Analysis of the Employee Commitment and Supply Chain Integration Effects on Industrial Enterprise

Lidiya Ivanovna Kulikova, Liliya Bagramovna Sungatullina, Aigul Ilshatovna Sabirova
[1,2,3]*Department of Accounting, Analysis and Audit in Institute of Management, Economics and Finance, Kazan Federal University*

Abstract— **To study methodological approaches to employee remuneration planning taking into account the relationship between the types of supply chain management (SCM) and the staff effectiveness based on the multiple regression model and evaluation of the optimal payment times based on a dynamic model with a distributed lag. The application of the concept of sustainable supply chain management in the operation strategy of industrial enterprise seems to be a very important function. This supply chain also covers all three aspects of sustainable development: business, environmental, and social. The linear multiple regression model, classical least squares method, dynamic model with a distributed lag. The article considers a methodological approach to planning staff remuneration taking into account the supply chain management requirements. The relationship between the types of wages and the employees' labor productivity is revealed and the optimal payment times are established to devise the best remuneration plan in supply chain process to each employee. The article develops a methodological approach to remuneration planning based on the relationship between supply chain and employee effectiveness based on the dominant types of remuneration and optimal payment times. The developed methodological approach to planning staff remuneration was disclosed based on the data of a shoe enterprise from 2016 to 2020. Meanwhile, managers should promote employee commitment not only for better supply chain success, but also to mitigate the barriers of supply chain management implementation. The main conclusions of the article can be used in the scientific and practical activities of manufacturing enterprises when planning supply chain strategies by evolving the employees.**

Keywords— *supply chain management, labor remuneration, planning, linear regression model, dynamic model, Commitment, Performance.*

1. Introduction

Against the background of digitalization of economic processes, the supply chain management system is faced with tasks whose solution is associated with the search for new approaches to organizing staff remuneration. The issues of consistency of the staff remuneration system with internal production and organizational conditions in the rapidly changing external competitive environment come to the fore. The solution to these problems requires improving approaches to regulating remuneration taking into account the integration of business strategies and changes in staff management methods. Such an approach will help to set up an objective wage payment system taking into account the importance of personnel and their contribution to the implementation of business goals.

The design of supply chain for a staff remuneration system reflects a business strategy and their compliance can be seen as a competitive advantage of an enterprise [1]. In this context, issues of remuneration should be considered through a system of staff motivation to effective activities. To that end, it is important to develop scenario-based approaches to salary allocation [2] taking into account accumulated knowledge and skills that increase performance effectiveness and are an investment in human capital at the same time since the development of skills serves as the basis for continuous efforts to maintain staff qualifications at the required modern competitive level [3].

In addition, advantages in staff skills are one of the forms of development of a knowledge-based enterprise and contribute to the achievement of business goals [4]. At the same time, when building a remuneration system, there is always a risk of distortions that can cause fluctuations in labor remuneration and reduce its competitiveness [5] which requires tracking the relationship between the minimum salary and the criteria for its growth due to increased efficiency and the impact of time factors [6]. Thus, the development of all elements of remuneration

International Journal of Supply Chain Management
IJSCM, ISSN: 2050-7399 (Online), 2051-3771 (Print)

must be evaluated [7] since the remuneration system is a significant motivator for improving employees' professional qualifications, and therefore for solving promising tasks of enterprise development [8].

In addition, remuneration is an element of the entire personnel management system [9] and should be based on the interconnection of business strategies taking into account the factors of the external and internal environment of the enterprise [10, 11] which contributes to an increase in the employees' performance effectiveness and acts as a factor in the sustainable development of the enterprise [12, 13].

Thus, remuneration planning is one of the key stages in the implementation of a business strategy based on an integrated approach to management organically linked to environmental factors of the enterprise and initiatives in the field of personnel development. Modelling an integrated supply chain and employee reward programme contributes to the achievement of the goals set. This process allows optimizing remuneration in the future, taking into account the relationship between certain types of remuneration and employee effectiveness [14]. This kind of optimization is based on the comparability of wages with increased staff productivity and the determination of the most optimal payment times.

2. Method

In the supply chain context, human performance refers to employees' performance excellence in meeting expected levels, or performance goals, on various SCM-related tasks and activities. The advisability of planning remuneration based on modeling poses the problem of choosing a specific model for assessing changes in wages. Modern information technologies allow one to use different methods of economic and mathematical research taking into account the business strategy and the strategy for optimizing remuneration [15].

One of the methods of processing information that reflects the stable trends of the object of study is modeling based on the series of dynamics. For remuneration planning, we propose the use of a linear multiple regression model to determine the relationship between the types of remuneration and the staff performance, and a dynamic model with a distributed lag to establish the optimal payment times.

The recommended methodological approach includes the following steps:

1) regression analysis of remuneration and personnel performance indicators to identify a significant relationship between them;
2) calculation of partial elasticity coefficients to determine the dominant types of wages;
3) building a dynamic model with a distributed lag for each type of wage;
4) formulation of a consolidated model with a distributed lag;
5) optimization of the staff remuneration system by comparing the obtained values.

The application of this approach to the planning of staff remuneration allows us to identify a favorable trend in the development of remuneration and make adjustments to the remuneration system to optimize it.

3. Results & Discussion

Human performance is crucial to supply chain strategy implementation. A firm may have sound supply chain strategies in place but suboptimal performance from its employees can easily sabotage the achievement of goals. We explore the proposed approach to planning staff remuneration based on the data of one of the industrial enterprises of the Russian Federation involved in the production of shoes. The company adopted the practice of determining remuneration as a percentage of the implementation of the product release plan or according to the level of the previous period with an increase proportional to the volume of production. This approach does not take into account the relationship between labor remuneration and staff productivity.

The data sample consists of six quarterly economic and financial indicators of the enterprise from January 2016 to December 2019, obtained from the official corporate information disclosure network SPARK (Table 1)

Table 1 Data on remuneration and labor productivity of a shoe enterprise staff for 2016-2019

Period	Production volume, pairs of shoes	Average headcount, people	Labor productivity, pairs of shoes/person	Reward for education, In SCM rub.	Reward for the production results, in SCM rub.	Incentive payments, rub.
Q1 2016	61963	744	83,28	3298,87	331595,21	3564,88
Q2 2016	99494	741	134,27	3645,45	345873,69	4509,89
Q3 2016	124094	725	171,16	3929,16	408759,80	4629,87
Q4 2016	135799	735	184,76	4159,45	455924,39	4894,86
Q1 2017	138809	746	186,07	19165,71	815219,95	38439,72
Q2 2017	136627	752	181,68	17908,04	810325,83	33934,64
Q3 2017	135135	748	180,66	16650,38	807438,92	32428,36
Q4 2017	136831	744	183,91	24392,72	1037549,61	36923,28
Q1 2018	118097	716	164,94	19287,64	887204,85	31024,84
Q2 2018	115706	701	165,06	22794,48	892423,92	33665,72
Q3 2018	124443	688	180,88	24547,90	899533,45	34486,24
Q4 2018	123442	679	181,80	25041,06	905314,49	38845,20
Q1 2019	124231	687	180,83	23054,08	897642,78	38126,78
Q2 2019	124372	685	181,56	24673,95	899563,54	38954,52
Q3 2019	128452	696	184,56	25342,87	901453,67	39128,03
Q4 2019	129643	702	184,68	25863,97	903650,67	39534,67

At the first stage of remuneration planning, we figure out the relationship between remuneration and staff productivity. To that end, we determine the relationship between these characteristics and conduct a regression analysis to identify the functional relationship between the quantitative indicators of time series. The results of the regression analysis are presented in tables 2, 3, 4.
The linear equation of multiple regression reads:

$$Y = 96,597 + 0,0028 \times X_1 + 0,0003 \times X_2 + 0,0077 \times X_3 + \varepsilon \quad (1)$$

where Y is labor productivity, pairs of shoes/person

X1- reward for education, rub.

X2 - reward for the production results, rub.

X3 - incentive payments, rub.

Table 2 Regression statistics of the dependence of labor productivity on staff remuneration

Multiple R	0,693106096
R square	0,48039606
Adjusted R square	0,350495075
Standard Error	21,5218994
Observations	16

According to the data in Table 2, the model explains 48.04% of the information available for making management decisions. The adjusted coefficient of determination which is more appropriate for assessing the quality of the selection of a model with several regressors, equals 0.3505, i.e., 35.05% of the information is explained by the model.

Table 3 Dispersion analysis of the dependence of labor productivity on staff remuneration

Parameter	df	SS	MS	F	Significance F
Regression	3	5138,891421	1712,963807	3,69817104	0,042914354
Residual	12	5558,305844	463,1921537		
Total	15	10697,19726			

The value of the Fisher's exact test statistic (F) is greater than the appropriate value of the F critical value , therefore, the constructed linear model of multiple regression is statistically significant. The F-significance of less than 0.05 indicates the presence of a statistically significant relationship between the variables with a probability of 90% and 95%.

Table 4 Coefficients of the regression equation of labor productivity depending on staff remuneration

Parameter	Coefficients	Standard Error	t-statistics	P-value	Lower 95%	Upper 95%
Y-intersection	96,59760953	35,60954749	2,712688488	0,01886132	19,01107069	174,1841484
Reward in SCM	0,002829711	0,00129221	2,18982389	0,38672627	0	0,005659423
Payment for the production result	0,000344603	0,000153729	2,241622342	0,23809731	0	0,000689207
Incentive payments	0,007661869	0,003147218	2,434489948	0,6716429	0	0,015323739

The observed value of t-statistics for each of the regression coefficients is greater than the critical value, therefore, each of the coefficients is statistically significant. Thus, with an increase in reward role in SCM for education by 1 ruble, labor productivity increases by 0.0028 units of measurement on average; an increase of reward in SCM for the production results by 1 ruble leads to an increase in labor productivity by 0,0003 units of measurement on average; an increase in incentive payments by 1 ruble leads to an increase in labor productivity by 0.007 units on average. To determine which of the types of remuneration affects labor productivity more significantly, we define the partial elasticity coefficients:

$$Э_{x1} = 0,0028 \times \frac{17734,73}{170,63} = 0,2941$$

$$Э_{x2} = 0,0003 \times \frac{762467,17}{170,63} = 1,5399$$

$$Э_{x3} = 0,0077 \times \frac{28318,22}{170,63} = 1,2716 \qquad (2)$$

According to the calculation, with an increase in reward in SCM for the production result by 1%, labor productivity increases by 1.5399%. This factor most significantly affects the increase in staff performance.

To optimize remuneration, dynamic models with a distributed lag for each type of remuneration must be built. Since quarterly data are presented, we choose the length of the lag equal to three to cover four quarters (t, t-1, t-2, t-3). The final lag suggests we use Almon's technique in the estimation of the model parameters. The chosen polynomial is of the third degree.

$$y_t = a + b_0 \times x_t + b_1 \times x_{t\ 1} + b_2 \times x_{t\ 2} + b_3 \times x_{t\ 3} + \varepsilon_t \qquad (3)$$

where y is labor productivity, pairs/person

xt - remuneration (by type) in the current quarter, rub.

xt-1 - remuneration (by type) in the previous quarter, rub.

xt-2 - remuneration (by type) two quarters ago, rub.

xt-3 - remuneration (by type) three quarters ago, rub.

- random deviation.

To build dynamic models with a distributed lag we transform the input data:

$$z_0 = x_t + x_{t-1} + x_{t-2} + x_{t-3};$$

$$z_1 = 0 \times x_t + 1 \times x_{t-1} + 2 \times x_{t-2} + 3 \times x_{t-3};$$

$$z_2 = 0 \times x_t + 1 \times x_{t-1} + 4 \times x_{t-2} + 9 \times x_{t-3};$$

$$z_3 = 0 \times x_t + 1 \times x_{t-1} + 8 \times x_{t-2} + 27 \times x_{t-3}. \qquad (4)$$

Then we determine the estimates of the coefficients in the regression equation:

$$y_t = a + c_0 \times z_0 + c_1 \times z_1 + c_2 \times z_2 + c_3 \times z_3 \qquad (5)$$

Table 5 Input data for a dynamic model with a distributed lag (factor - reward for education in SCM)

Labor productivity, pairs of shoes/person	Reward for education in SCM, rub.	Converted Variables			
		Z_0	Z_1	Z_2	Z_3
83,28	3298,87	-	-	-	-
134,27	3645,45	-	-	-	-
171,16	3929,16	-	-	-	-
184,76	4159,45	15032,93	21116,67	48200,79	122162,25
186,07	19165,71	30899,77	22954,12	52685,14	134019,88
181,68	17908,04	45162,36	39272,09	71165,95	158528,63
180,66	16650,38	57883,58	68717,81	132005,9	283538,87
183,91	24392,72	78116,85	109963,59	260773,9	677388,87
164,94	19287,64	78238,78	111417,6	252166,6	641112,84
165,06	22794,48	83125,22	118024,22	266711,9	663989,66
180,88	24547,90	91022,74	134547,92	319479,5	835699,04
181,80	25041,06	91671,08	127999,78	289314,6	727670,02
180,83	23054,08	95437,52	142520,3	328383	836875,22

181,56	24673,95	97316,99	146779,9	344149,4	886175,86
184,56	25342,87	98111,96	145905,29	342259,8	885215,21
184,68	25863,97	98934,87	143853,01	331525,4	845194,63

The regression equation for the transformed data reads:

$$y_t = \ 455{,}25 + 0{,}0004 \times z_0 + 0{,}0015 \times z_1 + 0{,}0008 \times z_2 + 0{,}0001 \times z_3 \quad (6)$$

$$b_0 = c_0;$$
$$b_1 = c_0 + c_1 + c_2 + c_3;$$
$$b_2 = c_0 + 2c_1 + 4c_2 + 8c_3;$$
$$b_3 = c_0 + 3c_1 + 9c_2 + 27c_3 \quad (7)$$

$$y_t = -455{,}25 + 0{,}0004 \times x_t + 0{,}0028 \times x_{t-1} + 0{,}0074 \times x_{t-2} + 0{,}0149 \times x_{t-3} + \varepsilon_t \quad (8)$$

To determine the sample estimates of the regression coefficients we perform the transformation: Then a dynamic model with a distributed lag reflecting the impact of reward for education in SCM on the productivity reads: The model shows that the greatest impact of reward for education in SCM is not manifested in the current quarter, but in subsequent quarters. The cumulative effect of reward for education in SCM on labor productivity for four quarters is 0.025 pairs of shoes per The average lag means that an increase in labor productivity under the influence of reward for employee. The average lag is determined by the formula:

$$L = \sum_{j=0}^{l} j \times \beta_j \quad (9)$$

$$L = 0 \times \frac{0{,}0004}{0{,}0255} + 1 \times \frac{0{,}0028}{0{,}0255} + 2 \times \frac{0{,}0074}{0{,}0255} + 3 \times \frac{0{,}0149}{0{,}0255} = 2{,}4438 \quad (10)$$

where j is the sequence number of the regression coefficient, β is the relative coefficient of the distributed lag model.

education in SCM occurs on average over two and a half quarters.

Table 6 Input data for a distributed lag model (factor - payment for production results)

Labor productivity, pairs of shoes/person	Payment for the production result, rub.	Converted Variables			
		Z_0	Z_1	Z_2	Z_3
83,28	331595,21	-	-	-	-
134,27	345873,69	-	-	-	-
171,16	408759,80	-	-	-	-
184,76	455924,39	1542153,09	2095292,81	4776611	12128820
186,07	815219,95	2025777,83	2311065,06	5203827	13064592,4
181,68	810325,83	2490229,97	2953348,13	6317756	15499129,7
180,66	807438,92	2888909,09	3808538,9	8174525	19642044
183,91	1037549,61	3470534,31	4873750,43	11385722	29300984,2
164,94	887204,85	3542519,21	5083404,94	11560238	29375858,4
165,06	892423,92	3624617,30	5384620,83	12304354	30988452,6
180,88	899533,45	3716711,83	5779482,45	13779190	36003902,2
181,80	905314,49	3584476,71	5345995,84	12454073	31993455,8
180,83	897642,78	3594914,64	5381653,15	12535264	32197027,9
181,56	899563,54	3602054,26	5406872,11	12614702	32427561,9
184,56	901453,67	3603974,48	5410792,57	12637965	32524197
184,68	903650,67	3602310,66	5393509,09	12578493	32334317,1

The regression equation for the converted data reads, After transforming the sample estimates of the regression coefficients the dynamic model with a distributed lag reflecting the effect of payment for the production result on the labor productivity reads

The model shows that the greatest influence of payment for the production result on labor productivity manifests itself gradually, increasing over three quarters. The cumulative effect of payment for the production result on labor productivity over four quarters is 0.0289 pairs of shoes per employee. The average lag is determined by the formula:

$$y_t = -25832{,}62 + 0{,}0008 \times z_0 + 0{,}0011 \times z_1 + 0{,}0011 \times z_2 + 0{,}00009 \times z_3 \quad (11)$$

$$y_t = -25832{,}62 + 0{,}00087 \times x_t + 0{,}00316 \times x_{t-1} + 0{,}00823 \times x_{t-2} + 0{,}01667 \times x_{t-3} + \varepsilon_t \quad (12)$$

$$L = 0 \times \frac{0{,}00087}{0{,}0289} + 1 \times \frac{0{,}00316}{0{,}0289} + 2 \times \frac{0{,}00823}{0{,}0289} + 3 \times \frac{0{,}01667}{0{,}0289} = 2{,}406 \quad (13)$$

where j, β is the same as in formula (9).

The average lag means that the increase in labor productivity under the influence of payment for the production result occurs within two and a half quarters.

Table 7 Input data for a distributed lag model (factor - incentive payments)

Labor productivity, pairs of shoes/person	Incentive payments, rub.	Converted Variables			
		Z_0	Z_1	Z_2	Z_3
83,28	3564,88	-	-	-	-
134,27	4509,89	-	-	-	-
171,16	4629,87	-	-	-	-
184,76	4894,86	17599,50	24344,29	54753,35	136960,75
186,07	38439,72	52474,34	27684,27	64003,35	163700,85
181,68	33934,64	81899,09	62119,05	99687,99	202605,09
180,66	32428,36	109697,58	125498,66	231747,3	473613,62
183,91	36923,28	141726,00	215616,8	514124,4	1341777,92
164,94	31024,84	134311,12	203583,92	472048,5	1212585,44
165,06	33665,72	134042,20	202156,48	470573,2	1201976,8
180,88	34486,24	136100,08	206485,24	490074,6	1278793
181,80	38845,20	138022,00	194892,2	448372,7	1141482,68
180,83	38126,78	145123,94	208814,84	479781,6	1223709,56
181,56	38954,52	150412,74	219275,9	503883,7	1280016,86
184,56	39128,03	155054,53	231743,68	541068,4	1392789,16
184,68	39534,67	155744,00	231417,41	538087,1	1380187,25

The regression equation for the transformed data reads,

$$y_t = -833{,}76 + 0{,}00084 \times z_0 + 0{,}00082 \times z_1 + 0{,}00109 \times z_2 + 0{,}00006 \times z_3 \quad (14)$$

$$y_t = -833{,}76 + 0{,}00085 \times x_t + 0{,}00284 \times x_{t-1} + 0{,}00740 \times x_{t-2} + 0{,}01493 \times x_{t-3} + \varepsilon_t \quad (15)$$

$$L = 0 \times \frac{0{,}00085}{0{,}0260} + 1 \times \frac{0{,}00284}{0{,}0260} + 2 \times \frac{0{,}00740}{0{,}0260} + 3 \times \frac{0{,}01493}{0{,}0260} = 2{,}40 \quad (16)$$

where j, β is the same as in formula (9).

The average lag means that an increase in labor productivity under the influence of incentive payments also occurs on average over two and a half quarters.

To plan labor productivity in Q1 2020, a consolidated dynamic model with a distributed lag must be built including all types of wages at the same time:

$$y_t = -20140{,}48 + 0{,}0003 \times x_t + 0{,}0018 \times x_{t-1} + 0{,}0054 \times x_{t-2} + 0{,}0109 \times x_{t-3} + 0{,}00057 \times x_{2t} + 0{,}00213 \times x_{2t-1} + 0{,}00612 \times x_{2t-2} + 0{,}01233 \times x_{2t-3} + 0{,}00063 \times x_{3t} + 0{,}00213 \times x_{3t-1} + 0{,}00542 \times x_{3t-2} + 0{,}01342 \times x_{3t-3} + \varepsilon \quad (17)$$

where y is labor productivity, pairs/person.

X1t - reward in SCM for education in the current quarter, rub.

X1t-1 - reward in SCM for education in the previous quarter, rub.

X1t-2– reward in SCM for education two quarters ago, rub.

X1t-3– reward in SCM for education three quarters ago, rub.

X2t– payment for the production result in the current quarter, rub.

X2t-1 - payment for the production result in the previous quarter, rub.

X2t-2– payment for the production result two quarters

ago, rub.
X2t-3– payment for the production result three quarters ago, rub.
X3t– incentive payments in the current quarter, rub.
X3t-1 - incentive payments in the previous quarter, rub.
X3t-2– incentive payments two quarters ago, rub.
X3t-3 - incentive payments three quarters ago, rub.
- random deviation.

According to the preliminary plan of the shoe enterprise, the following types of remuneration are expected (Table 8).

Table 8 Preliminary plan for the remuneration of a shoe factory staff of in 2020 without the interconnection of the types of wages and labor productivity

Period	Reward for education in SCM, rub.	Payment for the production result, rub.	Incentive payments, rub.
Q1 2020	24756	856439	39536
Q2 2020	27865	936347	45664
Q3 2020	28210	974563	48750
Q4 2020	28300	995563	49828
Total	109131	3762912	183778
Total	4055821		

Based on the preliminary remuneration plan, we calculate the expected staff productivity in Q1 2020. To that end, the values of the remuneration amounts for the given period (Table 8) and in Q2-4 2019 (Table 1) are substituted into the consolidated time series model with a distributed lag (Eq. 17). According to the calculation results, the projected value of labor productivity in Q1 2020 will be 1,073 pairs of shoes per employee. To determine the possible value of staff productivity in the following quarters of 2020, we substitute the values of the amounts for remuneration quarterly (Table 8) in the consolidated model of the time series with a distributed lag (Eq. 17). As a result, the projected values of labor productivity in Q2-4 2020 will be 1066, 1018, and 1078 pairs of shoes per employee, respectively.

The analysis of the relationship between the types of remuneration and staff productivity based on the time series model with a distributed lag allows us to state that each of the types of labor remuneration contributes to the growth of performance effectiveness, but the payment for the production result has the greatest impact. Moreover, an increase in labor productivity occurs, on average, over two and a half quarters. Therefore, to increase performance effectiveness at the end of the year (in Q4), it is advisable to increase payment for the production result; pay reward for education in SCM to an acceptable minimum mainly in Q1 and Q2; and leave incentive payments unchanged or increase in Q1 and Q2. The results of the planning of the staff remuneration of a shoe company in 2020 presented in Table 9.

Table 9 Remuneration plan for shoe factory staff in 2020

Period	Reward for education in SCM, rub.	Payment for the production result, rub.	Incentive payments, rub.	Labor productivity forecast, pairs of shoes/person
Preliminary remuneration plan without the relationship between the types of wages and staff productivity				
Q1 2020	24756	856439	39536	184,72
Q2 2020	27865	936347	45664	183,90
Q3 2020	28210	974563	48750	175,64
Q4 2020	28300	995563	49828	186,03
Total	109131	3762912	183778	
Total	4055821			
Compensation plan based on models of the relationship between the types of wages and labor productivity				
Q1 2020	24756	858439	39536	185,86
Q2 2020	25365	938347	44964	188,11
Q3 2020	25410	975563	45750	183,45
Q4 2020	25300	984563	46828	187,27
Total	100831	3756912	177078	
Total	4034821			

According to Table 9, the total remuneration taking into account the relationship between the types of wages and labor productivity will amount to 4,034,821 rub, which is 21,000 rub. less than the initial value that did not take into account the relationship between the types of payment and the staff effectiveness. In addition, on the basis of the proposed approach, it is possible to determine the product release provided that the product assortment and the number of personnel in the amount of 702 are maintained.

(185.86-184.72) x702 + (188.11-183.90) x702 + (183.45-175.64) x702 + (187.27-186.03) x702 = 10490 pairs of shoes

Managers should achieve internal integration before external integration and include external integration at the strategic level in order to reap the greatest advantages from supply chain integration. Thus, it can be stated that planning staff remuneration based on the linear model of multiple regression and the dynamic model of time series is appropriate. This approach allows one to determine what types of remuneration to a greater extent determine the increase in the employee efficiency and choose optimal payment periods.

4. Conclusions and future research

Managers interviewed across the five channel positions believe that people are vital to supply chain success. Interestingly, the amount of time and money spent by organizations to develop its people for supply chain collaboration pales in comparison to other bud-get expenditures – namely technology and partner se-lection. The presented work is devoted to the methodological aspects of remuneration planning in a production enterprise management system based on the multiple regression model and the dynamic model with a distributed lag. The study is based on empirically verified theoretical arguments in favor of staff motivation for improved performance [16-20]. The findings are based on practical recommendations in the works [21, 22] on methodological approaches to the study of the determinants of wage changes. The approach to remuneration planning for the staff of a manufacturing enterprise proposed in the study has several advantages due to the ability to trace the relationship between the types of remuneration and labor productivity in the short term and establish optimal payment times. In particular, it allows one to more qualitatively select prognostic factors of the staff remuneration system for a more meaningful interpretation of the modeling results when making management decisions. Thus, the study confirms the expected assumptions about a significant relationship between individual types of remuneration and employee effectiveness, as well as optimal payment times were calculated. All of this contributes to the optimization of the remuneration system for industrial enterprise staff.

The continuation of this research in the direction of studying the trends in the elements affecting the level of staff performance effectiveness will allow us to build a human capital management strategy focused on building an optimal remuneration system and rational use of enterprise financial resources.

Acknowledgements

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

References

[1] Armstrong, M. (2007). A handbook of employee reward management and practice. Kogan Page, London.

[2] Beardwell, J., & Claydon, T. (2010). Human resource management: A contemporary approach (6th ed.). Pearson Education, London.

[3] Boyd, B. K., & Salamin A. (2001). Strategic reward systems: A contingency model of pay system design. Strategic Management Journal, 22(8), pp. 777-792.

[4] Bush, T. J. (2003). Leverage employee rewards to drive performance. Hoosier Banker, 87(4), pp. 26-29.

[5] Chang, W.-J.A., & Huang, T. C. (2005). Relationship between strategic human resource management and firm performance: A contingency perspective. International Journal of Manpower, 26(5), pp. 434-449.

[6] Datta, P. (2012). An applied organizational rewards distribution system. Management Decision, 50(3), pp. 479-501.

[7] Dobija, M. (2011). Labor productivity vs. minimum wage level. Mod Econ, (2), pp. 780-787.

[8] Gazimova, E. F., Sabirova A. I., Zakharova, E. S, & Khabetdinov, R. (2019). Analysis of the efficiency of company's intangible assets management. International Journal on Emerging Technologies, 10(2), pp. 61-65.

[9] Koziol, L., Koziol, W., Wojtowicz, A., & Pyrek, R. (2014). An outline of compensation system based on human capital theory. Procedia Soci Behav Sci, 148, pp. 551-558.

[10] Koziol, W., & Mikos, A. (2020, June 1). The measurement of human capital as an alternative method of job evaluation for purposes of remuneration. CentralEuropean Journal of Operations Research, 28(2), pp. 589-599.
[11] Kulikova, L. I., & Goshunova, A. V. (2013). Measuring efficiency of professional football club in contemporary researches. World Applied Sciences Journal, 25(2), pp. 247-257.
[12] Ndinguri, E., Prieto, L., & Machtmes, K. (2012). Human capital development dynamics: The knowledge based approach. Academy of Strategic Management Journal, 11(2), pp. 121-136.
[13] Peng-Ju Su, A. (2020). Information advantage and minimum wage. Information Economics and Policy, 50, 100851.
[14] Pérez-Bustamante Ilander, G. O., Marques, C. S. E., Jalali, M. S., & Ferreira, F. A. F. (2016). The impact of continuous training in small and medium enterprises: Lessons from an industrial case analysis. Journal of Business Economics and Management, 17(2), pp. 234-250.
[15] Slaughter, S. A., Ang, S., & Boh, W. F. (2007). Firm-specific human capital and compensation-organizational tenure profiles: An archival analysis of salary data for it professionals. Human Resource Management, 46(3), pp. 373-394.
[16] Suleman, A., Suleman, F., & Reis, E. (2016). Fuzzy approach to discrete data reduction: an application in economics for assessing the skill premium. Journal of Business Economics and Management, 17(3), pp. 414-429.
[17] Sum, V. (2010). The role of training and firm's competitiveness in the knowledge-based economy. Review of Business and Technology Research, 3(1), pp. 1-12.
[18] Sungatullina, L. B., & Faizrahmanova, G. R. (2016). The modeling of industrial entity's dynamics staff costs. Academy of Strategic Management Journal, 15(Special Issue), pp. 69-76.
[19] Sungatullina, L. B., Neizvestnaya, D. V., & Kadochnikova, E. I. (2018). The efficiency analysis of measures to improve the labor productivity. Journal of Social Sciences Researcy, (1), pp. 260-266.
[20] Wang, D.-S., & Shyu, C.-L. (2008). Will the strategic fit between business and HRM strategy influence HRM effectiveness and organizational performance?, International Journal of Manpower, 29(2), pp. 92-110.
[21] White, R. (2005). A strategic approach to building a consistent global rewards program. Compensation and Benefits Review, pp. 23-39.
[22] Xiao, J. (2002). Determinants of salary growth in Shenzhen, China: An analysis of formal education, on-the-job training, and adult education with a three-level model. Economics of Education Review, 21(6), pp. 557-577.