

Shyfrina N. I.

*Ph. D. in Economics,
Associate Professor of Economic Theory, Statistics and Forecasting Department
Simon Kuznets Kharkiv National University of Economics, Ukraine;
e-mail: runavi33@rambler.ru; ORCID ID: 0000-0002-5079-5660*

Ukrainska L. O.

*Doctor of Economics, Professor,
Professor of Economic Theory, Statistics and Forecasting Department
Simon Kuznets Kharkiv National University of Economics, Ukraine;
e-mail: ukrainskalarisa@gmail.com; ORCID ID: 0000-0002-2500-0395*

Marchenko O. S.

*Doctor of Economics, Professor, Professor of Economic Theory Department
Yaroslav Mudryi National Law University, Kharkiv, Ukraine;
e-mail: ol.mar4enko2011@ukr.net; ORCID ID: 0000-0002-8153-4770*

Cherkashyna T. S.

*Ph. D. in Economics,
Associate Professor of Economic Theory, Statistics and Forecasting Department
Simon Kuznets Kharkiv National University of Economics, Ukraine;
e-mail: T.Cherkashina@hotmail.com; ORCID ID: 0000-0003-3675-0391*

IMPROVEMENT OF ECONOMIC EFFICIENCY OF THE ENTERPRISE BASED ON AUTOMATION OF MANAGEMENT OF MOTIVATION OF PERSONNEL

Abstract. In modern conditions of the functioning of economic activity, the economic efficiency of an enterprise directly depends on labor productivity and the quality of manufactured products, one of the key areas for improvement of which is the management of personnel motivation.

The existing practice of managing staff motivation is implemented directly by the enterprise management or specialized HR departments. At the same time, there is currently no automation of this process that can strengthen the motivation factors used at the enterprise. Given the relevance of this problem, the aim of the study is to increase the economic efficiency of the enterprise by developing a way to automate the management of staff motivation. To achieve this goal, the article explores theoretical approaches to determining the factors that influence the motivation of staff. The most significant factors of motivation are established: financial and free time stimulation. The capabilities of existing software products for personnel management of the enterprise are analyzed and systematized. A universal method for automating the process of managing staff motivation has been developed and proposed, which involves: setting individual parameters for any type and scale of an enterprise or organization, as well as the active participation of employees in choosing a motivation factor using accrual and individual use of the main and additional bonus points. The practical application of the proposed automation method makes it possible to increase the economic efficiency of the enterprise by strengthening the used motivation factors in terms of increasing labor productivity and the quality of manufactured products.

Keywords: economic efficiency, motivation factors, personnel motivation management, automation, Android operating system.

JEL Classification M5

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Шифріна Н. І.

*кандидат економічних наук,
доцент кафедри економічної теорії, статистики та прогнозування,
Харківський національний економічний університет ім. С. Кузнеця, Україна;
e-mail: runavi33@rambler.ru; ORCID ID: 0000-0002-5079-5660*

Українська Л. О.

*доктор економічних наук, професор,
професор кафедри економічної теорії, статистики та прогнозування,
Харківський національний економічний університет ім. С. Кузнеця, Україна;
e-mail: ukrainskalarisa@gmail.com; ORCID ID: 0000-0002-2500-0395*

Марченко О. С.

*доктор економічних наук, професор, професор кафедри економічної теорії,
Національний юридичний університет ім. Ярослава Мудрого, Харків, Україна;
e-mail: ol.mar4enko2011@ukr.net; ORCID ID: 0000-0002-8153-4770*

Черкашина Т. С.

*кандидат економічних наук,
доцент кафедри економічної теорії, статистики та прогнозування,
Харківський національний економічний університет ім. С. Кузнеця, Україна;
e-mail: T.Cherkashina@hotmail.com; ORCID ID: 0000-0003-3675-0391*

ПІДВИЩЕННЯ ЕКОНОМІЧНОЇ ЕФЕКТИВНОСТІ ПІДПРИЄМСТВА НА ОСНОВІ АВТОМАТИЗАЦІЇ УПРАВЛІННЯ МОТИВАЦІЄЮ ПЕРСОНАЛУ

Анотація. У сучасних умовах функціонування господарської діяльності економічна ефективність підприємства безпосередньо залежить від продуктивності праці та якості виробленої продукції, одним із ключових напрямів удосконалення яких є управління мотивацією персоналу.

Чинна практика управління мотивацією персоналу реалізується безпосередньо керівництвом підприємства або спеціалізованими HR-відділами. При цьому на нинішній день відсутня автоматизація цього процесу, здатна посилити чинники мотивації, які застосовані на підприємстві. Ураховуючи актуальність проблеми, метою дослідження є підвищення економічної ефективності підприємства шляхом розроблення способу автоматизації управління мотивацією персоналу. Для досягнення поставленої мети досліджено теоретичні підходи до визначення чинників, які впливають на мотивацію персоналу. Установлено найбільш суттєві чинники мотивації: фінансові й стимулювання вільним часом. Проаналізовано і систематизовано можливості наявних програмних продуктів з управління персоналом підприємства. Розроблено і запропоновано універсальний спосіб автоматизації процесу управління мотивацією персоналу, який передбачає: установку індивідуальних параметрів для будь-якого типу і масштабу підприємства або організації, а також активну участь співробітників підприємства у виборі того або іншого чинника мотивації за допомогою нарахування й індивідуального використання в корпоративному магазині основних і додаткових бонусних балів. Практичне застосування запропонованого способу автоматизації дає можливість підвищити економічну ефективність підприємства за рахунок посилення використовуваних чинників мотивації в частині підвищення продуктивності праці та якості виробленої продукції.

Ключові слова: економічна ефективність, чинники мотивації, управління мотивацією персоналу, автоматизація, операційна система Android.

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Шифрина Н. И.

*кандидат экономических наук,
доцент кафедры экономической теории, статистики и прогнозирования,
Харьковский национальный экономический университет им. С. Кузнеця, Украина;
e-mail: runavi33@rambler.ru; ORCID ID: 0000-0002-5079-5660*

Украинская Л. О.

*доктор экономических наук, профессор,
профессор кафедры экономической теории, статистики и прогнозирования,
Харьковский национальный экономический университет им. С. Кузнеця, Украина;
e-mail: ukrainskalarisa@gmail.com; ORCID ID: 0000-0002-2500-0395*

Марченко О.С.

*доктор экономических наук, профессор,
профессор кафедры экономической теории,
Национальный юридический университет им. Ярослава Мудрого, Харьков, Украина;
e-mail: ol.mar4enko2011@ukr.net; ORCID ID: 0000-0002-8153-4770*

Черкашина Т. С.

*кандидат экономических наук,
доцент кафедры экономической теории, статистики и прогнозирования,
Харьковский национальный экономический университет им. С. Кузнеца, Украина;
e-mail: T.Cherkashina@hotmail.com; ORCID ID: 0000-0003-3675-0391*

ПОВЫШЕНИЕ ЭКОНОМИЧЕСКОЙ ЭФФЕКТИВНОСТИ ПРЕДПРИЯТИЯ НА ОСНОВЕ АВТОМАТИЗАЦИИ УПРАВЛЕНИЯ МОТИВАЦИЕЙ ПЕРСОНАЛА

Аннотация. Исследованы теоретические подходы к определению факторов, оказывающих влияние на мотивацию персонала. Установлены наиболее существенные факторы мотивации. Разработан и предложен универсальный способ автоматизации управления мотивацией персонала, который предполагает: установку индивидуальных параметров для любого типа и масштаба предприятия, а также активное участие сотрудников предприятия в выборе того или иного фактора мотивации. Практическое применение предложенного способа автоматизации дает возможность повысить экономическую эффективность предприятия за счет усиления используемых факторов мотивации в части повышения производительности труда и качества производимой продукции.

Ключевые слова: экономическая эффективность, факторы мотивации, управление мотивацией персонала, автоматизация, операционная система Android.

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Introduction. In modern conditions of functioning of economic activity, the economic efficiency and competitiveness of the enterprise (organization) directly depends on labor productivity and product quality (goods, works, services). At the same time, managing staff motivation is one of the key areas for increasing economic efficiency.

The functions of managing staff motivation are carried out using human resources – management (of enterprise, organization, structural divisions, branches, etc.) or specialized HR-services (personnel management departments). This form of management is regressive from the point of view of the current level of development of science, engineering and technology, mass automation of production, implementation of predominant number of operations in accounting, financial and warehouse accounting using software.

The existing software products for HR management can slightly improve employee motivation in terms of the collective social climate, corporate communication and increase in information transfer speed. Thus, we have to state that today there is practically no developed software for managing staff motivation directly, and the use of human labor to stimulate the same human labor due to subjectivity, differences in education, qualifications, etc. is not always optimal.

Based on the above, the research topics and the developments in the field of improving the economic efficiency of the enterprise (organization), based on automation of staff motivation management, can reasonably be considered relevant, appropriate and necessary.

Research analysis and problem setting.

The problems of managing staff motivation are reflected in the work of economists and practitioners from around the world. In particular, A. Barzoki, A. Attafar and A. Ganatti conducted a research on the motivation of the personnel of Iranian industrial enterprises and found that high wages, financial bonuses and medical insurance have the most positive effect on staff motivation [1]; S. Hosseini using the regression analysis of factors affecting the motivation of personnel of Iranian

banking institutions proved that there is a close relationship between the degree of satisfaction with social needs and the level of motivation [2]; a similar study in the banking sector of Pakistan was conducted by A. Hah, S. Ahmed, S. Paul and S. Kazmi, which statistically proved the positive impact of staff motivation on labor productivity growth and improvement of the efficiency of Pakistan's banking business as a whole [3]; B. Gupta and J. Subramanian focused on motivation factors for personnel of Vietnamese consulting companies [4]; E. Kuranchi-Mensah and K. Amponsah-Taviah found that the most preferred motivators for employees of mining companies in Africa are financial incentives [5]; M. Odukah conducted a study of the personnel of Kenyan companies and showed a positive impact on employees' motivation of such factors as social recognition, working conditions, as well as a system of staff professional development [6]. Particularly noteworthy is the work of I. Nemeskova on the role of non-financial incentives and «privileges» (flexible work hours, free parking, free meals) in the process of motivation and development of workers involved in the finance sphere of the Czech Republic [7], as well as the scientific developments by V. Zaraket, M. Azakur and M. Fawaz who revealed the existence of a positive relationship between the financial remuneration system of employees employed in the banking sector of Libya and their degree of job satisfaction [8].

Given the importance of all of the above scientific developments, today there is an objective need to supplement these theoretical approaches to managing staff motivation by creating a way to automate them, corresponding to the current level of development of science and technology.

The objective of the research is to increase the economic efficiency of the enterprise based on the development of the way to automate the management of staff motivation of the enterprise (organization). To achieve this goal, it is necessary to solve the following tasks:

study and generalize the existing theoretical approaches to managing staff motivation and establish the most significant factors of motivation;

analyze existing software products for staff management;

develop an automated program for managing staff motivation.

Results of the research.

The analysis of the existing theoretical approaches to managing staff motivation shows that motivation factors are diverse and sufficiently subjective and, taking the above into account, to achieve the most effective labor results it seems appropriate to provide each employee with the opportunity to choose the appropriate remuneration. Moreover, the most preferable motivators are as follows: financial rewards and free time stimulation [1; 4; 5; 6; 9; 10; 11; 12; 14]. To a lesser extent, employees are interested in social security and participation in corporate events of the company [9; 11; 13; 14].

Currently, the market for automated systems in the field of staff management is represented by software products, which, based on their functional features, can be combined into the following groups:

1. Personnel and payroll accounting – makes personnel records of employees, formation of staffing table, time tracking («Employees of Enterprise», «Personnel», «KAMIN» [15], «Staff Management» [16]);

2. Time tracking – allows you to determine the time of arrival and departure and / or the location of an employee using GPS tracking («Pro100 Time-Keeper» [15], «Time Doctor» [17]); determines the duration of visits to various sites and programs («OfficeMetrica» [15], «StaffCounter», [17]);

3. Corporate social network, which provides for the transfer and control of the performance of work tasks, as well as the remote communication of employees («Bitrix 24» [18]).

The first group of software products specialize in accelerating personnel record keeping and payroll calculations.

The second group, in terms of motivation, is aimed at increasing the level of involvement in the work and control of labor discipline of employees.

The third group of programs is able to improve staff motivation in terms of employee

communication and speed of transmission of official information.

In connection with all of the above, it seems appropriate to develop an automated program for managing staff motivation, the algorithm of which implies several stages:

Stage 1 – accrual of basic bonuses (for the main work) and additional ones (for certain types of work and participation in corporate events of the company). In this case, the sum of the main bonuses is calculated in advance and is the subject for further adjustment;

Stage 2 – adjustment and receipt of bonus points. The adjustment of the sum of basic bonuses is carried out by multiplying by an uplift factor - in the absence of complaints from the management and customers of the company or writing off part of them – upon availability of violations of labor discipline;

Stage 3 – use of basic and additional bonuses in the corporate store implies an individual choice (purchase) of remuneration by each employee of the company based on the sum of available bonus points;

Stage 4 – management of the enterprise assesses the work of the staff for a certain period of time on the basis of obtaining the final data in the form of the sum of the received basic and additional bonus points for each employee, which allows timely identification of various levels in the work of the staff.

Software platform. The choice of the Android operating system as a software platform is justified by its market share, which is, among other things (interface convenience, multitasking, ability to run several applications at the same time, update frequency, etc.), the main undeniable and most significant advantage. According to StatCounter data for 2018, Android is the absolute leader in the world market of mobile operating systems (for the year – 75.45%), and in the market of all operating systems – the leading software product (39.63%) [19].

In the development of a software product, it seems appropriate to use object-oriented programming tools, the use of which is presented in the form of two main components:

1. The client part, directly the Android application. For the development of which was used the integrated environment (IDE) Android Studio. The main programming language chosen is Kotlin, proposed by the company JetBrains and officially supported by Google for the Android platform. To achieve a sufficient level of abstraction and following the principles of Clean Architecture, the application is built on the basis of the design pattern MVP (Model View Presenter). The solutions outlined above made the application easy to maintain and testable.

2. The server part that implements the programming interface of the application (API), necessary for the client component to interact with user data. The basis of this part is the Java programming language and the integrated development environment (IDE) IntelliJ IDEA, from the company JetBrains. Additionally, Java Enterprise and Spring Framework technologies were used to create the control module. MySQL was chosen as the database management system (DBMS) as satisfying all the requirements imposed on it, such as: reliability and speed of work.

Hierarchical management structure. The staff motivation management program is focused on a small number of users (up to 30 people) through the use of several control modules depending on the hierarchical structure of the enterprise, its elements and units. The control module is a system of settings (blocks), with the help of which individual parameters of the program for managing staff motivation are set.

It is assumed that the head of each structural subdivision (departments, branches, workshops, etc.) will exercise control over the motivation of employees under his command with the help of a separate control module. In turn, the control of the work of heads of structural units will be the direct task of enterprise management.

The system of accruing basic bonus points. The program provides for the accrual of basic and additional bonuses, which (at the request of the user) can be exchanged in a certain proportion.

The accrual and use of basic bonuses have the following features:

1. Unit No. 1 – sets the parameters for receiving the main bonuses (Table 1).

Table 1

Unit No. 1 – parameters of settings for the main bonus points

Marker	Accounting factors	Bonuses (per month)		Uplift factor	
		<input checked="" type="checkbox"/> Automatically		<input type="checkbox"/> Automatically	
<input checked="" type="checkbox"/>	Productivity		1	4	
<input checked="" type="checkbox"/>	Quality of work		4		
<input checked="" type="checkbox"/>	Lack of complaints from customers and staff		2		
<input checked="" type="checkbox"/>	Labor discipline		1		
	Total		8		32

Unit No. 1 settings include installation parameters that are set by the user or automatically:
bonus points system;
uplift factor;

factors of productivity accounting and quality of work.

2. The main bonuses are added in advance at the beginning of each month. The system of accrual of basic bonus points – involves the assignment of certain points to each accounting factor, which are set automatically or set by the user.

In automatic mode, the total amount of points is «8». Based on the priority tasks of the user, each chosen accounting factor is assigned its weight:

1 - min priority;

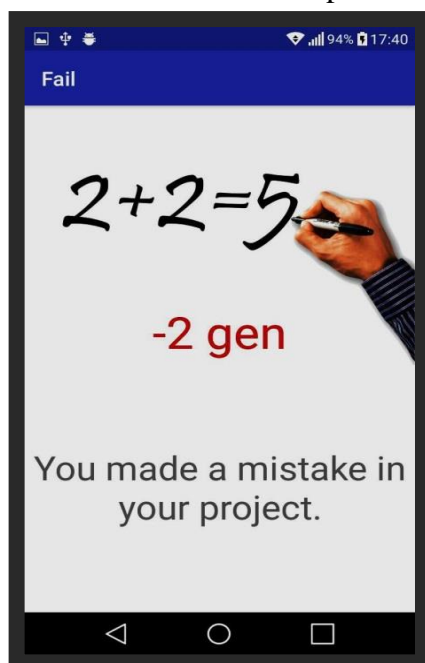
4 - max priority.

The individual system of bonus points is developed in the user mode.

Within a month, the amount of basic bonuses may decrease due to identified violations in the work, indicated in block No. 1 of the control module. In case of improper execution of the official assignment, the employee receives an official message (Fig. 1), and the preliminary bonuses accrued in this clause are removed.

3. At the end of each calendar month, the amount of pre-accrued bonuses, in the absence of malfunctions, is multiplied by an uplift factor (which is automatically equal to 2) and goes into the category of available (ready to be used in the corporate store).

The use of preliminary accrual of bonus points and an uplift factor provides enhanced staff motivation and stimulates more responsible execution of official tasks and labor discipline rules.



a) Service message about a mistake made in calculations



b) Service message about a violation of labor discipline

Fig. 1. Example of a service message: a) about a mistake in calculations; b) about violation of labor discipline

The choice of accounting factors is made by the user based on the relevance of the tasks of staff management of the enterprise (enterprise unit). Accounting factors include four points set by the program: productivity, quality of work, lack of complaints, labor discipline and four user-configurable ones.

The productivity – the choice of this function is appropriate if there are standards for carrying out work.

The quality of work is estimated by the absence of defects and / or errors (Fig. 1a). This factor is the most relevant, since the presence of defects or errors leads to additional production costs and reduction of productivity.

Lack of complaints from customers and staff. Modern business is based on competition for the consumer. Many service companies prefer to know the degree of customer satisfaction and the level of quality of service provided by employees. Typically, such practices are used by banking institutions, mobile operators, insurance companies, public service enterprises, etc. The program will take into account only negative feedback, upon receipt of which an employee receives an official message and the preliminary bonuses accrued in this clause are removed.

Labor discipline – this paragraph takes into account violations of labor discipline (Fig. 1b).

The system of accrual of additional bonus points. Additional bonuses are accrued, in fact, for certain types of work and participation in corporate events of the company. Their amount, unlike the basic bonuses, is set by the user and is not multiplied by the uplift factor.

Unit No. 2 – sets the parameters for receiving additional bonuses (Table 2). The factors of receiving additional bonuses can be assessed by the management individually, for each employee, depending on the amount of his contribution to the improvement of the work of the company. When accruing additional bonuses, the management sends a service message to an employee.

Table 2

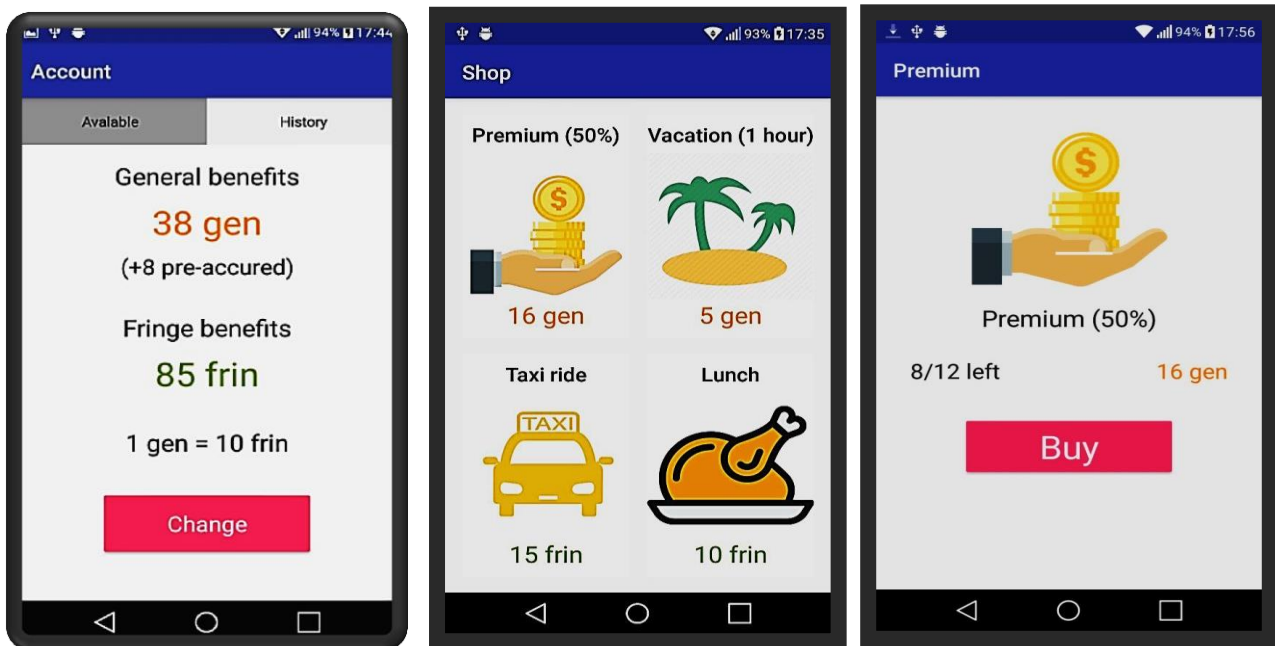
Unit No. 2 – parameters for settings of additional bonuses

Marker	Accounting factors	Bonuses (per month)
<input checked="" type="checkbox"/>	Overtime	20
<input checked="" type="checkbox"/>	Innovation proposal	30
<input checked="" type="checkbox"/>	Participation in corporate events	8
<input checked="" type="checkbox"/>	Advanced training	7
<input checked="" type="checkbox"/>	Gratitude from the superiors	5
	Total	70

The sum of the main (available and pre-accrued) and additional bonuses is displayed in the program in the tab «Account» (Fig. 2a). Also in the tab «Account», you can see the history of accruals and exchange the main (Gen) for additional (Frin) bonuses at the designated rate.

The use of basic and additional bonuses takes place in a corporate store (Fig. 2b), where, respectively, there are two product groups, the cost of which is indicated in the conventional currencies of the corporate store (Gen / Frin - basic / additional bonuses). The basis of this decision is the unequal degree of staff interest in various factors of motivation.

In Unit No. 3, the user sets the types of possible rewards and the parameters for their receipt for each calendar year (Fig. 2c), which are displayed in the form of corporate store goods on the employees' mobile device. Moreover, the total amount of Gen and Frin should be approximately equal to the annual amount of the main and additional bonuses set in block No. 1 and No. 2, taking into account the uplift factor.



a) Tab «Account»

b) Corporate store

c) Product page (remuneration)

Fig. 2. Example of displaying in the program: a) tab “Account”; b) corporate store; c) product pages (remuneration)

The parameters for using the basic and additional bonuses are set by the user in Unit No. 3 (Table 3).

Table 3

Unit No. 3 – parameters of corporate store settings

Reward options	Parameters				
	Unit of measurement		Unit of measurement		Unit of measurement
<input checked="" type="checkbox"/> Monthly premium	% salary	16	Gen	12	192
<input checked="" type="checkbox"/> Quarterly premium	% salary	48	Gen	4	192
<input checked="" type="checkbox"/> Annual premium	% salary	192	Gen	1	192
<input checked="" type="checkbox"/> Free time	Hour / day	5/40	Gen	40/5	200
<input checked="" type="checkbox"/> Taxi	1 ride	15	Frin	10	150
<input checked="" type="checkbox"/> Business lunch	1 lunch	10	Frin	50	500
<input checked="" type="checkbox"/> Visit to sports complex	1 visit	20	Frin	50	1000
<input checked="" type="checkbox"/> Choice of vacation time	1 time	50	Frin	3	150

The program provides for the following types of rewards, which, if necessary, can be changed at the request of the user:

1. Premiums – monthly, quarterly and annual. This is the most sought-after type of material incentive now.
2. Free time. Having extra free time or vacation is a good motivator for most employees. The program provides an opportunity to get additional free time in hours or days.
3. Additional provision in the form of a taxi, a business lunch or a visit to the sports complex will be relevant if the company has concluded service agreements with these organizations.
4. The choice of vacation time for many is quite relevant. The program settings provide a calendar where the employee can specify the time of both the main and additional vacations. The company's management, at its discretion, may exclude certain periods from the choice of vacation days in the calendar settings.

By opening the tab for a certain product (remuneration), the employee sees the following parameters (Fig. 3b): Premium (50%) – type of remuneration (premium in the amount of 50% of the salary); 8/12 left – the available number of units (8) of those provided before the end of the calendar

year (12); 16 gen – unit cost in conventional currency (main (Gen) or additional (Frin) bonuses); Buy – the offer to buy.

Results of the work. The proposed staff motivation management program also provides for the company management to receive data on the results of each employee's work on a specific date. This function allows you to select the best employees according to the results of a certain period, as well as to structure the staff by the level of working capacity.

Conclusions. The research studied and generalized theoretical approaches to managing staff motivation. The most significant factors that influence the motivation of the personnel of the enterprise (organization) were established. The analysis and systematization of existing software products in the field of staff management according to the functional features of accounting were made.

The method for automating staff motivation management of the enterprise was developed and proposed, the use of which will, due to the strengthening of motivation factors, increase the economic efficiency of the enterprise in the field of labor productivity and quality of manufactured products. The features of the proposed automation method are as follows: universality of use; use of the client part as an Android application; assessment of the work of staff using the system of basic and additional bonuses and uplift factors which increase them; the presence of a «corporate store» in which employees can purchase the company's proposed premiums and incentives of their choice.

The direction of further research in this area is the practical testing of the developed method for automating the management of staff motivation at enterprises and organizations of Ukraine.

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Марченко О. С., Черкашина Т. С.

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Marchenko O. S., Cherkashyna T. S.