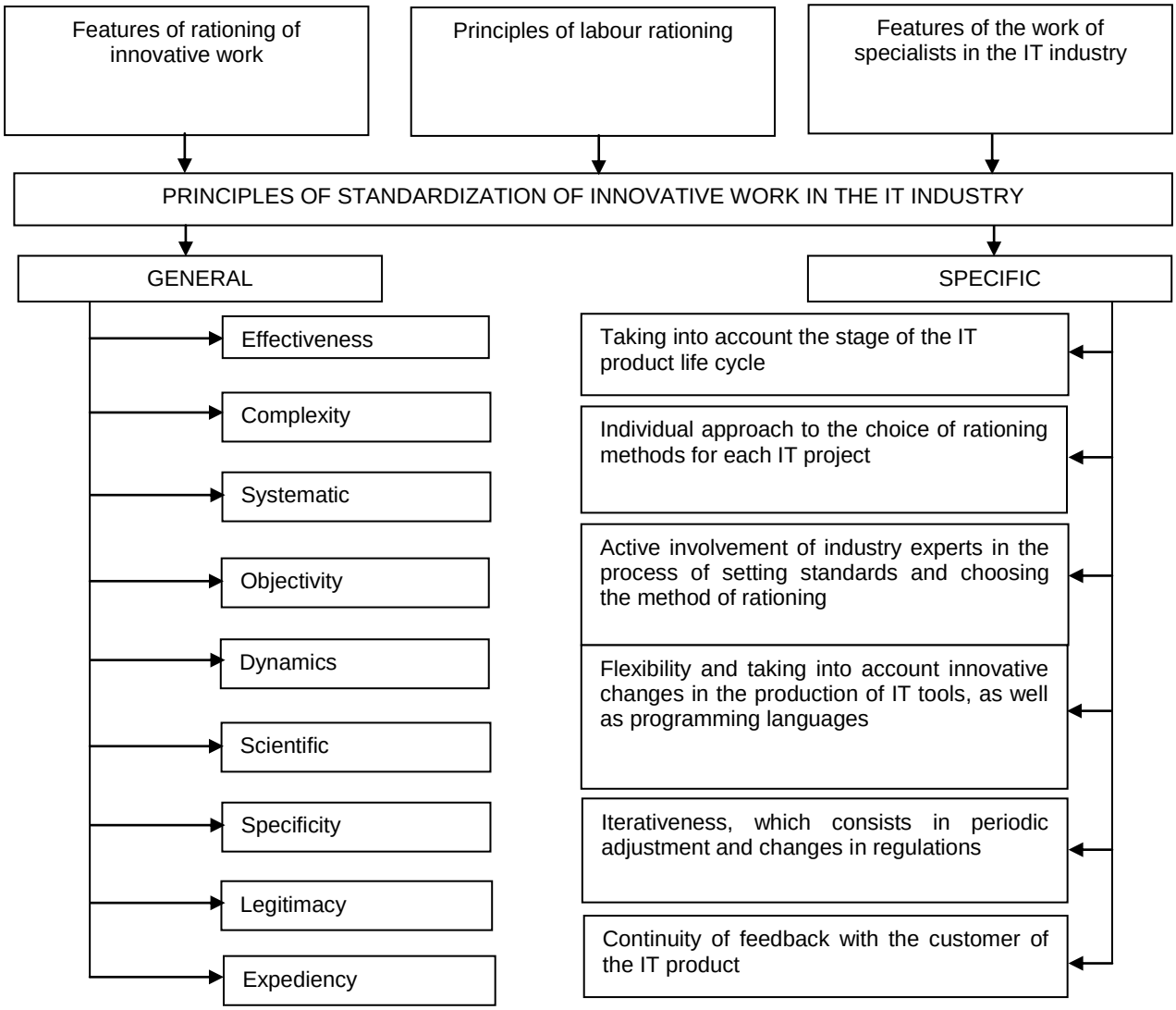

Fig. 5. Principles of standardization of innovative work in the IT industry

Source: author's development

As noted above, innovative work in the IT industry can be aimed at both improving the process and creating a new product. In the latter case, as a rule, the final product is different types of software. Despite the fact that the software product is a very specific result of the innovative work of an IT specialist, modern authors draw attention to a number of problems that determine the complexity of the rationing process, namely:

– the software product is a vast result of intellectual activity, and therefore all the difficulties of R&D rationing are related to the rationing of labour costs and time to create software;

– in the process of software product development there is an adjustment of requirements to it, additional conditions are put forward by the customer, priorities can change that leads accordingly to adjustment of terms and cost of its production. Such current adjustments significantly complicate the process of labour regulation in the IT industry;

– after the implementation of the software product, it is often necessary to combine it with existing software at the customer's enterprise, which requires additional time and labour, which is almost impossible to standardize in advance, because each customer has an individual software configuration;

– the variety of programming languages and skill levels determines and cuts the cost of time and labour to create the same purpose (but not in complexity and efficiency) software. This leads to different labour costs and approaches to their calculation. However, for the end user, the intricacies of the software development process are usually unknown. Thus, the customer focuses on a certain amount of budget that he is willing to spend on software, and is often guided in choosing a contractor at a competitive price. This means that the cost of labour is adjusted to market prices and the established standards will also be adjusted;

– a certain part of the work, the level of complexity and the required time and human resources vary significantly from project to project, so the standard standards for such work cannot be unambiguously set and each time changed and determined by experts depending on project conditions, customer requirements, structure his enterprises, etc. [29].

Conclusions from the study. Thus, we substantiate the importance of innovative work for the social and economic development of Ukraine, features and principles of evaluation of innovative work in the IT industry.

During the study of the main functions performed by the rationing of innovative IT-work at the macro-, meso- and micro-economic levels, the main functions of rationing of innovative work were identified and differences in their content and features of manifestation at different economic levels: macro- (state), meso- (IT industry) and micro- (enterprise).

Based on the principles of labour rationing and taking into account the peculiarities of rationing of innovative work and the peculiarities of the work of specialists in the IT industry, the principles of rationing of innovative work in the IT industry are formulated, which are divided into two groups: general and specific.

The direction of further research may be the development of norms and standards of time spent for IT workers.

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