

CONCEPTUAL BASES OF FORMATION OF COMPETENCE POTENTIAL OF LIVING LABOUR UNDER THE INFLUENCE OF CYBER-PHYSICAL SYSTEMS

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Abstract. The relevance of the issue of the competence potential of living labour is due to the need for evolutionary changes in the labour potential of the workforce as a response to the transformation of embodied labour in the context of the digitalisation of the economy. The *aim of the research* is to substantiate the conceptual foundations for the formation of the competence potential of living labour in the new conditions of digital transformation. In order to achieve this goal, the conceptual and categorical apparatus of labour theory has been improved, the types and structure of competences, functions and tools for building competence potential have been defined. *Methodology.* General scientific research methods were used in the study. In particular, using the methods of induction and deduction, the genesis of the concept of "competence" is studied to determine the substantive transformations in time, using the method of comparison, the common and distinctive features of the concepts of "competence" and "competency" are identified, using the systematic method, the structural elements of the concept of "competence" are identified and the introduction of the concept of "competence potential" of living labour into the scientific apparatus of labour theory is substantiated. The obtained *results* of the study created the basis for substantiation of the conceptual scheme of formation of the competence potential of living labour, which consists in allocation and coordination of the structural elements of the categories "potential", "competence", "labour potential". It is concluded that the expansion of the competence potential of living labour should be carried out in areas in accordance with the types of competences, in particular, individual and academic competences, workplace competences and industry competences. It is established that: a) individual competences depend on genetic characteristics of a person and are formed in non-formal and informal education; b) the institute of micro-qualifications should become an effective tool for the development of academic and workplace competences; c) individual, academic and workplace competences are crystallised into sectoral competences, which are reflected in the sectoral qualification frameworks and determine the vector of movement of a modern specialist in professional activity. The practical value of the research results is associated with the possibility of forming and implementing a labour management policy adequate to the new economic conditions.

Key words: competence potential, cyber-physical system, competence, competency, micro-qualification, on-the-job training, sectoral qualification framework.

JEL Classification: J24, M53

1. Introduction

The realities of today require the identification of reference points for the post-war recovery of Ukraine's economy. It is already evident that the enormous scale of the war tragedy necessitates a reasonable rebuilding of the Ukrainian economy with the efficient use of limited resources, which can be ensured by the limitless potential of modern digital technologies. In such circumstances, the

problem of the shortage of necessary knowledge, skills, and experience in the labour force involved in economic activity poses new challenges to society, and the enormity of the tasks facing society makes the concept of the competence potential of living labour in all its manifestations relevant. The phenomenon of the competence potential of living labour is associated to a greater extent with the field of education, but the challenges of today determine

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its fragmentary coverage in various fields of human activity, and, as a result, a unified theoretical framework for the competence potential of living labour has not yet been formed. The article is aimed at studying the conceptual foundations of the competence potential of living labour under the influence of cyber-physical systems. The achievement of this goal is ensured by consistently solving the following tasks: first, determining the peculiarities of the functioning of cyber-physical systems in the context of their impact on the transformation of the competence potential of living labour; second, studying the genesis of the conceptual apparatus of the competence potential of living labour; third, substantiating the theoretical foundations of the formation of the competence potential of living labour; fourth, outlining ways to expand the competence potential of living labour. The information sources of the study are fundamental and applied research by Ukrainian and foreign scientists, as well as current regulatory and legal acts of Ukraine.

2. Development of Cyber-Physical Systems as a Prerequisite for Transforming the Competence Potential of Living Labour

One of the most important achievements of the Fourth Industrial Revolution is the introduction of cyber-physical systems in most areas of human life. A cyber-physical system (CPS) is an information technology concept that involves the integration of computing resources into physical processes. In such a system, sensors, equipment and information systems are connected throughout the entire value chain, which extends beyond the boundaries of a single enterprise or business. These systems communicate using standard internet protocols to predict, self-adjust and adapt to changes (Yershova, Odnovolyk & Bazhan, 2019).

Among the characteristic features of CPS are the following (Liu Y., Peng Y., Wang B. L., Yao S. R., and

Liu Z. H., 2017): a) physical systems are the structural element of CPS; b) information systems are the core of CPS; c) CPS is the result of combining heterogeneous systems; d) CPS should be reliable, secure, efficient, dynamic and predictable, and operate in real time; e) CPS is making a transition from cloud computing to fog computing; f) the ability to make independent decisions is an inherent property of CPS; g) CPSs are able to adapt to changes in the external environment.

It is important to note that CPSs are becoming new means of production with which people must learn to coexist. The SWOT analysis of cyber-physical systems presented in Figure 1 shows that, on the one hand, CPSs create unlimited opportunities to overcome limited human capabilities, and on the other hand, they pose serious challenges that require a new quality of human capital to overcome.

Having become an integral element of a reflexive and active environment, cyber-physical systems have an objective impact on production factors, and, above all, on the labour factor. In order to participate in production processes, employees must have traditional knowledge of a particular field, as physical systems remain the structural elements of cyber-physical systems, and the objectively valid fundamental laws and regularities in physics, chemistry, mathematics and related sciences cannot be cancelled. At the same time, the impact of digital transformation on the means of production and labour objects has resulted in a fundamental change in the labour process and the role of humans in it. With the transition of production from labour-intensive technologies through capital-intensive to knowledge-intensive technologies, low-skilled labour is being replaced by high-skilled labour. The capabilities of cyber-physical systems ensure the synchronisation of work in time and space of various machines and equipment, rapid response and decision-making. In such conditions, a person must adapt to a new role

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Adaptation to changes in the environment • Ensuring synchronous execution of a large number of physical processes 	<ul style="list-style-type: none"> • High cost of modern technologies • Level of trust in modern technologies and their reliability 	<ul style="list-style-type: none"> • Overcoming the limitations of human capabilities • Elimination of dusty, boring, dangerous work 	<ul style="list-style-type: none"> • Increased employment and inequality problems • Security, confidentiality, intellectual property protection • Environmental risks

Figure 1. SWOT analysis of cyber-physical systems (CPSs)

Source: compiled by the author

in reproduction processes, determine the initial and final parameters, the permissible range of deviations, and effectively use information received from technologically complex machines, i.e., human labour is being intellectualised. Advanced knowledge and intelligence are starting to become a source of new value generation, replacing mere physical labour. As the prominent American writer of the XIX century E. Hubbard noted: "One machine can do the work of fifty ordinary people. No machine can do the work of one unique person." (Russiian, 2021, p. 105)

The rapid development of science and technology has contributed to the emergence of a basis for a new approach to defining the essence of labour potential. This is a competence-based approach, according to which labour potential is defined as the integrated ability of the workforce to work, taking into account new capabilities (competences and competencies) that meet the requirements of digital and information and communication technologies (Shatalova, 2023).

3. Genesis of the Conceptual Apparatus of the Competence Potential of Living Labour

The analysis of scientific literature shows that there is no generally accepted interpretation of the concept of "competence potential". This is due to its capacity, complexity and distribution in various spheres of human activity. The origins of the concepts of "competence" and "competency" were at the intersection of several branches of knowledge, as evidenced by the process of their evolutionary formation.

The process of development of the content of the concept of "competence" proceeded as it moved from one field of knowledge to another with the following periodisation:

1. *First stage (1960–1970)*: characterised by the introduction of the category "competence" into the scientific apparatus of the field of linguistics, creation of prerequisites for the distinction between the concepts of "competency" and "competence".

2. *Second stage (1970–1990)*: characterised by the use of the categories "competency" and "competence" not only in the theory and practice of linguistics, but also in the field of administration, leadership, management, and communication training.

3. *Third stage (90s of the twentieth century)*: characterised by the expansion of the scope of the concept of "competence", in particular, in the field of pedagogy and psychology, where professional competence becomes the subject of special comprehensive consideration.

In addition, this transition between different spheres of human activity was accompanied by evolutionary changes in the content of the concept of "competence". The concept has evolved from a simplified understanding of competence as a demonstration of ordinary human activity to the perception of this concept as the acquisition of higher-order qualities necessary in life, complementing modern digital technologies, and the ability to use them (Figure 2).

The essence of the concept of "competence potential" is related to such categories as: "potential", "skills", "competency" and "competence", between which there is a close relationship. According to the purpose of this study, first of all, it is necessary to identify the characteristic features inherent in such categories as "competence" and "potential".

First of all, the concept of "competence" should be studied from the etymological point of view. The explanatory dictionary of the Ukrainian language

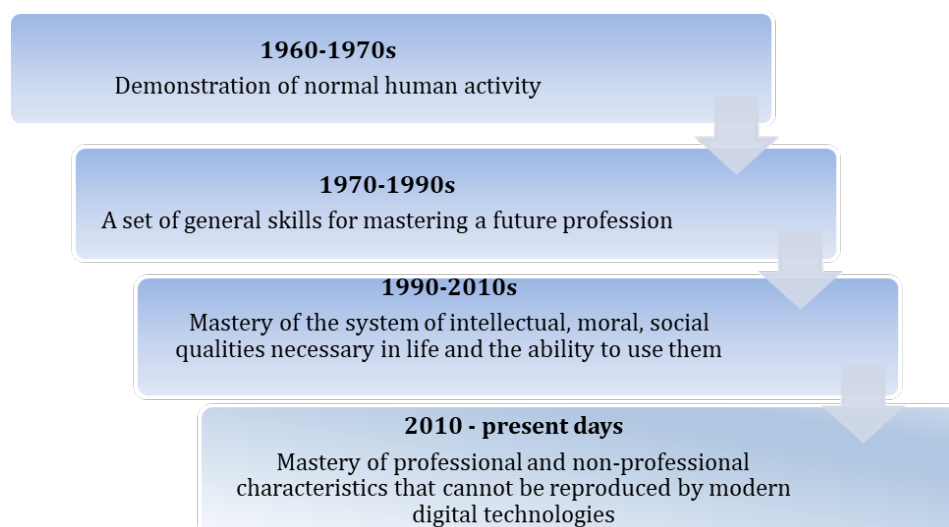


Figure 2. The genesis of the concept of "competence"

Source: compiled by the author on the basis of (Nalyvaiko, 2021)

states that "competence" is a property and state with the meaning of competent (Dictionary of the Ukrainian language online). "Competent" – having sufficient knowledge in a field; being well versed in something; knowledgeable (Dictionary of the Ukrainian language online). According to the definitions provided, it is impossible to identify the difference between the concepts of "competence" and "competency". In addition, the English word "competence(y)" is translated into the Ukrainian words "competence" and "competency", adding even more confusion to the conceptual apparatus.

Summarising the definitions of the concept of "competence" presented within the regulatory framework of Ukraine (Table 1), it can be described as a dynamic combination of knowledge, skills, abilities, ways of thinking necessary for a person to socialise, carry out professional and educational activities.

The concept of "potential" is traditionally associated with realised and potential opportunities, but its essence is much deeper. Potential is a triad that embodies the past, present and future. Potential expresses the past, as it reflects a set of properties accumulated in previous times, and, as a result, becomes identical to the concept of "resource". Reflecting the present, the potential characterises the ability to practically apply the opportunities

accumulated in the past and becomes identical to the concept of "asset". Orientation towards the future leads to continuous development and brings the category "potential" closer to the concept of "opportunities".

The competence potential of living labour is of particular importance in conditions of uncertainty, during crises, and changes in the phases of economic cycles. The focus of the competence potential of living labour is the ability and readiness for effective work, solving problems of varying degrees of complexity with the use of modern objects and means of labour, modern technologies.

In a general sense, according to the author, the competence potential of living labour is the use value of labour force that determines the limits of its participation in labour activity. The competence potential combines various characteristics and properties of the labour force, which have a certain terminological certainty and orderliness.

The basis of competence potential is formed by such concepts as knowledge, skills, competences, and competencies.

Knowledge is a set of facts, principles, theories and practices related to a field of work or study. It is the outcome of learning and a prerequisite for the concepts of skills, competences and competencies.

Skills are narrower in content than competencies, as they relate more to basic predefined or routine

Table 1

Interpretation of the concept of "competence" in the legal acts of Ukraine

Regulatory act	Interpretation of the concept of "competence"
The Resolution of the Cabinet of Ministers of Ukraine "On Approval of the State Standard of Basic and Complete General Secondary Education" No. 1392 of November 23, 2011 (The Resolution of the Cabinet of Ministers of Ukraine "On Approval of the State Standard of Basic and Complete General Secondary Education" No. 1392, 2011).	An integrated ability acquired in the learning process, consisting of knowledge, skills, experience, values and attitudes that can be implemented in practice in a holistic way.
The Resolution of the Cabinet of Ministers of Ukraine "On Approval of the National Qualifications Framework" No. 1341 of November 23, 2011, as amended on June 25, 2020 (The Resolution of the Cabinet of Ministers of Ukraine "On Approval of the National Qualifications Framework". No. 1341., 2020); The Law of Ukraine "On Education" No. 2145-VIII of September 5, 2017, as amended on January 19, 2019 (The Law of Ukraine "On Education" No. 2145-VIII, 2017).	A dynamic combination of knowledge, skills, abilities, ways of thinking, attitudes, values, and other personal qualities that determines a person's ability to successfully socialise, conduct professional and/or further educational activities.
The Law of Ukraine "On Higher Education" No. 1556-VII of July 1, 2014, as amended on December 13, 2022 (The Law of Ukraine "On Higher Education" No. 1556-VII, 2014).	The ability of a person to successfully socialise, learn, and carry out professional activities based on a dynamic combination of knowledge, skills, abilities, ways of thinking, attitudes, values, and other personal qualities.
The Law of Ukraine "On Civil Service" No. 889-VIII of December 10, 2015 (The Law of Ukraine "On Civil Service" No. 889-VIII, 2015).	The ability of a person to apply special knowledge, skills and abilities within the limits of the powers assigned to the position, to demonstrate appropriate moral and business qualities for the proper performance of the assigned tasks and duties, training, professional and personal development.
Methodological recommendations for the development of professional standards (Methodological recommendations for the development of professional standards, 2023).	The ability of a person to carry out activities in the profession, which is the result of a combination of knowledge, skills, abilities, ways of thinking, views, values, and other personal qualities.

Source: compiled by the author on the basis of (The Law of Ukraine "On Education"; The Law of Ukraine "On Higher Education"; The Resolution of the Cabinet of Ministers of Ukraine; Rashkevich, Andreychuk, 2015; Raven, 2002; Recommendation on a European approach to micro-credentials for lifelong learning and employability)

Table 2

Common and distinctive features of the concepts of "competency" and "competence"

Competency	Competence
Common features	
<ul style="list-style-type: none"> – They reflect the integrity and collective, integrative essence of the educational outcome and the result of human activity. – They are improved through integration with other knowledge, skills and abilities. – They are dynamic in nature. 	
Distinctive features	
It is defined by a certain <i>organisation, institution, state</i> as a predetermined requirement for knowledge, skills, abilities that a person must have to be successful in that field.	A <i>person's</i> achievement determines the qualitative level of knowledge, skills and abilities acquired through learning and the ability to apply them based on one's own experience in the process of carrying out certain activities.
A certain set of knowledge, skills, and abilities is defined in advance.	A qualitative characteristic of the acquisition of knowledge, skills, abilities, which is manifested in the process of practical activity.
The results are to some extent expected and measurable.	It is difficult to assess results using pre-established criteria. The criterion of effectiveness is the efficiency of activities.

Source: compiled by the author on the basis of (Semigina, Rashkevich, 2022)

procedures. Skills are defined as the ability to apply knowledge and use know-how to complete tasks and solve problems.

The concept of "competency" is a good knowledge of something; the range of powers of a person, institution or organisation; the range of issues in which this person has certain powers, knowledge, experience, and so forth (Dictionary of the Ukrainian language online).

The concept of "competence" is more capacious and refers to the person (as opposed to the concept of "competency", which is related to the content of the field of activity) (Dictionary of the Ukrainian language online). Thus, competence should be considered a qualitative characteristic that manifests itself in the process of practical activity, while competency is a certain, predefined set of knowledge, skills, and abilities. The phenomenon of competence of living labour is that it goes beyond special professional training, covering its extra-professional and supra-professional characteristics. It is about independence, the ability to take responsibility and make independent decisions, a creative approach to any business, the ability to complete what has been started, the ability to constantly learn, flexibility of thinking, abstract, systematic, experimental thinking, and sociability.

Common and distinctive features of the concepts of "competency" and "competence" are presented in Table 2.

4. Conceptual Foundations for the Formation of Competence Potential of Living Labour

A critical analysis of the theoretical developments of Ukrainian and foreign scholars allowed to identify four components of the concept of "competence": cognitive, activity-process, personal, motivational (Figure 3).

The cognitive component is a prerequisite for the implementation of the activity-process component, since the acquisition of knowledge and understanding must precede practical activity. The level of a person's cognitive abilities largely determines the level of his or her professional qualification. It is about the ability to remember, understand, apply, evaluate and create.

The activity-process component involves the practical, timely use of previously acquired knowledge. Competence is manifested exclusively in the process of human activity and is manifested in the form of the ability to solve practical problems.

The personal (axiological) component is important from the point of view of motivating a person to implement the cognitive and activity-process component. The knowledge, skills and abilities that constitute the routine, purely performing side of professional activity are successfully formed and updated only with personal acceptance and awareness of the great social significance of the relevant goals, which determines the formation of high responsibility, initiative, and readiness for creativity (Smagina, 2020). In today's environment, social and labour relations and education are increasingly going beyond formality and becoming informal. As a result, personal qualities of a human being are becoming more important, since the actualisation of his or her potential will depend on his or her desire and efforts to self-realise in a certain field of activity, the ability to self-organise and discipline. The cost of unused opportunities will be high and will only increase over time. It is the personal component that distinguishes the concepts of "professionalism" and "qualification" from the concept of "competence".

The motivational component is the willingness to demonstrate competence.

In general terms, the concept of "competence" has the following formula: COMPETENCE = KNOWLEDGE + SKILLS + ATTITUDE + DESIRE.

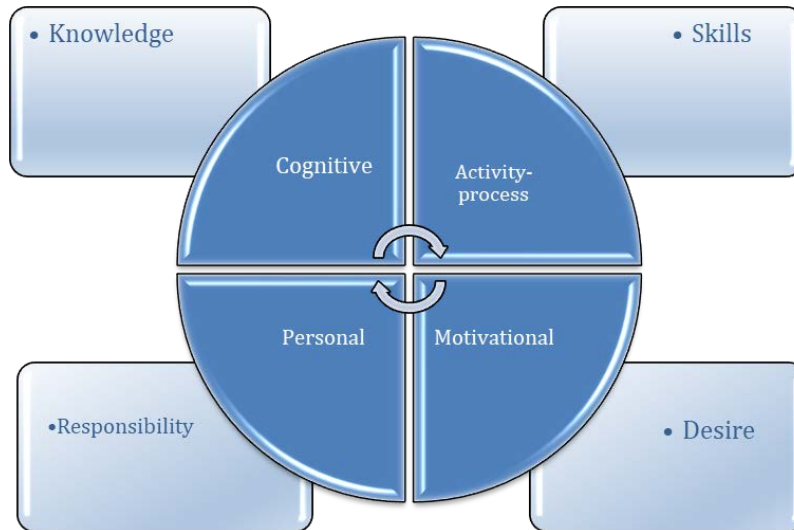


Figure 3. Structural components of the concept of "competence"

Source: compiled by the author on the basis of (Semigina, Rashkevich, 2022)

A set of competences and competencies of a living force is not a potential in itself. The complex synthesis of the properties of the concept of "potential", on the one hand, and the concept of "competence" with all its derivatives, on the other hand, forms the basis of the simple in name and complex in essence concept of "competence potential". The concept of "labour potential" embodies certain constituent elements: qualification (knowledge, skills and abilities), psychophysiological (abilities,

health, efficiency, endurance, type of nervous system), personal (level of civic consciousness and social maturity, value orientations, needs, attitude to work) potentials (Raven, 2002).

The alignment of the above structural elements of the competence and labour potentials is shown in Figure 4.

The essence of the competence potential is revealed by the functions it performs, among which the following should be highlighted:

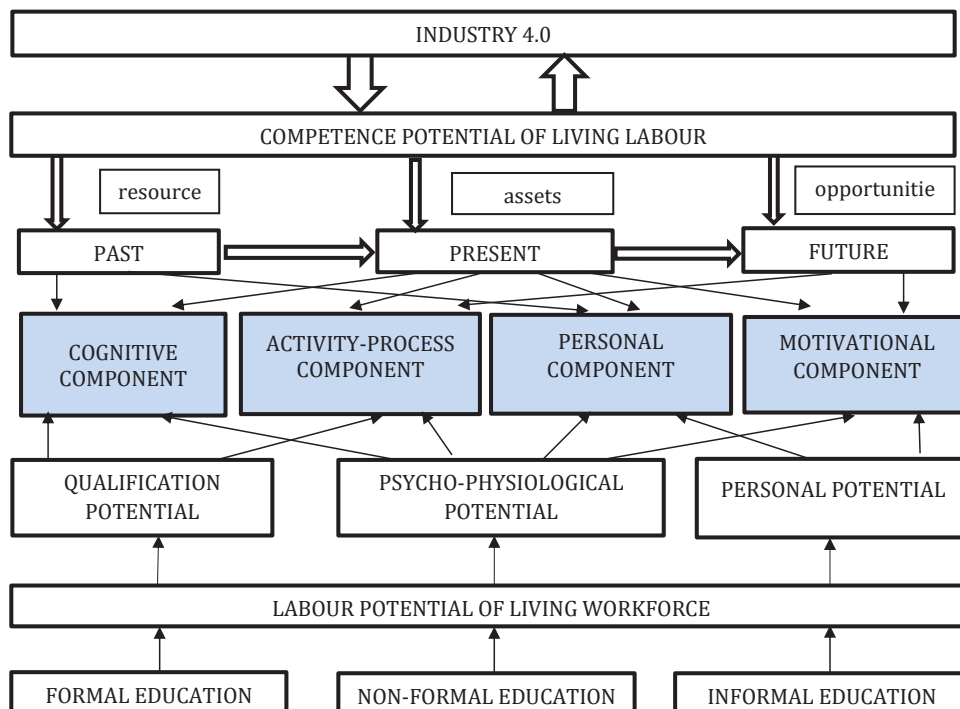


Figure 4. Conceptual diagram of the competence potential of living labour in the context of Industry 4.0

Source: compiled by the author

– *Industrial*. The competence potential of living labour is a tool that allows for the most efficient use of means of production and modern technologies, including digital ones, in the production of goods and services. The desire of humans to facilitate their work by voluntarily transferring production, management and control functions to smart machines has led to a fundamental change in the role of humans in economic activity and the content of the labour process. With the transition of production from labour-intensive through capital-intensive to knowledge-intensive technologies, low-skilled labour is being replaced by the most skilled labour. Technologically sophisticated production processes require the most trained and competent employee who is proficient in modern information technology.

– *Cognitive* is basic and ensures the accumulation and systematisation of information about objective and subjective processes and phenomena of the world. In the context of digital transformation, cyber-physical systems are being formed that create opportunities for remote monitoring and control of the physical production process and obtaining feedback. A virtual environment is created with digital copies of real objects and models of relationships between them. In addition to traditional knowledge of the laws and regularities of the environment and certain technological sectoral knowledge, employees must have the knowledge, skills and abilities to work with digital (virtual) copies of physical objects, i.e. to process large flows of information coming from sensors, sensors, actuators in a continuous mode. Thus, there is a shift in human functions from mono- to multi-tasking, and they become more versatile and efficient.

– *Axiological*. In the competence potential, values are defined as essential characteristics of consciousness, a phenomenon that combines the objective and subjective, structures the spiritual and practical orientations of each person, acts as a source of direct motives for their behaviour, and directs them to achieve an ideal that expresses these values.

– *Integrative*. Competence potential promotes coordinated cooperation of other types of potential, including technological, production, organisational, social, digital, etc., as well as the use of the capabilities of environmental factors to achieve certain goals.

– *Adaptive*. Competence potential helps to adapt to changes in the environment. It is important to emphasise that in the context of Industry 4.0, it is impossible to predict the skills and knowledge that employees may need in 5 years, and therefore they must be adaptable to organisational change and have a desire to learn throughout their lives.

– *Communicative*. At all stages of the business process, it is necessary to build effective communication, which depends on a person's personal qualities, life and professional experience.

– *Creative*. It is manifested in the ability to solve problems and perform tasks using atypical methods, which is made possible by the accumulated knowledge, experience, values, and aptitudes.

The competence potential of living labour is formed throughout the entire human life cycle and is unique for each individual due to the exclusivity of physiological characteristics and factors that influence its formation and development. The formation of a modern specialist takes place through the accumulation, transformation and layering of various types of competences (Figure 5).

The individual competences of a specialist depend to a greater extent on natural characteristics, including the following: natural inclinations and innate abilities, health status, type of nervous system, emotional intelligence, stress resistance, endurance, etc.

Academic competences are formed in educational institutions. These include literacy, mathematical skills, foreign language skills, and communication skills.

Workplace competences are formed directly at the workplace, they are more specific and result-oriented.

Industry competences integrate the requirements necessary to work in a particular industry and are characterised by a common set of professional activities.

5. Ways to Expand the Competence Potential of Living Labour

It is advisable to expand the competence potential of living labour in the following areas in accordance with the following types of competences: individual and academic competences, workplace competences and industry competences.

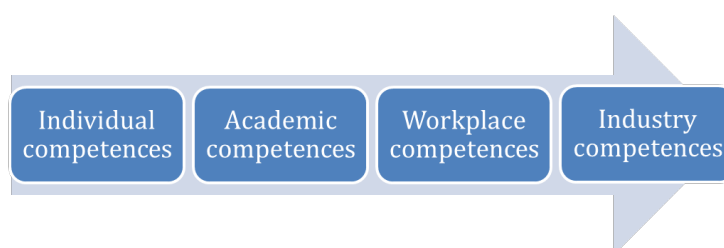


Figure 5. Transformation of specialist competences in social production

While individual competences depend to a greater extent on genetic characteristics of a person and are formed in informal education, academic competences are formed in the education system by a sequential layering of competences acquired at each level of education, reflecting their complexity, uniqueness, and long-term nature of formation.

The introduction of micro-qualifications will be of great importance for the development of academic and workplace competences.

Micro-qualifications should be seen in both broad and narrow terms. In a broad sense, micro-qualifications are emerging as a new institutional phenomenon; in a narrow sense, they represent a new tool created by academic institutions, business and labour to improve employability in a volatile labour market. The growing role of micro-qualifications is driven by the impossibility of reliably forecasting the demand for skills and competencies of the workforce, even in the short term, in a dynamic and unpredictable environment.

The definition of micro-qualifications provided by the Council of the European Union is generally accepted, according to which a micro-qualification is a confirmation of learning outcomes that a learner has acquired after a short training (Recommendation on a European approach to micro-credentials for lifelong learning and employability, 2022). Learning outcomes should be assessed according to transparent standards.

Micro-qualifications will be particularly important in helping laid-off workers and workers whose skills have become obsolete and whose jobs are under threat of automation to acquire new skills in demand on the labour market, thus effectively reducing the mismatch between labour supply and demand. Moreover, they will support students in improving their employability in the labour market.

Micro-qualifications are of particular importance in the changing conditions of the modern socio-ecological and economic environment, which is

characterised by contradictory phenomena and processes, as they are characterised as follows:

- They are a tool for certifying the results of small individual training sessions. They allow for targeted, flexible acquisition of knowledge, skills and competencies, meeting new needs in society and the labour market, and filling skills gaps without changing traditional qualifications. If necessary, they can complement existing qualifications without undermining the credibility of traditional education and training programmes.

- They will facilitate the integration of older people into the labour market and the continuation of their work. Unfortunately, the low level of income of the working population and the low level of social security provided by the state force older people with objectively determined disabilities to continue working after reaching retirement age. According to the Pension Fund of Ukraine, as of January 1, 2023, there were 10.7 million pensioners in Ukraine, of whom 2.7 million were employed, i.e., every fourth. It is clear that pension payments (the average pension as of January 1, 2023 was 4,622.59 UAH) are not able to cover the costs of the elderly in the face of high drug costs, food prices and high utility tariffs. In addition, in the context of the post-war recovery of Ukraine, the shortage of labour will be covered, among other things, by working pensioners who will adapt their life experience to the challenges of today.

- They will facilitate the professional development and mobility of workers, including people in non-traditional forms of work (e.g., in the platform economy) who do not have full access to training.

- They will become a tool for acquiring digital skills in the context of global digital transformation.

Examples of micro-qualifications include a working programmer learning a new programming language and obtaining a universally recognised certificate of a new skill, a working accountant acquiring micro-

Table 3

SWOT analysis of micro-qualifications

Strengths	Weaknesses
1. Prompt response to labour market needs 2. Upskilling and retraining 3. Lifelong learning 4. Individual trajectory of acquiring and confirming professional skills 5. Cooperation and alignment of interests of employers and education providers	1. Lack of awareness and uncertainty about the benefits 2. Variety and complexity of micro-qualifications causes confusion for potential users 3. Lack of transparency of quality assurance 4. Limited use by vulnerable groups
Opportunities	Threats
1. Additional opportunities for self-disciplined active people to develop themselves and advance in their careers are created for successful working people 2. Contribute to accelerating the official recognition of non-formal learning 3. For employers, they create opportunities to increase employee motivation and productivity, and retain employees	1. Threat to the integrity of academic education, disconnection between education and the labour market 2. Threats to the deterioration of the quality of education 3. Risks of commercialisation of education services and activities of vocational education institutions

Source: compiled by the author on the basis of (Semigina, Rashkevich, 2022)

qualifications as an auditor, real estate appraiser, or insurance agent.

A summary analysis of the advantages and disadvantages of micro-qualifications is presented in Table 3.

Workplace competences are of the utmost importance, as they require the ability to use the acquired academic competences in a sectoral and individual context.

The most common methods of expanding workplace competences are the following: on-the-job training based on the experience of others under the guidance of qualified workers – teachers, masters and instructors of industrial training; performing special tasks aimed at increasing the level of competence; participation in trainings, seminars, and studying specialised literature.

Modern information, communication and digital technologies create opportunities to move from using non-technological and low-tech learning methods to high-tech ones. It is about immersive technologies that have unlimited potential for learning. At present, in Ukraine, these technologies are mostly associated with leisure and entertainment, while in the developed world they are widely used in the fields of economics, medicine, hospitality, and tourism.

Providing training for employees entails additional costs for employers, who must plan for the costs of organising training for their staff. Article 15 of the Law of Ukraine "On Professional Development of Employees" states that the employer shall finance the professional development of employees at its own expense and from other sources not prohibited by law (The Law of Ukraine "On Professional Development of Employees" No. 4312-VI, 2012). A study of the experience of developed countries shows that the state can participate in financing the training of enterprise personnel through traditional state instruments of direct and indirect methods of state regulation of the economy, in particular, tax benefits, grants, subsidies, etc.

The formation of an employee's competence potential in social production takes place through the crystallisation of individual, academic and workplace competences into industry competences, which are reflected in industry-specific qualification frameworks. On the one hand, the sectoral qualification frameworks will serve as a compass to determine the vector of movement of a modern specialist in professional activities, and on the other

hand, their implementation will help position and recognise national educational programmes in other countries and improve the quality of educational programmes as a result of cooperation between educational institutions, employers and professional associations (Rashkevich, Andreychuk, 2015).

6. Conclusions

The study has led to the conclusion that one of the phenomena of the Fourth Industrial Revolution is cyber-physical systems, which, on the one hand, are becoming a tool for overcoming limited human capabilities, and on the other hand, create serious challenges, the overcoming of which requires a new quality of human capital as a response to the intellectualisation of human labour.

The study found that the evolutionary development of the concept of "competence" took place in various fields of knowledge, in particular, in the field of linguistics, management, psychology, pedagogy, which made it possible to trace changes in its content and the path to a modern understanding as the acquisition of higher-order qualities that complement modern digital technologies and the ability to use them.

The article identifies the common and distinctive features of the concepts of "competency" and "competence", on the basis of which it is established that the phenomenon of competence of living labour is that it goes beyond special professional training, covering its extra-professional and supra-professional characteristics. A deep understanding of the content of the concept of "competence" has created the basis for defining its structural elements, in particular, cognitive, activity-process, personal, motivational components, which will contribute to its further practical improvement.

The article develops and substantiates a conceptual scheme of formation of the "competence potential" of living labour in the conditions of the Fourth Industrial Revolution, which consists in allocation and coordination of structural elements of the categories "potential" (resources, assets, opportunities), "competence" (cognitive, activity-process, personal, motivational components), "labour potential" (qualification, psycho-physiological, personal potentials).

The results obtained in the course of the study indicate the complexity and uniqueness of the competence potential of the workforce, emphasise the long-term nature of its formation and will help to increase the efficiency of its use.

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