

Competitive development of the economy based on the system of labor force motivation indicators

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Abstract. One of the most pressing and urgent tasks of a modern leader is to stimulate labor activity, since it is labor resources that are the driving force of any economic processes. Such stimulation is possible by building an effective motivation system based on motivational factors. In turn, the motivation system should provide:

- a way of attracting labor activity and retaining highly qualified personnel with the highest level of human capital;
- the formation of a corporate culture, taking into account the social responsibility of business;
- achievement of the strategic development goals of the organization on the basis of building a system of sustainable competitive advantages.

The relevance of these issues is also confirmed by the need to ensure the growth of labor productivity caused by the rapid reduction in the number of labor resources in Ukraine, due to the demographic crisis of previous years.

In view of the above, the purpose of this research is to study the competitive development of the economy based on a system of indicators of labor force motivation.

Keywords: Demographic Crisis, Labor Force Motivation, System of Indicators.

JEL: A1, G0, J0

1. Introduction

It is known from personnel management that the driving force of any economic processes is labor resources. Since the management process is continuous due to the need for constant decision-making, stimulating labor activity is one of the most pressing and urgent tasks of a modern manager. Such stimulation is possible by building an effective

motivation system based on motivational factors. In turn, the motivation system in any enterprise should provide a way of:

- attracting and retaining highly qualified personnel with the highest level of human capital;
- formation of corporate culture, taking into account the social responsibility of the business;
- achieving the strategic goals of the organization's development on the basis of building a system of sustainable competitive advantages.

Such scientists as A. N. Baksalova, A. S. Bilichenko, A. A. Klimchuk, A. M. Mikhailov, V. V. Yarmosh [1-4], and others were engaged in the analysis and classification of modern methods of personnel motivation in their works. To a large extent, their scientific developments are based on the results of world experience and are based on the works of foreign authors.

The issues of effective management of economic objects due to motivation and stimulation of labor force were studied by such domestic scientists as: V. M. Grineva, S. T. Duda, N. M. Zayarnaya, H. R. Kitsak, V. V. Korolkov, V. M. Nizhnik, A. A. Harun, I. A. Shevchuk [5-9, 15-17], and others.

The general features of these studies are the direction of management efforts and orientation to a specific person. In this regard, the vast majority of works in this area, as an object of management, considers a separate enterprise operating in a market economy. On the other hand, the quantitative and qualitative composition of the labor force, their living conditions, psycho-emotional state and, accordingly, the level of motivation can influence not only the competitive development of business entities, but also the state and dynamics of the development of individual industries and the economy as a whole.

For example, the creation of competitive working conditions is a motivating factor for the activation of labor migration of the population. Unfortunately, to date, the problem of motivation of labor resources at the industry level has hardly been investigated through certain objective reasons, which are discussed below. The relevance of these issues is also confirmed by the need to ensure the growth of labor productivity due to the rapid reduction in the number of labor resources in Ukraine, as a result of the demographic crisis of the previous years.

Considering the above, the purpose of this study is to investigate the competitive development of the economy based on a system of indicators of labor force motivation.

2. Materials and methods

Based on the work of foreign scientists, A. A. Klimchuk and A. M. Mikhailov conducted a deep analysis and generalization of existing theories of employee motivation [3]. According to the proposed classification, all theories of motivation that exist today can be divided into 3 groups:

- meaningful approach - proceeds from the fact that each person has a hierarchy of needs, the satisfaction of which leads to an increase in the motivation of their work. The most famous representatives of this approach are: F. Taylor's theory of scientific management, E. Mayo's social theory, A. Maslow's theory of needs, theories "X", "Y" and "Z" by D. McGregor and V. Ouchi. Along with the classification of needs, they also study methods of meeting them;
- procedural approach - recognizes the existence of needs, but states that the main motivational factors are each individual's perception of a particular situation and expectations of reward based on social comparisons and past experience. This approach includes: the theory of expectations by V. Vroom, the theory of justice by S. Adams, the theory of social comparisons by L. Festinger, the theory of typical variables and individual choice by T. Parson, and others;
- behavioral approach-based on the identification of factors that directly affect the behavior of people. These factors include: the close circle of the environment, national and cultural characteristics, the level of participation, economic and social status, working conditions, life experience, and so on. The most famous scientific developments are: D. McClelland's theory of acquired needs, F. Herzberg's two-factor theory, K. Levin's field theory, D. Lockwood's theory of work orientation, and so on.

Thus, it can be noted that today, among the scientists who have studied this problem, there is no single and agreed point of view regarding the most effective tools for motivating workers. In practice, this leads to the fact that the form and methods of employee motivation depend on the management style of their managers.

From the point of view of statistical and economic modeling, the use of these approaches also has significant drawbacks, in particular, the impossibility of a quantitative assessment of the phenomenon under study. At best, we will have a multi-priority ordinal scale based on individual surveys.

Within the framework of this study and taking into account these prerequisites, the following factors were included in the composition of motivational factors, or those that are indicators of the level of motivation of the workforce and directly affect the productivity and competitiveness of enterprises in the industry:

Employee turnover is a generalized indicator that characterizes the rate at which an enterprise or industry loses its employees and is calculated using the formula:

$$(1) \quad M_1 = \frac{NE_D}{\overline{NE}} \times 100\%$$

Where M_1 - staff turnover, %; NE_D - the number of dismissed full-time employees during the reporting period, thousand. Person; $\overline{NE}$ - average annual number of employees.

This indicator takes values from 0% to 100% and should be minimized. A high level of staff turnover indicates low motivation and vice versa.

Economic development in Ukraine during 2013-2019 was characterized by prolonged crisis phenomena in all sectors. This, in turn, led to irregular operation of enterprises and, as a result, problems with timely payment of wages. Since the level of per capita income in Ukraine for decades remained at one of the lowest levels among the countries of Western Europe, in our opinion, this factor is one of the main ones that directly affect the motivation of employees. Among the possible manifestations are:

- an increase in the number of employees on unpaid leave;
- transfer of employees to a part-time work week;
- the deficit of the payroll and the growth of the level of debt.

For their quantitative assessment, the following indicators were used in this study:

$$(2) \quad M_2 = \frac{NE_L}{\overline{NE}} \times 100\%$$
$$M_3 = \frac{NE_{PT}}{\overline{NE}} \times 100\%$$

$$M_4 = \frac{W_A}{WF} \times 100\%$$

Where M_2, NE_L - the share and number of employees on unpaid leave, respectively; M_3, NE_{PT} - the proportion and number of employees transferred to part-time workweeks, respectively; M_4 - the level of wages arrears relative to the monthly fund, %; W_a - wage arrears at the end of the reporting period, mln. UAH; WF - the average monthly wage fund in the reporting period, mln. UAH

All of the above indicators of the level of motivation should be minimized.

Even if the enterprises of the industry work rhythmically, and employees receive their wages on time and in full, this does not mean that they are necessarily satisfied with its amount. Although the level of satisfaction with income is always subjective, socio-economic statistics keep records of the indicators of the subsistence level and the actual subsistence minimum. Comparison of the average level of wages in the enterprise, or in the region with the maximum permissible level, especially when the advantage is insignificant, is also an important motivational factor.

$$(3) \quad M_5 = \frac{W}{SM_A} \times 100\%$$

Where M_5 - the ratio of wages to the actual subsistence minimum, %; W - the average monthly wage, UAH; SM_A - the actual subsistence minimum, UAH.

This indicator should be maximized.

Each industry has its own specifics of production activities, often associated with harmful working conditions. The exceptions are wholesale and retail trade, financial, insurance, professional, scientific and technical activities, education, health care and the provision of other types of services. All other sectors of the economy have a negative impact on the life and health of employees, which cannot but reduce the motivation to work. This indicator will look like:

This indicator will look like:

$$M_6 = \frac{NE_H}{NE} \times 100\%$$

Where M_6, NE_H - the share and number of employees with harmful working conditions, respectively.

3. Results

We studied the dynamics of motivational factors by type of economic activity in Ukraine in 2013-2019. The choice of this period was determined by the available data of the State Statistics Service of Ukraine in the open access [10]. In 2013, the system of indicators for labor statistics in Ukraine underwent certain changes. Therefore, the possibility of conducting a retrospective analysis on earlier periods is limited. Table 1 shows the results of a generalized analysis of the dynamics of M_1 and M_2 indicators by type of economic activity in 2013-2019.

Table 1. Dynamics of staff turnover and part of the number of employees on unpaid leave in 2013-2019

	$M_1, \%$		$M_2, \%$	
	2019	Absolute change, %	2019	Absolute change, %
1	2	3	4	5
Agriculture	54.8%	-5.8%	0.3%	-0.3%
The mining industry	21.0%	-0.3%	0.5%	+0.1%
Processing industry	35.7%	+2.6%	0.8%	-2.7%
Supply of electricity, gas	23.6%	+2.2%	0.4%	+0.3%
Water supply, sewerage and waste	24.6%	-3.1%	0.2%	-0.1%
Construction	51.5%	-0.2%	0.3%	-5.7%
Wholesale and retail trade	53.2%	+0.5%	0.1%	-0.2%
Transport, warehousing	33.2%	+5.5%	0.1%	-0.4%
Financial and insurance activities	36.4%	+2.2%	0.2%	0.0%
Professional, scientific and technical activities	33.2%	+5.0%	0.1%	-0.1%
Education	17.4%	+4.5%	0.0%	0.0%
Health care	19.5%	-0.8%	0.0%	0.0%
Provision of other types of services	40.8%	+9.7%	0.1%	-0.4%
Total	32.7%	+2.9%	0.2%	-0.7%

Columns (2) and (4) of Table 1 show the results of calculating these indicators according to the data of 2019, and columns (3) and (5) show their total absolute growth during 2013-2019. As it can be seen, the staff turnover in 2019 is 32.7% on average in the economy. At the same time, it increased by 2.9%, which indicates a general negative trend of reducing the level of labor motivation. This was the case in most economic activities. That is, the socio-economic conditions contributed to the increase in the outflow of labor. The worst situation was observed in agriculture, where $M_1 = 54.8\%$. The main reason for this is the seasonal nature of labor. Also, high turnover was in trade (53.2%) and

construction (51.6%). On the other hand, the education sector (17.4%) and the health sector (19.5%) have a low percentage of dismissed employees.

As noted above, financial problems due to inefficient operating activities due to the economic crisis and the loss of solvency in many domestic enterprises often led to a forced reduction in the wage fund. Accordingly, the share of full-time employees on leave without pay in 2019 was $M_2 = 0.24\%$. At the same time, the worst situation occurred in the processing (0.82%) and mining (0.49%) industries. Education (0.01%) and healthcare (0.05%) were again among the most successful areas in this indicator, due to the high proportion of enterprises and public sector organizations. The data in column (5) shows that significant progress has been made in this direction in recent years, in particular in construction (-5.7%) and the processing industry (-2.7%).

According to the motivational factors discussed above, the following indicators, the dynamics of which is shown in Table 2, are the share of employees transferred to a part-time working weeks and the level of wage arrears.

Table 2. Dynamics of the share of workers transferred to part-time workweeks and levels of wage arrears in 2013-2019

	$M_3, \%$		$M_4, \%$	
	2019	Absolute change, %	2019	Absolute change, %
Agriculture	0.7%	-5.0%	0.8%	-1.2%
The mining industry	1.9%	-2.5%	24.1%	+22.8%
Processing industry	6.2%	-12.9%	11.4%	+6.1%
Supply of electricity, gas	2.9%	-3.5%	1.0%	+0.6%
Water supply, sewerage and waste	0.5%	-5.5%	4.1%	+1.5%
Construction	1.1%	-20.4%	2.4%	-5.3%
Wholesale and retail trade	0.2%	-2.4%	0.5%	0.0%
Transport, warehousing	1.7%	-25.3%	2.8%	-4.5%
Financial and insurance activities	0.4%	-1.6%	1.6%	-0.2%
Professional, scientific and technical activities	1.3%	-2.3%	1.9%	-0.3%
Education	0.0%	-0.1%	0.1%	0.0%
Health care	0.1%	-0.4%	0.3%	+0.1%
Provision of other types of services	0.5%	-2.8%	0.2%	-0.2%
Total	1.7%	-6.0%	3.9%	+1.4%

Data in Table 2 indicates that in 2019 among full-time employees, only $M_3 = 1.7\%$ were transferred to part-time work. Moreover, since 2013, this indicator has decreased by 6%, which has little positive effect on the motivation of labor in all types of economic activity

without exception. The most vulnerable were, again, the industrial enterprises: mining (1.9%), processing (6.2%), and electricity and gas suppliers (2.9%). During the study period, the overall improvement in this indicator occurred in transport (-25.3%) and in construction (-20.4%). In the health education sectors, the share of part-time workers was almost 0%.

The average national level of wage arrears in 2019 was $M_4 = 3.9\%$ of the monthly fund. Although this indicator has tended to improve since 2015, the economic crisis of 2014-2015 was much more severe. Therefore, the level of 2013 for M_4 at the end of the study period was not reached. The industrial sector of the economy suffered the most from this. Thus, in the mining industry, the level of wage arrears increased by 22.8% to 24.1%, and in the processing industry by 6.1% to 11.4%. Comparison of the calculated values and dynamics of the motivational factors M_2 , M_3 , and M_4 showed the presence of a complex problem of these types of activities in this area of analysis. Given that the share of the mining and processing industry in the country's GDP is about 26%, this may affect labor productivity and the competitiveness of the economy as a whole. Similarly, the lowest levels of debt were found in education (0.1%), other services (0.2%), and health (0.3%).

The dynamics of the last two motivational factors, M_5 and M_6 in 2013-2019, in the context of types of economic activity, are shown in Table 3.

Table 3. Dynamics of the ratio of the average wage to the actual subsistence minimum and the share of full-time employees with harmful working conditions in 2013-2019

	M_5 , %		M_6 , %	
	2019	Absolute change, %	2019	Absolute change, %
Agriculture	206%	+9.2%	10.1%	+2.6%
The mining industry	364%	-79.4%	66.2%	-5.9%
Processing industry	256%	-21.9%	26.6%	-0.7%
Supply of electricity, gas	326%	-53.2%	34.2%	+0.6%
Water supply, sewerage and waste	195%	-38.3%	31.8%	+1.0%
Construction	218%	-9.7%	16.9%	+0.7%
Wholesale and retail trade	251%	-2.1%	—	—
Transport, warehousing	272%	-29.7%	23.8%	-0.2%
Financial and insurance activities	370%	-72.8%	—	—
Professional, scientific and technical activities	310%	+0.1%	—	—
Education	189%	-37.9%	—	—
Health care	163%	-35.8%	—	—
Provision of other types of services	259%	-37.2%	—	—
Total	244%	-30.5%	11.2%	-0.8%

In the world practice, several approaches are used to determine the amount of the subsistence minimum. In Ukraine, the subsistence minimum is understood as the cost estimate of the consumer basket, taking into account the minimum set of food and non-food goods and services necessary to preserve human health and ensure its vital activity [11].

On the other hand, the actual subsistence minimum is calculated on the basis of average prices for consumer goods and services, as well as tariffs for housing and communal services. Given these definitions, it is the actual subsistence minimum that is more consistent with the actual amount of necessary expenditures, per capita. Therefore, it was taken as the basis for calculating the M_5 indicator. At the end of 2013, it was UAH 1,188 and at the end of 2019 – UAH 4,296.

In the economy as a whole, the average salary of full-time employees at the end of the reporting period exceeded the actual subsistence minimum by $M_5 = 2.44$ times. However, this is 30.5% less than in 2013, which means that there are negative trends in the redistribution of public spending in favor of priority goods and services, which cannot have an additional motivating effect. The highest level of the M_5 index in 2019 was typical for financial and insurance activities (370%), the extractive industry (364%), and the supply of electricity and gas (326%). The lowest level occurred in healthcare (163%) and education (189%).

Some economic activities are related to harmful working conditions that directly affect the health of full-time employees and life expectancy. This weakens the motivation to work, especially in middle age, when the health status of people begins to gradually deteriorate. In the whole country, the share of such workers is about $M_6 = 11.2\%$. At the same time, the most harmful conditions are traditionally characteristic of the industrial sector of the economy. For example, in the mining industry at the end of the period, this indicator exceeded 66%.

Thus, we analyzed the current state and dynamics of labor motivation indicators in 2013-2019 in the context of economic activities. The next stage of the analysis should be to determine their impact on the competitive development of the economy.

The concept of competitiveness of the national economy on the basis of foreign experience has been studied by many domestic scientists, among whom should be mentioned: Ya. B. Bazilyuk, M. A. Kizim, E. M. Kryachko, A. A. Shvidanenko, and others

[12-14]. The analysis of the interpretations allows us to conclude that competitiveness is always based on competitive advantages, the composition of which directly depends on the goals of the study. Thus, competitiveness is a relative concept that is subject to a system of national priorities. In determining them, we will proceed from the following problems that require urgent solutions:

- technological backwardness in most sectors of the economy, especially those related to material production;
- the lack of sustainable economic growth that would allow improving the standard of living of the population;
- an open economy implies free competition for consumers in both domestic and foreign markets. The goal of strengthening the position of domestic producers in foreign markets is to improve the balance of payments and ensure solvent demand for products.

According to this, we will consider the following indicators as indicators of the competitiveness of the national economy:

The share of value added in total output. In its economic essence, the share of value added is a criterion for the efficiency of social production, which directly depends on the technological development of individual industries and the country's economy as a whole. It is the use of modern technologies in all areas that is the source of rapid economic growth.

The rate of economic growth. The only way to improve the lives of the population is to ensure sustainable development. Despite the economic crisis of 2014-2015, as a result of which the physical volume of Ukraine's GDP decreased by 14.8%, the gap from the level of 2013 at the end of the reporting period was still 3.5%. It should also be noted that it is the countries with a small GDP per capita that have the greatest potential for rapid development. On the other hand, it is much more difficult for developed countries to maintain high GDP growth rates.

The share of net exports in total output. The country's balance of payments is one of the most important factors for ensuring the stability of the national currency. The export of products to foreign markets reduces the dependence of national producers on the crisis phenomena within the country. The competitiveness of domestic products in terms of technical and economic parameters directly affects the value of exports, and so on.

The study of the available statistical dependencies between the set of motivational factors and the specified indicators of competitive development of the economy allowed us to identify certain quantitative patterns between them. In particular, such dependencies occurred between the factors of motivation of labor resources and the sectoral rates of economic growth. At the same time, there was no sustained impact on the share of industry value added and net exports.

Directly, motivational factors can influence the average level of labor productivity of employees. Which, in turn, determines the sectoral rates of economic growth, taking into account the dynamics of the number of labor resources.

$$(5) \quad RO_i = RNE_i \times RP_i$$

Where RO_i , RNE_i , and RP_i are, respectively, the growth rates of the physical volume of output, the number of employees, and labor productivity for each type of economic activity.

The search for functional relationships between the growth rates of labor productivity for each type of economic activity and the corresponding motivational factors in this study was performed using regression-correlation analysis, taking into account certain prerequisites and criteria.

The statistical database of observations is based on semi-annual data from 2013-2019. That is why the number of factors in each regression model was limited to two, which were selected using linear correlation coefficients. The variational analysis of the input data showed that with a confidence of 90%, they can be used for regression analysis.

Verification of the adequacy of all the constructed dependencies was performed using the Fisher criterion and with 90% confidence confirmed its compliance for each specific case. Also, a necessary stage of the analysis was to check the statistical significance of all the coefficients of the obtained regression using the Student's t- criterion. According to the results of these tests, not for all types of economic activity, the list of which is given in Table 1, it was possible to establish a stable relationship between motivational factors and the dynamics of labor productivity.

The final stage of the regression analysis involved checking the unaccounted vestiges for compliance with the normal distribution law using the Pearson's criterion χ^2 .

The essence of this criterion, as well as the previous ones, assumed a comparison of the calculated values χ^2 with the critical level.

In agriculture, the most important motivational factors affecting the productivity of full-time workers were the ratio of wages to the actual subsistence minimum and harmful working conditions. The corresponding constructed dependency has the form:

$$RP_A = 1,0579 + 0,1930M_5 - 3,8073M_6,$$

Where RP_A is the rate of labor productivity growth per one full-time employee in agriculture.

According to the results of statistical verification of the input data, it was not possible to identify adequate regression dependencies for such types of economic activities as: supply of electricity, gas and steam, wholesale and retail trade, transport and warehousing, professional, scientific and technical activities, and so on. For all other types of activity, the influence of motivational factors on the growth rate of labor productivity is represented by a system of equations (7)-(14).

$$(7) \quad RP_{MI} = 2,9703 - 0,7184M_4 - 2,6254M_6$$

$$(8) \quad RP_{PI} = 4,9774 - 1,9799M_1 - 12,2448M_6$$

$$(9) \quad RP_{WS} = 0,9385 - 1,1274M_3 + 0,0577M_6$$

$$(10) \quad RP_C = 1,2223 - 0,1072M_1 - 0,8773M_3$$

$$(11) \quad RP_F = 1,3950 - 25,8209M_2 - 11,0488M_4$$

$$(12) \quad RP_E = 1,1177 - 0,4398M_1 - 23,2048M_2$$

$$(13) \quad RP_{HC} = 1,2278 - 0,9912M_1 - 12,1712M_2$$

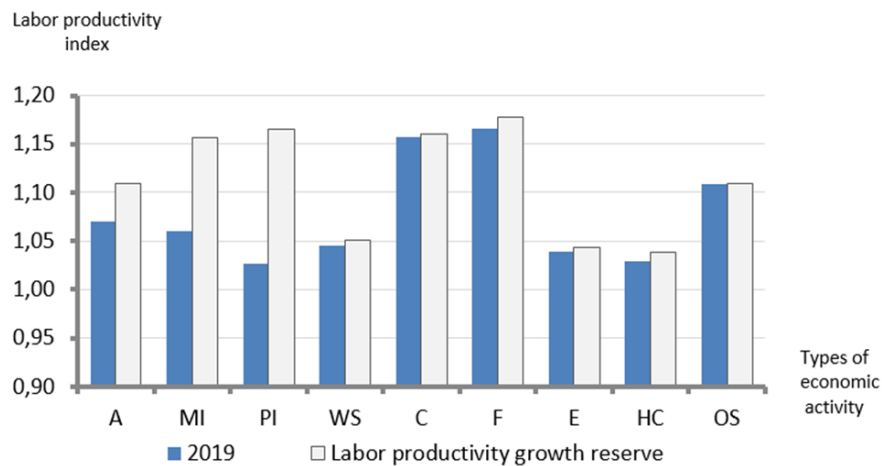
$$(14) \quad RP_{OS} = 1,1137 - 0,9440M_2 - 0,7339M_3$$

Where RP_{MI} , RP_{PI} , RP_{WS} , RP_C , RP_F , RP_E , RP_{HC} , RP_{OS} –the growth rate of labor productivity per full-time employee in the mining industry, processing industry, water supply and waste management, construction, financial and insurance activities, education, healthcare, and other types of services, respectively.

The resulting equations (6)-(14) can be used to calculate the reserves of labor productivity growth by meeting the motivational needs of the labor force. Figure 1 shows

the results of such an assessment, provided that the values of motivational factors improve by 5%.

Figure 1. The results of calculating the reserve for the growth of labor productivity by type of economic activity



As can be seen from Fig. 1, the largest reserves for the growth of labor productivity, per worker, are in:

- the processing industry, where the highest dependence of the effective indicator of $[(RP)]_{PI}$ was on staff turnover and a high proportion of harmful labor;
- mining industry, where the $[(RP)]_{MI}$ indicator depended on the level of wage arrears and a high share of harmful and life-threatening production, and so on.

This, accordingly, will have a positive impact on the industry's economic growth rates.

3. Conclusions

The scientific novelty of this work is creating of a system of regression equations for the dependence of industrial labor productivity on motivational factors, in contrast to existing approaches, establishes a quantitative relationship between these indicators and allows to determine the reserves of competitive economic development.

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