



Macroeconomics

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**QUALITY OF WORKING LIFE IN VIEW
OF DIGITALIZATION OF THE ECONOMY:
ASSESSMENT AND DEVELOPMENT TRENDS**

Abstract

The article substantiates the feasibility of considering the digitalization factors in the conceptual principles of decent work of International Labour Organisation. The negative consequences of digitalization stunting the improvement of working life quality at different management levels are systemized. The paper determines the risks caused by digitalization in various fields, namely employment, work conditions, decent remuneration, personal and professional development opportunities, democratization of working life. The features of precarious employment are identified and grouped by types of manifestation. The authors sug-

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gest a methodology for assessing working life quality based on a combined approach that uses statistical and sociological indicators and calculates an integrated index. This allows for an evaluation of both objective and subjective factors of economic and social digitalization's impact, as well as executive decisions on approaches to and mechanisms of improving the quality of working life. The suggested methodology has been tested using statistical data and subjective assessments on the quality of working life. The paper investigates and summarizes the trends in changes of sub-indices of working life quality over the period of 2013-2019, as well as the influence of components on the changes in the integrated index.

Key words:

Integrated index of working life quality; subjective and objective components of working life quality; precarious employment; assessment of working life quality; digitalization of economy.

JEL: J01, J08, J21, J28, J3, J81, M14, M15.

2 figures, 6 tables, 2 formulae, 26 references.

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Problem Statement and Literature Review

Changes that occur in a person's life are evaluated positively if they are related to improving the quality of life itself. Modern European strategies for social development link the effectiveness of social policy with the improvement in the quality of life. People are satisfied with their quality of life when the conditions of their lives meet their needs and capabilities.

Today, when the digitalization of the economy and society is accelerating and spreading, radical changes are overtaking the labour sector and the quality of working life (QWL). The quality of working life is the most important component of the quality of human life. It is no coincidence that decent work has long remained a priority strategic direction of the International Labour Organization's policies, the implementation of which ensures the decent quality of working life. The International Labour Organization provides assistance in the creation and development of Decent Work Programs for Ukraine; currently the Program for 2020-2024 is in force. It focuses on social dialogue and social protection, but the impact of digitalization on decent work in general and its structural components are not defined or addressed. This is unreasonable because the digital transformations create obstacles and dangers that stand in the way of achieving decent work. High quality of working life determines employee satisfaction with the conditions and content of work, its fair evaluation and remuneration, social significance, stability, partnerships, work safety conditions, participation in management, and work-life balance.

In order to achieve the goals of prevention and minimization of risks and threats to the establishment of decent work and a high quality of working life, it is necessary to assess the current state and recent changes in this field.

Assessing changes in the quality of working life precipitated by the all-encompassing digitalization and the challenges of today is a complex and extremely important task at both the production and personal levels, as well as at the macro and regional levels. There is a need to improve the methodology for assessing the quality of working life in the context of digitalization of the economy to obtain an objective tool for making management decisions aimed at increasing the quality of working life and identifying mechanisms and directions for achieving this. This makes the problems set by this paper relevant and timely.

Literature review. The topic of quality of working life is neither popular, nor well researched at this time. In Ukraine, there was a surge in scientific publications on this issue in 2000-2010, when the research on the preservation and development of labour potential intensified and the quality of working life was the main condition for its achievement. Several scientific publications on this topic are quite thorough, among them the textbook of A.M. Kolot (Kolot et al., 2009)

and monographs by L.V. Shaulska (Shaulska, 2005), scientists of the Institute of Industrial Economics of the National Academy of Sciences of Ukraine (Amosha et al., 2006; Khandii, 2019; Novikova et al., 2020), as well as ILO legal documents (Bogatyrenko, 2007).

Generalization of the content of scientific publications on the QWL problems makes it possible to determine the essence, content and structural components of working life quality, as well as to assess it. First of all, QWL is a characteristic of the quality of life itself; it is related to the field of work and life of the employee, it determines the social value of work and the value of the employee.

The quality of working life characterizes its compliance with the indicators of decent work and its principles. Quality of working life is a source of motivation for employees to be active and work productively. Assessment of QWL characterizes the conditions of social and legal protection of employees and development of social and labour relations.

Attempts to systematize and structure the variety of characteristics of QWL, which are the focus of experts in other countries in determining democratic processes in production, resulted in the following blocks: economic (satisfaction with the duties and pay), humanistic (awareness and interest in work), illness prevention (preservation of physical and intellectual ability to work), democratic (employee participation in enterprise management processes) (Yershov & Radchenkova, 2001; Nayak et al., 2016; Rai, 2015; Fontinha et al., 2016; Talib et al., 2015).

Since the 2000s, conceptual approaches to defining the content and components of QWL have been associated with the emerging new understanding of the meaning of work, presented as the concept of «decent work». Decent work, as defined by the ILO, is «productive work that is voluntary, provided under normal conditions, which develops and does not degrade human dignity, provides fair pay, social guarantees, non-discrimination in the workplace, ensuring the full range of labour rights and opportunities to realize the worker's abilities and personal aspirations» (Bogatyrenko, 2007). According to the broad definition (Bogatyrenko, 2007), decent work is work that brings adequate income and at the same time leaves time for other aspects of life, provides family security, respects human rights, gives the right to vote and paves the way to social integration. Decent work is the red string that connects an employee's economic and social goals.

In modern international practice, scientists, specialists, experts, managers, and practitioners widely discuss issues related to the possibilities of implementing the basic provisions and requirements of the ILO concept of «Decent Work» (International Labour Organization, 2013). Particular attention is paid to the evolution of the category of QWL, taking into account the key qualitative characteristics of work, which form the basis of the concept. In particular, these include

working conditions, social and labour relations, development of civil society institutions, social partnership, adherence to the principles of tripartism, etc.

The substantive characteristics of the quality of working life and decent work coincide according to the main criteria of the QWL. They create the possibility of full employment; stability and confidence in providing work; equal opportunities and equal treatment in terms of employment; decent wages and fair remuneration for work; comfortable and safe working conditions; decent working hours; employment matching the educational and professional qualifications; career prospects and self-realization; presence of innovative and creative elements of the work process; the possibility of combining work and family responsibilities, personal development; democratization of labour relations, social dialogue, representation of employees and employers; social protection, provision of social guarantees, etc.

The defined criteria work provided that there are conditions necessary for the realization of the principles which cause increase of QWL. Well-known Ukrainian scientist A. M. Kolot (2009) has structured the requirements for the implementation of these principles. He believes that:

- work must be creative and deliberate;
- work should ensure continuous training and education of the worker;
- workers must participate in production decisions;
- work should involve mutual assistance between team members;
- there must be a harmonious connection between work and the social environment;
- workers must be confident in the future, not fearing dismissal, see the prospect of career growth;
- working conditions must be safe for health.

In determining the nature, content and components of the quality of working life, there are three main approaches that calculate the level of its manifestation. *The subject-object approach* describes the production and personal level. This approach considers the QWL of an individual employee, staff as a whole or its separate structural divisions. *The system approach* is related to the macro (regional) level of QWL and is characterized by a set of production process modes, types of safety and working conditions that ensure full satisfaction of current and future social and labour needs, realization of labour and creative potential of employees and satisfaction of owners' and employers' interests. In the *process approach*, the quality of working life is considered as a constantly changing category – one that improves or develops or, conversely, stagnates in line with the significant socio-economic transformations of the economy and society.

The analysis of scientific publications reveals the existence of many methodological approaches to assessing the quality of working life, which differ in the list of meaningful components and the choice of statistical or sociological indicators of measurement. However, the existing methods of assessing the quality of working life do not take into account the consequences of digitalization of the economy and society.

The aim of the research is to develop a scientific and methodological approach to assessing the quality of working life, taking into account its transformational changes under the influence of digitalization of the economy.

Research Results

Transformation processes, which are associated with the development of information and communication technologies and digitalization of the economy, significantly affect the social and labour relations and are accompanied by both positive and negative consequences for the labour sector. These negative consequences include the conditions and factors that constrain the improvement of the QWL. Generalization and systematization of the negative consequences of digitalization as factors hindering the improvement of working life quality makes it possible to group them by areas of manifestation (employment, conditions and wages, opportunities for self-realization and self-development, democratization of labour relations) and management levels (Table 1).

The digitalization of the economy is associated with the emergence of new non-standard forms of employment – remote, platform, etc. Modern technological innovations provide the employee with the possibility of remotely attending workplace and performing work. The new model of employment and social-labour relations is based on project, contractual or informal agreements, accompanied by non-permanent employment. As a result of the transition from permanent to temporary employment, the share of employees whose employment relationships are of an extraordinary atypical nature is growing. Significant development of non-standard forms of employment and part-time employment create conditions for hidden unemployment. The transformation of work is accompanied by the depletion of certain areas of employment, a significant reduction in the share of jobs, falling demand for professions that are associated with the implementation of formalized repetitive operations. The digitalization of the economy is characterized by inequality in the generation of jobs for decent work, which causes its deficit.

Table 1

Negative consequences of digitalization as factors restraining the improvement of QWL by areas and levels of manifestation

Area of manifestation	macro (regional) level	production and personal levels
I. Employment, working conditions	<p>Deepening structural unemployment, rising hidden unemployment</p> <p>Growing shortage of skilled labour</p> <p>Deepening professional qualification asymmetry of the labour market</p> <p>Increase in temporary, part-time, remote, informal employment</p> <p>Increased discrimination in employment in terms of age, gender and digital literacy</p> <p>Shrinking middle class</p> <p>Precarization of employment</p> <p>Emergence of a new class of «dependents»</p> <p>Labour and educational emigration, loss of labour and educational potential of the country</p> <p>Dissolution of the system of collective bargaining, individualization of social and labour relations</p> <p>Government agencies losing the mechanisms for influencing the provision of decent QWL</p>	<p>Forced transition of an employee to temporary, part-time, remote employment (forced self-employment, informal employment)</p> <p>Lack of guarantees of stable employment, fear of losing a job</p> <p>Reduced employment opportunities in jobs with decent working conditions</p> <p>Reduced employment opportunities in comfortable and safe working conditions</p> <p>Increase in employment opportunities that do not correspond to the educational, professional and qualification level of the employee</p> <p>Disruption of the work schedule and life balance</p> <p>Increased manipulation of the employee's state of mind</p> <p>Development of anxiety, depression and other negative psychological consequences in employees</p> <p>Increased social and legal insecurity of employees</p>
II. Decent reward, opportunities for self-realization and self-development	<p>Reduced opportunities to ensure fair remuneration for work</p> <p>Insufficient earnings to reproduce the workforce and support the family</p> <p>Discrepancy between the educational and qualification level of the employee and the requirements of the employer</p>	<p>Inability to secure a guaranteed, fair assessment and remuneration for work</p> <p>Decreased opportunities for career growth and self-realization</p> <p>Imbalance between the educational and qualification level of the employee and the needs of the employer</p>

Area of manifestation	macro (regional) level	production and personal levels
	<p>Reduced career prospects and self-development opportunities</p> <p>Increased social inequality in income and social and labour status</p> <p>Emerging intergenerational gap in digital competencies</p> <p>Social alienation and social maladaptation of the unemployed population</p> <p>Depreciation of labour potential</p>	<p>Decrease of creative and innovative features of work, loss of value in rationalization</p> <p>Reduced opportunities to earn extra money from work and chances to capitalize on professional competencies</p> <p>Limited conditions and opportunities for creating collective labour values of employees (social and labour status, labour honour, dignity, business reputation, etc.)</p> <p>Increased discrimination against employees by age, gender, etc.</p> <p>Social alienation, lack of belonging to the labour collective</p> <p>Falling employee satisfaction with work</p> <p>Emerging syndrome of «working poor»</p>
III. Democratization of working life	<p>Reduced level of social and legal protection, violation of labour rights and guarantees</p> <p>Decreased opportunities for exercising the social and labour rights of employees</p> <p>Replacement of collective labour relations with individual interactions, spread of contractual employment</p> <p>Complications in resolving labour disputes</p> <p>Uncertainty of representation to protect the rights and interests of workers in the digital (platform) economy</p> <p>Loss of social security guarantees for employees</p> <p>Spread of individualism in labour relations</p>	<p>Reduced ability to protect basic labour rights of employees</p> <p>Reduction (absence) of the benefit packages, absence of collective agreements</p> <p>Loss of employee representation in management processes</p> <p>Individualization of labour relations</p> <p>Social isolation and social exclusion</p> <p>Consolidation of poverty among workers</p> <p>Virtually no obligation on the part of the employer to create a decent QWL</p>

Digitalization in the field of employment is accompanied by a disruptive effect (Shvab, 2016), i.e. the polarization of employment, income, precarization of employment, growth of structural (technological) unemployment due to the narrowing of the labour market. This hinders the assurance of the quality of working life.

Discrimination in the field of labour in the course of implementing ICT also has a negative impact on QWL, due to a number of objective and subjective reasons that arise from the high content and structural complexity of the labour processes, as well as the differing nature of the quantity and quality of norms specifying the principles of non-discrimination. Significant negative impact is also associated with the imperfection of special regulations, the difficulty of identifying discrimination and defining specific areas and subjects of responsibility, the uncertainty of specific forms and technologies of prohibition and compensation, etc.

The latest non-standard forms of employment are characterized by a fairly high level of instability, and in English-language sources it is defined as «precarious employment» (Kim & Kirpach, 2019). Non-standard employment includes part-time employment, part-time workday or week, temporary employment and its flexible forms, seasonal work, unregulated employment and other forms and manifestations. Such types of employment are accompanied by unregulated employment, lack of job guarantees, part-time pay, lack of social guarantees and other consequences that negatively affect the quality of working life. Some non-standard forms have existed for a long time, but with the advent of digitalization and the newest forms of employment, their impact has increased significantly. For instance, platform employment has a number of signs of precarious employment, which can be systematized by the subjects of their manifestation (table 2).

Calculating the levels of QWL, trends, patterns of change, the impact of individual components on such changes determines the need and possibility of their quantitative measurement.

Quality of working life both in terms of content and internal components is a multidimensional concept that is assessed using a set of indicators and a generalized integrated index. To date, there is no universal method for calculating the levels of QWL, but most approaches are based on the algorithms of multidimensional average or additive functional models. The main difference between them is related to the internal structure of the integrated assessment, measurement indicators, the presence or absence of subjective evaluations, and levels of calculation (Andreyeva & Polkova, 2013; Zonova & Nekhoda, 2019).

The algorithm for estimating the level of QWL includes the following steps:

- substantiation of internal components, which change the most in terms of digitalization of the economy, labour sector and social and labour relations;
- selection of indicators for definition and measurement of each component, development of an information subsystem;

Table 2

Signs of precariousness of platform employment

For employees	For employers
<ul style="list-style-type: none"> • uncertain or unclear employment status, as a consequence, instability and dissatisfaction with employment; • individualization of work, lack of collective action, lack of interpersonal communication; • low or insufficient income; • non-payment or its delay of wages for work performed; • intensification of work «anytime, in any city»; • lack of (blurring) boundaries between work and personal life, accompanied by stress and burnout; • supply from platforms exceeds demand, fierce competition for jobs; • excess of professional skills compared to the requirements of employers; • few prospects for professional development; • reduction of the level or absence of social protection, reduction of social guarantees 	<ul style="list-style-type: none"> • employee's low level of motivation to work; • high staff turnover; • low entry barriers for workers; • lack of methods of interaction with employees; • discrepancy between the professional level of employees and the requirements of employers; • conflicts between permanent employees and those employed on the platforms

- standardization of initial indicators and indices;
- development of an additive model for aggregation of indicators into sub-indices for each internal component (I_C) and into a generalized integrated index – I_{QWL} ;
- analysis of the main trends and patterns of change in the levels of I_{QWL} ;
- using methods of proportional distribution to determine the impact of each internal component on changes in the quality of working life.

The quality of working life in times of digitalization of the economy significantly depends on the general socio-economic situation in the country and hinges on both the general level of economic development and the intensity of the digitalization processes. Based on this, one of the internal components of calculating and assessing the level of QWL at the macro level characterizes the conditions of its formation and assurance.

The most significant changes in the QWL, precipitated by the destructive factors of digitalization, have occurred in the labour market and employment, in the system of decent wages and safe working conditions, in terms of full social protection and other components of labour. The subjective assessment of a person's degree of satisfaction with all aspects of work is significant and important.

For each component, the choice of measurement indicators or their calculation is based on a number of basic principles that ensure the reliability and objectivity of the information subsystem:

- basing indices and indicators of their measurement on the data of official statistics services or on the results of sociological surveys;
- compliance of sociological information with the criteria of representativeness and reliability;
- capacity of indicators to reflect the changes in and comparability of the index;
- selection of the most adequate and informative indicators from all possible options for a specific component.

Based on the fact that digitalization has significantly accelerated over the past six to seven years, all indicators for assessment are taken for 2013-2019. Elaboration on aggregation of initial indicators and indices in the integrated assessment of quality of working life or algorithm of its calculation is as follows.

Algorithm for calculating the integrated index of quality of working life (I_{QWL}):

$$I_{QWL} = \frac{\sum_{i=1}^4 I_{it}}{4}; I_{it} = \frac{\sum_{j=1}^{k_i} X_{jt}^N}{k_i} \quad (1)$$

where: X_{jt}^N – normalized values of initial indicators:

$$\text{for stimulants: } X_{jt}^N = \frac{X_{jt} - X_{j \min}}{X_{j \max} - X_{j \min}};$$

$$\text{for depressants: } X_{jt}^N = \frac{X_{j \max} - X_{jt}}{X_{j \max} - X_{j \min}};$$

i – ordinal number of the component of the integrated index, $i = \overline{1, 5}$;

j – ordinal number of the indicator for calculating the sub-index for the i -th component, $j = \overline{1, k_i}$; k_i – number of indicators for the i -th component; t – year, $t = \overline{1, 7}$;

I_{it} – sub-index of the i -th component, for the t -th year.

The influence of each component on the relative change in QWL is calculated using by the following ratio:

$$\Delta_{i,rel} = \frac{R_{\Delta I_{QWL}}}{\Delta \sum I_i} * \Delta_i, \quad (2)$$

where: $\Delta_{i,rel}$ – the influence of the i -th component on the relative change in I_{QWL} , %;

$R_{\Delta I_{QWL}}$ – the rate of change of the integrated index, %;

$\Delta \sum I_i$ – absolute change of sub-indices;

Δ_i – absolute change of the i -th sub-index.

Components and indicators of their measurement with the directions of influence on the change in QWL are outlined in Table 3.

Table 3

Components of quality of working life and indicators of their measurement

Components of QWL	Measurement indicators	Legend ($X_{i,j}$)	Influence on QWL
I. Conditions for assuring and creating QWL	Gross domestic product per capita: – in USD	$X_{1,1}$	stimulant
	– in USD PPP (2011)	$X_{1,2}$	stimulant
	Labour productivity, GDP per employee, USD	$X_{1,3}$	stimulant
	Digital sector (DS) in the economy: – share in the number of employees in the DS.	$X_{1,4}$	stimulant
	– labour productivity, GVA per employee, USD	$X_{1,5}$	stimulant
	– the ratio of labour productivity in the DS to labour productivity in the economy	$X_{1,6}$	stimulant
	– share of the population that belongs to the middle class: – by a comprehensive criterion (income, education, qualifications)	$X_{1,7}$	stimulant
	– by self-identification	$X_{1,8}$	stimulant

Components of QWL	Measurement indicators	Legend ($X_{i,j}$)	Influence on QWL
II. Employment, labour market	Employment rate, %	$X_{2,1}$	stimulant
	Average number of employees in full-time employment or equivalent, in % of the total number of employees	$X_{2,2}$	stimulant
	Average number of full-time employees, % of employed population	$X_{2,3}$	stimulant
	Turnover ratio: – upon hiring – upon firing	$X_{2,4}$ $X_{2,5}$	stimulant depressant
	Share of employees, % – at large enterprises – at small enterprises	$X_{2,6}$ $X_{2,7}$	stimulant stimulant
	Share of individual entrepreneurs in % to the average number of employees by business entities	$X_{2,8}$	stimulant
	Rate of informal employment in % to total employment	$X_{2,9}$	depressant
	Share of employees employed in professions that do not correspond to the specialty according to their diploma, %	$X_{2,10}$	depressant
	Youth aged 15-24 who do not work or study in % to the total number of young people of the age bracket	$X_{2,11}$	depressant
	Unemployment rate of the population aged 15-70 (according to the ILO methodology), %	$X_{2,12}$	depressant
	Share of precariously employed in % to the total employed population	$X_{2,13}$	depressant
	III. Income and wages	Average wages, USD PPP (2011)	$X_{3,1}$
The ratio of average wages to the subsistence level, %		$X_{3,2}$	stimulant
The share of wages in GDP, %		$X_{3,3}$	stimulant
Share of wages in total household resources, %		$X_{3,4}$	stimulant
Wage arrears in % to the national payroll		$X_{3,5}$	depressant
Share of employees who are paid minimum wage, %		$X_{3,6}$	depressant
Inequality in wages: – decile differentiation coefficient of distribution of employees by the size of the accrued salary – ratio of the average wage of women and men		$X_{3,7}$ $X_{3,8}$	depressant stimulant

Components of QWL	Measurement indicators	Legend (X_{ij})	Influence on QWL
IV. Working conditions and safety	Share of employees working in hazardous conditions in % to the registered number of full-time employees	$X_{4,1}$	depressant
	Share of employees entitled to benefits in % to the total number of employees	$X_{4,2}$	depressant
	Number of injured at work, per 1,000 employed	$X_{4,3}$	depressant
	Number of taken sick days per employee	$X_{4,4}$	depressant
V. Self-assessment of QWL	Lack of suitable work	$X_{5,1}$	depressant
	No opportunity to earn extra money	$X_{5,2}$	depressant
	No opportunity to work with full efficiency	$X_{5,3}$	depressant
	Share of respondents who are most afraid of: – unemployment – non-payment of wages	$X_{5,4}$ $X_{5,5}$	depressant depressant
	Internet use: – share of people who use the Internet at work – share of people who do not have the opportunity, but have the need to use the Internet	$X_{5,6}$ $X_{5,6}$	stimulant depressant

Two variants of the integrated index of quality of working life are defined according to the formula (1) – without considering the subjective component of (I_{QWL}), and taking it into account (I^{\prime}_{QWL}) (Table 4; fig. 1).

Over the past seven years, the quality of working life has been moderate. It ranged from 0.41 (2015) to 0.582 (2019)¹. The lowest values were observed during 2015-2018, which was caused by the significant economic crisis due to the occupation of Crimea and armed conflict in eastern Ukraine. Only two years later, a slight revival of the national economy was accompanied by an improvement of QWL. In 2018, its increase was 21.4% compared to the previous year, and in 2019 – almost 14%.

¹ According to the presented method of normalization of initial indicators on the basis of the theoretical scope of variation, the maximum level of the integrated index and each sub-index is 0.9.

Table 4

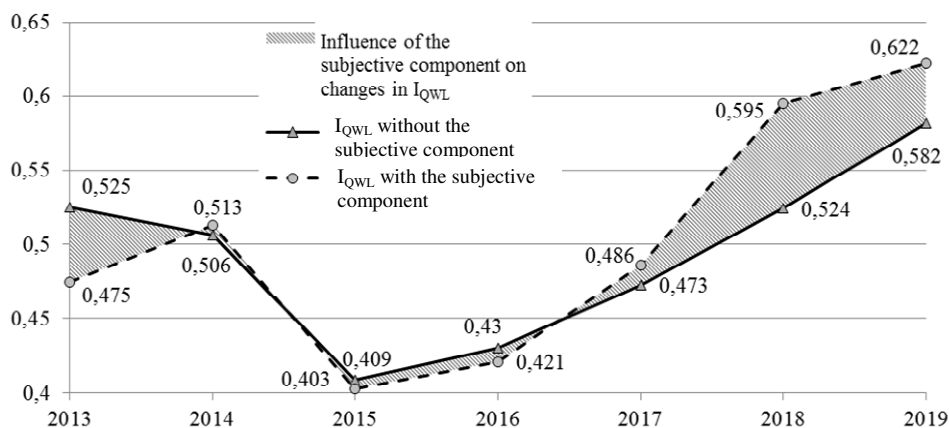
Changes in integrated indices of QWL and sub-indices taking into account and disregarding the subjective component for 2013-2019

Year	Conditions for assuring and creating QWL		Employment and labour market		Income and wages		Working conditions and wages		Integrated index of QWL without the subjective component		Self-assessment of QWL		Integrated index of QWL with the subjective component	
	I_1	% of previous year	I_2	% of previous year	I_3	% of previous year	I_4	% of previous year	I_{QWL}	% of previous year	I_5	% of previous year	I_{QWL}^s	% of previous year
2013	0,49	–	0,55	–	0,48	–	0,58	–	–	–	0,277	–	0,475	–
2014	0,36	73,5	0,432	78,5	0,41	85,4	0,82	141,4	0,525	94,6	0,544	196,4	0,513	108,0
2015	0,25	69,4	0,434	100,5	0,35	85,4	0,6	73,2	0,506	80,84	0,383	70,4	0,403	78,6
2016	0,29	116,0	0,468	107,8	0,37	105,7	0,59	98,3	0,409	105,13	0,385	100,5	0,421	104,4
2017	0,4	137,9	0,521	111,3	0,42	113,5	0,55	93,2	0,43	110,0	0,541	140,5	0,486	115,4
2018	0,59	147,5	0,576	110,6	0,54	128,6	0,59	107,3	0,473	121,36	0,679	125,5	0,595	122,4
2019	0,71	120,3	0,517	89,8	0,59	109,2	0,51	86,4	0,574	113,9	0,782	115,2	0,622	104,5
Rate of change, 2019 to 2013	–	144,9	–	94,0	–	122,9	–	87,9	–	110,86	–	282,3	–	130,9

Source: Calculated by the authors using the statistical and sociological data from the official websites of the State Statistics Service and the Institute of Sociology of the National Academy of Sciences of Ukraine (State Statistics Service of Ukraine, 2018, 2019a, 2019b, 2019c, 2020a, 2020b, 2020c, 2020d, 2021; Vorona & Shulha, 2020).

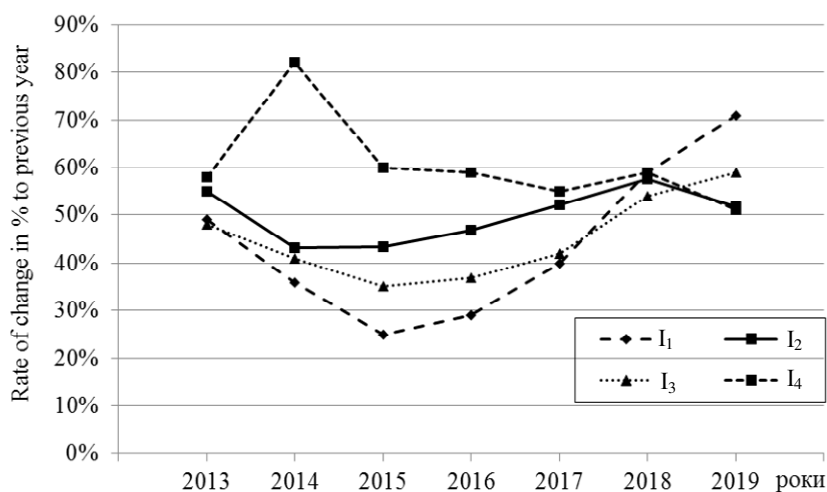
Similarly, starting from 2018, the level of QWL taking into account the subjective component became much higher (Fig. 1). Thus, in 2018 the increase was 13.5%, and in 2019 – 6.9%. This is directly related to improving the conditions for creating and assuring a certain quality of working life, i.e. with the stabilization of the economic situation in the country. These conclusions are confirmed by trends in individual sub-indices. For example, over the studied period, the sub-index for the component «Conditions for creating and assuring QWL» (I_1) increased by almost 45%, and the component «Income and wages» (I_3) rose by 23%. At the same time, the situation on the labour market has deteriorated, while a negative trend has developed for the component that determines the working conditions and safety. In general, over the past seven years, the sub-index I_4 has decreased by almost 12% (Table 4, fig. 2).

Figure 1

Comparative assessment of the integrated indicators of the quality of working life with and without the subjective component

Source: Calculated by the authors using the statistical and sociological data from the official websites of the State Statistics Service and the Institute of Sociology of the National Academy of Sciences of Ukraine (State Statistics Service of Ukraine, 2018, 2019a, 2019b, 2019c, 2020a, 2020b, 2020c, 2020d, 2021; Vorona & Shulha, 2020).

Figure 2

Changes in sub-indices of quality of working life for 2013-2019

The sub-index with the subjective component (I_5) increased more than 2.8 times, while from 2017 to 2019 the annual growth fluctuated within 32.0%, which confirms the conclusion about the optimistic attitudes of respondents about the possibility of improving the quality of working life despite the minor signs of economic recovery and growth.

Additive functional model, which is implemented through the algorithm of multidimensional average (1), allows the method of proportional distribution to determine the impact of each component and individual indicator on the relative change of the integrated index of quality of working life. The corresponding calculations for formula (2) are detailed in Tables 5 and 6.

Table 5

Influence of internal components on the change of the integrated index of quality of working life (I_{QWL}), % to the previous year

Year	Conditions of creating and assuring QWL	Employment and labour market	Income and wages	Working conditions and safety	Rate of change (+, -) I_{QWL}
2014	-6,2	-5,6	-3,3	11,5	-3,6
2015	-5,43	0,099	-2,964	-10,868	-19,160
2016	2,44	2,07	1,222	-0,611	5,13
2017	6,4	3,1	2,910	-2,41	10,0
2018	10,0	2,91	6,34	2,11	21,36
2019	52,3	-25,7	22,1	-34,8	13,9
2013-2019	10,5	-1,57	5,24	-3,31	10,86

Table 6

Influence of internal components on the change of the integrated index of quality of working life (I_{QWL}) taking into account the subjective component, % to the previous year

Year	Conditions of creating and assuring QWL	Employment and labour market	Income and wages	Working conditions and safety	Self-assessment of QWL	Rate of change (+, -) I'_{QWL}
2014	-5,48	-5,0	-2,95	10,1	11,24	8,0
2015	-4,3	-4,51	-2,33	-8,56	-4,28	-21,4
2016	2,05	-1,74	1,024	-0,512	0,1024	4,4
2017	5,32	2,66	2,51	-2,01	7,82	16,3
2018	7,81	2,26	4,93	1,64	5,76	22,4
2019	4,0	-1,965	1,665	-2,66	3,43	4,47
2013-2019	9,30	-1,39	4,62	-2,63	21,0	30,9

Thus, for the entire studied period, the main factors of improving the QWL were the components that largely depended on the general economic situation in the country. First of all, these are the general conditions for creating and assuring a certain level of quality of working life and the positive changes associated with the growth of wages and income. Positive dynamics of indicators of these very components accounts for almost 14% out of the 31% general growth of I_{QWL} . However, the QWL was most influenced by the subjective component, which was determined on the basis of self-assessment of the quality of working life submitted by respondents. Almost two thirds of the overall increase was precipitated by the positive dynamics of self-assessments of certain indicators (Table 6).

The main factors restraining the growth of the QWL belonged to the components «Employment and labour market» and «Working conditions and safety». In general, the QWL for the studied period decreased by 4-5% at their expense. Internal indicators for the component «Working conditions and safety» almost annually restrained the possible improvement of QWL. Despite the slight fluctuations in the number of injuries at work during 2014-2019, the severity of injuries has increased significantly, which was the main factor reducing the quality of working life.

Quite high indicators of labour turnover, especially dismissal rates, are the main depressants with regards to assuring the quality of working life among the indicators of the component «Employment and labour market»; both the general level of employment and the share of employees in large enterprises (with a simultaneous significant increase in underemployment) are also declining. The share of employees in professions that do not correspond to the specialty according to their diploma is increasing. A significant reduction in the full-time staff is accompanied by an increase in non-standard and informal employment. In general, there is a positive trend of changes in establishing a better quality of working life.

Conclusions

The developed scientific and methodological support for assessing the level of QWL makes it possible to track changes in the quality of working life in times of digitalization of the economy. In the absence of both statistical and sociological information on the volume of remote work and other modern forms of employment in the country, the conditions and consequences of such employment in the context of ensuring decent working conditions and satisfactory or high quality of working life, this is a worthy scientific achievement.

Calculations show that the impact of digitalization of the economy on the changes in social and labour relations and the labour sector with regards to es-

establishing a new quality of working life is insignificant, and some manifestations are episodic and unrelated. As a result, there is virtually no information on the impact of these processes on the transformation of the society and labour. Despite these objective circumstances, certain patterns of changes in the level of QWL allow us to identify «pressure» points or bifurcation points, which today clearly act as deterrents to improving the quality of working life, in particular the spread of non-standard, part-time employment, and what is essentially hidden unemployment. In general, these processes are accompanied by the growing precariousness of employment.

A significant disincentive factor is also the mismatch between the educational and professional level of employees and the requirements of employers, which is determined by the growing share of employees employed in professions that do not correspond to their specialty according to their diploma.

The tendency of the increasing severity of occupational injuries has a negative impact as well, while there are no indications of reductions in their volume.

In general, there has been a slight improvement in the quality of working life over the past seven years, which has fluctuated within a fairly moderate level. In short, the positive trend in changing the quality of working life is caused by a slight recovery of the economic situation in the country and the optimistic mood of the people rather than any positive changes in labour and social relations. These positive changes should be strengthened and used in the context of digitalization to assure better quality of life while preventing and minimizing risks to the development of Ukraine's labour potential.

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