

Personnel Material Motivation and Its Effect on Enterprise Economic Processes

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Abstract. The indicators system characterizing the personnel financial motivation and enterprises economic processes is improved. These indicators unlike existing fragmentary indicators take into account wages efficiency indicators such as profitability / yield payroll, the cost of wages and wages level (in total production costs) next with the established directions of productive resources usage for quantitative and qualitative evaluation of the state of these phenomena at the macro level. The developed methodical approach to the calculation of personnel material payouts involves the determination of additional pay on the bases of proposed labor contribution rate, which takes into account labor costs without the use of invariant scales and size of incentive and compensation payments by a corresponding coefficient whose value depends on value of certain assessment factors, which makes possible to create conditions for wages part objective formation.

Keywords. Enterprise economic processes, Management decisions, Material payments, Payment of labor, Personnel material motivation efficiency, Production resources, Set of interrelated phenomena of economic character.

1. Introduction

The current economic situation in Ukraine requires companies developing new approaches to management, the use of which should ensure not only survival, but also improving competitiveness. One aspect of this task is staff financial motivation, as salary is most of the total income of industrial enterprises staff and is one of the most important places in the formation of motives for effective work.

However, the economic activities of Ukraine machine-building enterprises indicates insufficiently effective staff motivation, that is accompanied by the lack of compliance of staff motivation to maximize the results of their work, and reduction in real salary. Under these circumstances, the enterprise policy in the staff financial motivation should lead to the rational use of productive resources through the system of more advanced methods, the result of which is to increase the level of development of enterprise economic processes.

2. Analysis of the recent research and problem definition

Investigation of personnel motivation as a component of enterprise management is highlighted in the papers of such scientists: Volgin M.O. [1], Doronina M.S. [2], Yeskova O.L. [3-5], Kulikov G.T. [6-7], Semikina M.V. [8-9] and many others. Fundamental bases for studying various aspects of economic processes in the enterprises activities are considered in the papers of Kalinina A. E. [10], Savitskaya G.V. [11], Popovych P. Ya. [12], Fayer O.V.

[13], Budzishevsky S. [14] and others. Analysis of scientific publications and business practices indicate the need for proper methodological support for effective material motivation.

3. Research results

The systematization of existing approaches to the definition of the essence of material motivation of the personnel makes possible to consider it as a source of newly created value of the enterprise and personnel income on the basis of the establishment of forms and sizes of wages, dividends payment. The paper substantiates the interrelation of the categories defining the influence of personnel motivation on the corresponding object. The starting point is the goals, as well as the setting of tasks for which the methods of personnel material motivation can be used. In this case, the main effect of the method is determined by compliance with the principles of material motivation. The method of motivation which is chosen and used in this paper contributes to direct or indirect influence of management activity on the enterprise final results.

On the basis of the development of theoretical positions in the direction of the study of the enterprise economic processes, it is proposed to consider them as a set of interrelated phenomena of an economic nature to achieve a certain result by transforming the "inputs" through the resources usage in the "outputs". Based on this definition, "input" is represented as a motivational impulse, economic processes as directions through which the transformation of "inputs" into "outputs", and the final result of the enterprise activity is "output". This approach is oriented on considering economic processes as ways of ensuring the final results of enterprises economic activity on the bases of usage of productive resources (capital, material, labor, financial, information, innovation, management).

In accordance with the task of indicators increasing that provide the enterprises results and staff salaries size, the organizational and economic principles of the formation of effective personnel material-based motivation, which involve three stages:

1. analysis of the status of staff material motivation effectiveness;
2. development of decision for increasing the influence of material motivation on the enterprise economic processes;
3. adoption and implementation of the decision.

The identified stages are the theoretical preconditions for the development of methodological support for the implementation of the company's motivation policy.

The system of indicators was developed for assessing the effectiveness of staff material motivation and productive resources utilization; the level of influence of personnel material motivation on the aggregate of the phenomena of economic character of the enterprises is determined and estimated.

The formation of the system of indicators for assessing the staff material motivation effectiveness and the development of enterprise economic processes in terms of productive resources usage is carried out on the basis of implementation of the stages of selection of indicators (Fig. 1). The selection of indicators was carried out in the presence of their compliance with certain criteria and taking into account the expert evaluation results.

The evaluation of the personnel material motivation effectiveness was carried out on the basis of the existing system of indicators in the context of substantiation of the relevant criteria and conditions (Tab. 1).

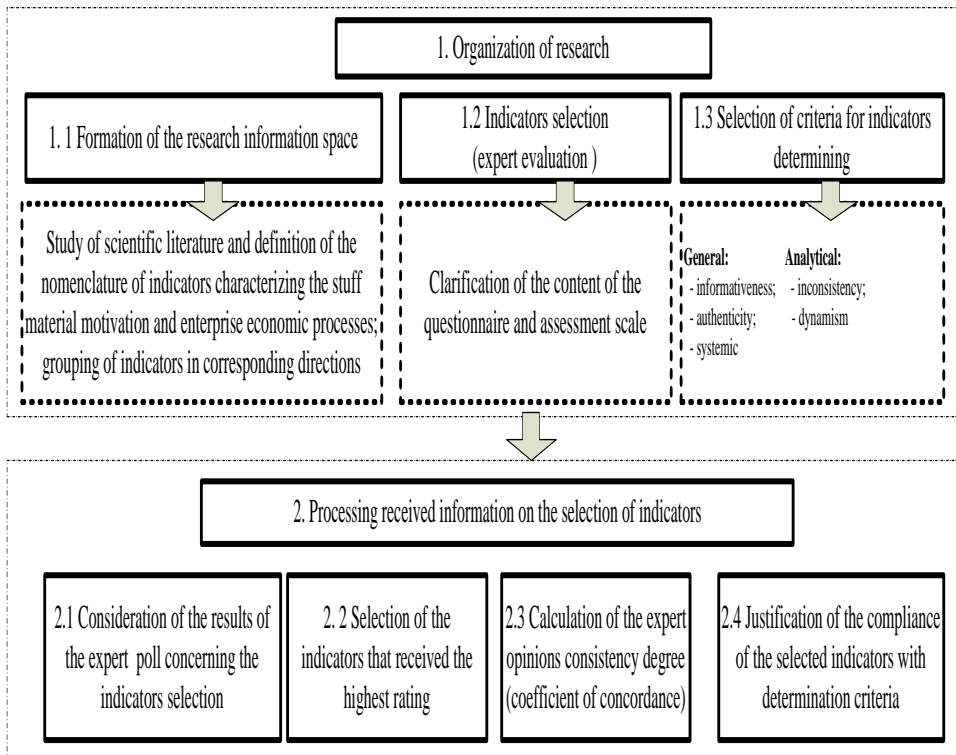


Fig. 1. Stages of the analyzed indicators selection [developed on the bases 1, 2, 3]

Table 1. Indicators, criteria for evaluation and conditions for staff material motivation effectiveness

Indicator	Criteria for evaluation	Condition
Yield / Profitability of the wage fund and other material payments to staff	Relevance of the stuff means of motivation to the task of maximization enterprise income / profit	Net income / profit of enterprise should be greater than the value of the salary fund and other personnel material payments
Wage cost index	Compliance with the growth rate of the wage growth rate of labor productivity	The growth rate of labor productivity should be higher than the growth rate of payroll
Specific weight of labor costs in the total enterprise costs	Reduction in the share of labor costs in total production costs	Labor costs should be reduced due to the relative savings of the wage fund in the context of increasing labor productivity and the wage fund per employee

Via cluster analysis (k-means method), the personnel material motivation effectiveness according to the standardized data of 13 machine-building enterprises was estimated. As a result, the following information was obtained (Tab. 2).

Table 2. Interpreting and profiling clusters according to efficiency level of staff material motivation

Cluster characterizing effectiveness level of staff material motivation	Cluster profile and <i>k</i> -medium scale intervals			The number of observations per cluster
	Yield / profitability of the fund of wages and other material payments	The cost of wages	Wage level (in total production costs)	
	[-0,76; 0,46] – low (0,46; 1,68] – average (1,68; 2,9] – high	[-0,76; 0,46] – high (0,46; 1,68] – average (1,68; 2,9] – low	[-0,76; 0,46] – low (0,46; 1,68] – average (1,68; 2,9] – high	
Cluster 1 (high level)	High / High	High	Average	6
Cluster 2 (low level)	Low / Low	Average	Average	18
Cluster 3 (average level)	Low / Low	High	Low	28

On the bases of the analysis, the minority of observations (about 12%) belongs to the first cluster (group) with a high level of staff material motivation effectiveness. Enterprises of the third and second clusters have a low profitability / wage earnings, but the standardized *k*-average values differ by this indicator: the average level of material effectiveness corresponds to the value of 0.127 and the low is -0.76. The index of labor costs, which has a high level for enterprises of the first and the third groups, is almost twice less than the value of enterprises with an average level of staff material motivation effectiveness.

Estimation of values of indicators characterizing the enterprise industrial resources usage was carried out in a similar way, which makes possible to solve a number of main tasks in further research: firstly, to provide the prerequisites for determining the level of influence of personnel material motivation on the enterprise economic processes by reducing the size of the data by classifying the values of indicators for qualitative features of three levels: high, average, low; and secondly, to set priorities in indicators increasing for each group of companies by the level of material motivation effectiveness; and thirdly, to determine the probable state (high, average, low) of economic processes development for each group of enterprises.

Variance analysis is used for determination the level of influence of personnel material motivation on a set of interrelated phenomena of economic nature (economic processes). The level of influence of personnel material motivation is estimated on the basis of the obtained value of the factor variance (σ^2). Subsequently, two-factor variance analysis is used for determination the level of consistent impact of personnel material motivation with each of the economic processes in turn. In this case, the calculated general level of influence has a qualitative estimate, which is obtained by grouping the values of the factorial variance over the established interval scale. The results of the calculations show that about 71% of the indicators characterizing the economic processes of the enterprise, the level of influence of personnel material motivation is low or very low, about 19% is below average and average, about 10% is high or very high.

Reserves of indicators growth characterizing economic processes taking into account the state of the external environment are determined. The methodical approach to making management decisions in the field of material motivation is proposed; the methodical approach to calculating the material payments in terms of wages is presented; the probability of changing the enterprise economic processes development in 2017 year is determined.

Functioning of an enterprise as an economic entity in a market environment requires the consideration of the state of the environment for determination the reserve for increasing the enterprises indicators. A number of steps were implemented for this:

1) gradation of the scale of evaluation of the indicators level by the maps of U. Shuhart with boundaries determination (optimal, warning, control), corresponding to different environment states (active, neutral and passive);

2) determination of optimal values of the corresponding indicators in conditions of different state of the environment by the method of nonlinear programming. In this case, the objective function $y(x)$ involves maximum targeting, and as the limitations for each indicator, the values of their boundaries are used: the optimal, warning and control (optimization criteria). The effective indicator is the sales volume per one employee, which characterizes the market situation;

3) the reserves of increase of indicators are determined by comparison of their real and optimal simulated values.

The results of determining the reserves for increasing the indicators for representative enterprises of each group by the level of material motivation effectiveness are: for JSC "Frunze Plant" (1 cluster) are the reserves for increasing the coefficients of inventory turnover (x_6) and rate of unfinished production turnover (x_7), financial stability coefficient (x_8) and financial autonomy coefficient (x_9); JSC "Melitopol Machine Building Plant" (2 cluster) has reserves of the following indicators: coefficient of extensive equipment loading (x_2), coefficient of working time usage (x_5), coefficients of inventory turnover (x_6) and rate of unfinished production turnover (x_7), financial autonomy (x_9); JSC "Kharkiv Machine-Building Plant "Miner Light"(3 cluster) can increase the intensive loading of equipment (x_1), rate of unfinished production turnover (x_7) and the coefficient of working time fund usage (x_5).

The proposed methodological provision of the formation of the influence of the personnel material motivation on the indicators of enterprise final results is based on the substantiation of each of the stages of management decisions implementation.

Thus, at the first stage, the analysis and comprehensive justification of the reasons of problem situation towards the formation of personnel material motivation effectiveness testifies to the possibility and expediency of its solution through the appropriate methods usage.

At the second stage, the peculiarities of the solution are considered in the following way:

1) restrictions are determined – a group of enterprises on the level of personnel material motivation effectiveness: high, average, low.

2) corresponding decisions were generated by distinguishing the general (basic) and specific (separate) methods of personnel material motivation, considered as an alternative impact on each of the provided economic processes.

In the third stage of the adoption and implementation of the decision on the application of appropriate methods of personnel material motivation, first of all, the consideration of criteria is done, namely: the level of influence of personnel material motivation on economic processes on the scale of the intervals of the factorial dispersion must be in the range below the average - very high ([0,351; 0,67]). In addition, it is necessary to take into account the

availability of reserves for increasing the enterprise economic processes indicators under the existing conditions of the external environment.

Decision-making depends on the achievement of the greatest interrelation between the personnel material motivation effectiveness level as a defining limitation and indicators characterizing the investigated processes. Economic-mathematical model solves this problem, namely: for each group of enterprise we select model of linear regression, for which the value of the correlation coefficient is maximal, and the relationship is statistically reliable.

The resulting model has the following form:

1. for enterprises of the first group – with high personnel material motivation effectiveness level (JSC "Frunze Plant")

$$1.1 y_7 = 30 + 8.7PMV - 13.66U - 61.35P \quad (r = 0.88) \text{ (turnover of working capital)}$$

where y_7 - rate of unfinished production turnover;

PMV - profitability of the wage fund and other material benefits;

U - index of labor costs;

P - share of the wage fund in total production costs;

$$1.2 y_8 = 0.47 PMV - 0.53 U \quad (r = 0.95) \text{ (accounts payable usage)}$$

where y_8 is the coefficient of financial stability.

2. for enterprises of the second group - with low personnel material motivation effectiveness level (JSC "Melitopol Machine-Building Plant"):

$$2.1 y_7 = 7.36PMV - 0.36U + 6.8P \quad (r = 0.97) \text{ (turnover of working capital)}$$

where y_7 - rate of unfinished production turnover;

$$2.2 y_5 = 1.004 + 0.37 PMV - 0.06U \quad (r = 0.90) \text{ (working time usage)}$$

where y_5 - coefficient of working time usage.

3. For enterprises of the third groups – with average personnel material motivation effectiveness level (JSC "Kharkiv Machine-Building Plant "Miner Light"):

$$3.1 y_5 = 0.8 - 0.072 U + 1.49 P \quad (r = 0.95) \text{ (working time usage)}$$

where y_5 - coefficient of working time usage.

These models usage makes possible to choose the optimal solution by applying the most appropriate specific methods of personnel material motivation, which ensure these indicators impact on the enterprises final results. So, for the first and the second cluster of enterprises we recommend to set a premium of 0.5% for each percentage reduction in working capital balances. For the 1 cluster enterprises it is expedient to use the increase of the premium for reduction of payables (as a percentage of the official salary).

For enterprises of the second and the third clusters we recommend to establish a wage increase ratio due to the full usage of working time; wages correction depending on the level of production normative tasks realization taking into account their tension. At the same time, at the enterprises of each group it is necessary to improve and use the general methods of personnel motivation: the establishment of scientifically justified ranges of marginal rates of the tariff net, payment of 13 salary, payment of dividends, participation in the enterprise profits.

The personnel material motivation at industrial enterprise is becoming an increasingly complex process, which requires, along with the application of existing methods new ones, which depend on economic opportunities and the social orientation of the enterprise. In this regard, the paper proposes a methodical approach to calculating the material payments of personnel in terms of remuneration, which is based on the determination of two developed indicators of their formation such as the indicator of labor input and the coefficient of incentive

and compensatory payments. This approach in comparison with existing alternatives provide the following main benefits:

- fragmentation of the stimulated indicator scale (the indicator of labor input) at infinitesimal intervals to achieve a continuous motivation to save labor costs, which eliminates the establishment of constant premium amount when overproduction if their various values are at the same interval calculated scale;

- determination of the real level of personnel material motivation (setting the amount of the premium on the basis of additional wages) for the worked period, taking into account the actual results (profit and savings of material and raw materials resources) at the corresponding labor costs without distribution of the planned fixed amount of funds for current bonus;

- differentiation of the establishment of incentive and compensation payments for personnel on the bases of the availability of the most significant groups of factors for the staff: 1) the staff position factor (responsibilities, work effectiveness, status and prestige); 2) personal factor (family income, presence of debts, number of dependents); 3) other factors (availability of housing, rental costs, housing location, etc.).

Ensuring the influence of the personnel material motivation on the enterprise economic processes is illustrated by determining the probable change in the level of development of economic processes (using the theory of Markov chains), taking into account the personnel material motivation efficiency for the period of 2017, which solves the prediction of their qualitative state.

The defined vector of finite probabilities for achieving a qualitative state of certain economic processes is presented in Tab. 3.

Table 3. The probability of achieving a qualitative state of development of economic processes (high, average, low) in enterprises with different efficiency levels of staff material motivation

Effectiveness level of staff material motivation	State of development of working capital turnover			The state of development of the process of using payables			The state of the development of the use of working time		
	2014	2017	Probability of change in 2017	2014	2017	Probability of change in 2017	2014	2017	Probability of change in 2017
High	H	H	0,32	H	H	0,34	-	-	-
		A	0,68		A	0,66		-	-
		L	0		L	0		-	-
Low	L	H	0	-	-	-	A	H	0,12
		A	0,55		-	-		A	0,54
		L	0,45		-	-		L	0,34
Average	-	-	-	-	-	-	A	H	0,71
		-	-		-	-		A	0,28
		-	-		-	-		L	0,01

So determination of economic processes development level of machine-building enterprises in 2017 makes possible to conclude that enterprises with average level of personnel

effectiveness with high probability (0.71) will be able to achieve high level of development of the process of working time usage. For enterprises with high level of staff material motivation effectiveness, there is a greater probability (0.66) for the achievement of the average level of development of the use of accounts payable and is almost the same (0.68) of the turnover of working capital. For the enterprises of the second group, the indicators show high probability of reaching the average level of the development of the circulating capital turnover and working time usage (0.55 and 0.54, respectively).

The usage of the management these theoretical and methodological approaches enables reasonable and systematically determine and evaluate the personnel material motivation effectiveness and its role in ensuring the development of the enterprise economic processes and, accordingly, coordinate the activities in the necessary directions, by applying methods of personnel material motivation.

4. Conclusion

Thus, the leading role in motivation of work belongs to the personnel material motivation as a source of the newly created value of the enterprise and the income of the workers on the basis of the establishment of forms and sizes of wages, participation in profits, and payment of dividends. For completeness of understanding of the motivational component of management, it is necessary to define its goals, tasks and methods, which must be based on the appropriate principles for ensuring the impact on the object - the enterprise economic processes.

In order to determine the object of influence of the personnel material motivation, the content of the category "enterprise economic processes" is disclosed as a set of interrelated phenomena of economic character for achievement of a certain result by transforming the "inputs" with the help of resources into the "outputs". It has been established that economic processes can be considered as ways of ensuring the final results of the enterprises activities on the bases of all resources types' usage.

For assessment the effectiveness of the material motivation and the level of development of productive resources usage, the system of indicators has been formed, the selection procedure of which was carried out in two stages: 1) organization of research (formation of the information space of the research, selection of the method of indicators choosing - expert assessment and criteria for determining indicators); 2) data processing (taking into account the results of expert surveys, justification of the compliance of selected indicators with the proposed criteria).

The estimation of the level of personnel material motivation influence on a certain set of interrelated phenomena of economic character on the scale of the intervals of the factorial dispersion, made it possible to find out that the majority of the indicators that characterize them, the level of influence is in the range [very low – low]. The obtained results are the necessary information base for making managerial decisions when implementing the motivation policy at the enterprise.

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