

MANAGING ENTERPRISE PERFORMANCE IN THE FOOD INDUSTRY

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Abstract: The paper is devoted to the development of important elements of the system of enterprise performance management. Author proposes to divide the entire staff of the enterprise into the three categories: main production personnel; subsidiary workers and engineering personnel; managers, clerks and other personnel. The model of personnel motivation and model of internal performance benchmarking are developed. The results of successful introduction of these models on the food enterprises of Ukraine are described.

Key words: performance management; internal benchmarking; personnel motivation; food enterprise; Ukraine

JEL Codes: M12, L25, L66

Introduction

Due to the large number of processes, departments, staff and management levels, ensuring efficiency on medium or large enterprise is complex and very important task. Unlike small enterprises, here is not enough to evaluate the efficiency and seek assistance in the benchmarking agency (BBA or RBA) to select the firm-benchmark (see [1]). The complexity of the organizational system requires a multilevel approach and the application of different methods of performance management. In addition, given the significant national differences in various aspects, including mentality, the mere use of performance management techniques that are successfully implemented in practice of American or Japanese companies in the domestic environment may not lead to desired results. However, the ignoring of these methods by local companies, given the very small experience of their work in a market economy and, correspondingly, the weakness of domestic empirical and methodological base, it would also be unwise, as they have been formed and perfected over more than one decade. It makes us look for ways to create a special model, allowing domestic enterprises to adequately manage the performance, which should in one way or another rely on the experience of foreign companies and their methodology, but also take into account local conditions.

Among the variety of existing methods of performance management, in our opinion, the most applicable under conditions of Ukrainian food corporations, where often a directive (authoritarian) management system operates and workers

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put their personal interests ahead of corporate, are the methods based on the construction of a rigid vertical control, regular monitoring and control. However, a system of performance management should not inhibit a motivation of employees and their desire to exercise creativity in work. Here it is expedient to use the mechanism of competition both from external competitors and from within the company – between the units and groups of workers (teams), which, combined with adequate incentive system, would ensure the unity of the direction of individual and corporate interests.

Identification of the best units (workers, groups) and processes, and desire of the remaining units to be the best within the enterprise can best be achieved by means of internal benchmarking tools. External competitiveness of the enterprise as a whole and its individual units and processes can provide tools of competitive and process benchmarking. However, to reach high enterprise performance based on various types of benchmarking and other techniques, it is necessary to develop a system of motivation, without which actions to improve efficiency will not be sustainable with long-term nature.

This study is directed to develop the important elements of the system of enterprise performance management – a model of personnel motivation, and model of internal performance benchmarking, and to introduce these models on the food enterprises of Ukraine.

Model of personnel motivation

To build effective system of the enterprise performance management it must be supported by a powerful motivation model, which ensures implementation of the decisions taken to improve enterprise efficiency.

The model of motivation for the mechanism of performance management should be based on the systems of personnel stimulation and internal competition.

The basic goals of the system of personnel stimulation in the context of performance management can be:

- (1) increasing labor productivity,
- (2) reduction of wastage,
- (3) decrease of material input,
- (4) improvement of energy efficiency.

Since the wastage is reflected in the amount of materials used, then the

second and third goals can be combined. In accordance with these goals, key indicators of system of personnel stimulation are the following:

- (1) the index of labor productivity;
- (2) the index of materials use;
- (3) the index of energy use.

These indicators adequately reflect, respectively, the result of the employee (department, company) and the costs of materials and energy resources for its achievement. They should be calculated monthly for each production unit (department, shop, team, site, etc.) and process (preparation, processing, assembling, etc.). The combination of these three indicators in estimating the efficiency of the unit (process) stimulates an increase in output per unit of time for rational use of raw materials and economical use of energy. The latter also provides an extensive improvement of production equipment and other electrical equipment, and besides saving energy, it helps to extend the actual period of its lifetime, thereby reducing capital costs. Comprehensive assessment of the staff by the three indices will provide an opportunity to avoid the situation when the growth of efficiency of one resource is achieved through the use of larger amounts of another resource, e.g. productivity growth due to increasing costs of material and energy or reducing energy intensity by increasing the proportion of manual labor and material consumption.

Total monthly growth of employee wage should consist of three incentive bonuses: for the growth of labor productivity; for better utilization of material inputs; for improving the use of electricity. Computing features to each of these components are described below.

Index of labor productivity is determined by the following relation:

$$I_p = \frac{I_q}{I_L} \cdot 100, \quad (1)$$

where I_q is index of production; I_L is index of labor.

The index of production is defined as the ratio of the actual daily output to the base daily output. As a base daily output here can be the value of this indicator for the previous period or planned output, i.e. technically sound indicator, for the current period.

The index of labor is calculated as the ratio of the average actual (de-facto)

number of employees to the average listed number of employees of a unit (group). Thus, if the engaged work force was more than regular staff, this index will be higher than 1.

The value of the calculated index of labor productivity (1) sets the level of incentive percent bonus to wage (salary) for the growth of labor productivity with the help of table of relation of productivity and bonuses.

Table 1 displays one of the options for awarding bonuses to employees – proportional, in which for each percentage increase in labor productivity an enterprise pay a half of percent of bonus to the monthly salary. In fact, this ratio should depend on such basic factors: the share of wages in the cost of production, the profitability of products, etc.

Index of labor productivity, %	Percentage of bonuses, P_b	Index of labor productivity, %	Percentage of bonuses, P_b
100	0,0	111	5,5
101	0,5	112	6,0
102	1,0	113	6,5
103	1,5	114	7,0
104	2,0	115	7,5
105	2,5	116	8,0
106	3,0	117	8,5
107	3,5	118	9,0
108	4,0	119	9,5
109	4,5	120	10,0
110	5,0

Table 1. The relations of the index of labor productivity and the percentage of bonuses

The lower the share of labor in production costs and profitability, the fewer can be this proportion and, consequently, incentives for more productive work. In addition, in various situations would be better apply not proportional, and progressive or regressive scale of productivity-bonus ratio, which will reflect the current policy of the company in respect of the required rate and quality of economic growth.

Index of materials use takes into account the composition of raw materials used in the production process, and the percentage of the actual decrease in their use of each kind:

$$I_{mu} = (a_1MI_1 + a_2MI_2 + \dots + a_nMI_n), \quad (2)$$

where a_n is a share of n -th kind of material in a total material consumption in production, or a weight corresponding to its relative importance in the consumer value of product; MI_n is a percentage of increasing (decreasing) use of n -th kind of material in production.

The percentage of increasing (decreasing) use of each kind of material in production can be defined as:

$$MI_i = \frac{M_i^N - M_i^F}{M_i^N} \cdot 100, \quad (3)$$

where M_i^N is planned (normative) consumption of i -th kind of material in production; M_i^F is actual consumption of i -th kind of material in production.

Applying an index of materials use (2), and the percentage of the plan execution for the output, we can determine the level of percent bonus to wage (salary) for the effective use of material resources:

$$P_{MU} = \frac{I_{MU} \cdot I_q \cdot k_m}{100} - 100, \quad (4)$$

where I_q is a percentage of the plan execution for the output; k_m is a coefficient taking into account the ratio of reducing consumption of materials and wage growth; if $k_m < 1$, wage rise slower than the material consumption decreases; if $k_m = 1$, wage rise proportional, and if $k_m > 1$, wage rise faster.

The value of coefficient k_m is determined by enterprise independently, depending on the level of material consumption, the profitability of products, as well as the current goals of the enterprise on the dynamics of output, the level of profitability and the share of material costs in production costs.

Index of energy use defines actual consumption of electric energy in comparison with its planned or technically sound (normative) level:

$$I_{EU} = \frac{E^N - E^F}{E^N} \cdot 100, \quad (5)$$

where E^N is planned (normative) consumption of electric energy in production; E^F is actual consumption of electric energy in production.

The level of percent bonus to wage (salary) for the effective use of electric energy defines similarly as for materials:

$$P_{EUI} = \frac{I_{EU} \cdot I_q \cdot k_e}{100} - 100, \quad (6)$$

where k_e is a coefficient taking into account the ratio of reducing consumption of electric energy and wage growth; if $k_e < 1$, wage rise slower than the energy consumption decreases; if $k_e = 1$, wage rise proportional, and if $k_e > 1$, wage rise faster.

The value of coefficient k_e determined by enterprise independently, depending on the level of material consumption, the profitability of products, as well as the current goals of the enterprise on the dynamics of output, the level of profitability and the share of energy costs in production costs.

The total amount of incentive bonuses (stimulation) of the proposed system for each worker is defined as follows:

$$P_i = (P_p + P_{MUI} + P_{EUI}) \cdot T_i \cdot K_c, \quad (7)$$

where T_i is tariff rate (salary) of the i -th worker of a unit; K_c is coefficient taking into account the degree of influence (the category) of employee of a unit on the key operating indicators.

In the context of employee participation in the growth of labor productivity

and reduce material and energy intensity of production it is appropriate to divide the entire staff into the following three categories:

1) *main production personnel*, i.e. those workers, from work of which is directly dependent production performance of the enterprise; this can be turners, millers, mechanics, operators, assembly line workers and other professions of main production;

2) *subsidiary workers and engineering personnel*, i.e. who are not directly produce goods, but is closely linked to the main production and have a significant impact on its provision, state and result; this can be repairmen, engineers, toolmakers, technologists, electricians, controllers, adjusters, etc.;

3) *managers, clerks and other personnel*, i.e. who have no direct effect on output; this can be the top and middle managers (directors, heads of departments and divisions), specialists of functional departments (accounting, human resources, marketing, supply, financial, economic, etc.), security guards, cleaners, etc.

For the first category coefficient K_c must be equal 1, because namely these workers directly effect on output, consumption of materials and energy consumption for equipment. For the second category coefficient K_c may be set within 0.7-0.9, which is associated with the degree of involvement of employees in the growth of production efficiency. For the third category, it is expedient to set K_c in the range 0.4–0.6 that, on the one hand, points to a much smaller role of this category in the formation of output and, on the other hand, stimulates the responsibility of non-production workers for the results of the enterprise, allowing them to feel like members of the unified team.

Optimal way of use of the offered system of stimulation is its application for the whole enterprise, i.e. benefits for growth of indicators of production efficiency are shared between each worker of the enterprise according to the results of the last month. In this case each worker will understand that quantitative and qualitative results of his work will influence both the size of his wage, and the general wages fund of the personnel of enterprise.

However, single introduction of the offered system of stimulation can lead to a situation when lagging divisions (workers) will parasitize on leaders, and leaders cannot receive adequate compensation for the effective work. That is why it is necessary to support it with other motivational tools, which, on the one hand, can ensure a spirit of competition in organization, and, on the other hand, provide assistance to lagging divisions that are unable to improve its performance.

Thus the model of personnel motivation will consist of various complementary tools (Figure 1).

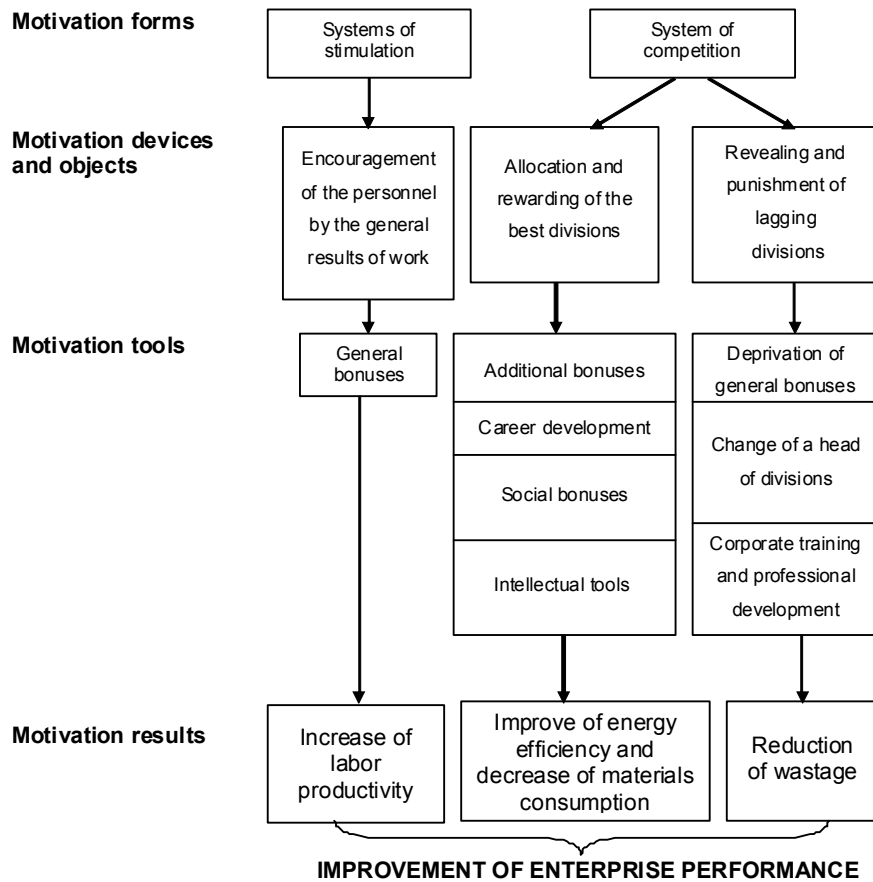


Figure 1. Model of personnel motivation for performance management

The system of internal competition allows supporting additional selective encouragement and rewarding of the best divisions (leaders) of the enterprise, and also punishment of heads and deprivation of bonus of the most lagging divisions (outsiders). Also such sanctions should not be individual because they can suppress motivation of lagging groups to work effectively. Therefore they need to be combined with an opportunity to correct their mistakes by training, improvement of professional skill and studying of an operational experience of the best divisions (leaders) both inside of the enterprise and outside.

Identifying the best and lagging units and processes within the company, adaptation of the best experience of own leaders and the best practices outside the company can be performed using a combination of internal and external benchmarking.

Model of internal performance benchmarking

Unlike small companies, large companies are able to manage effectively without external information, with the use of internal benchmarking. As practice shows, internal benchmarking, in certain circumstances is able to reduce costs and increase efficiency by tens of percent [2]. And, despite that the results of its implementation due to the limited internal capacity, as a rule, modest than external benchmarking, the internal benchmarking can become such daily mechanism for improving operations and processes, identifying and training the lagging units (workers, teams) for methods of work that could close the gap to the best and through this improve the enterprise performance.

However, application of internal benchmarking alone without external sources of improvement, in the absence of a strong innovation activity of enterprises in the development of new operational and management methods and technology will inevitably lead to equalization of the level of efficiency in the enterprise and reaching its internal limit, i.e. a stop of development. Therefore, to provide a continuous process and continuous improvement, the enterprise performance management should actively use the tools of internal benchmarking that reveal the inner potential of the enterprise, and various types of external benchmarking that give to enterprise new, more ambitious targets and goals, which raise it to the next stage of development and level of efficiency.

There is no universal model of internal benchmarking. This is associated with organizational, managerial and technological features, which make each company unique. However, great experience of its implementation by the leading foreign companies allows us to formulate the general rules and to develop a model of internal performance benchmarking for enterprise. In addition, given the importance of attracting diverse tools, this model should enable possible an interaction of internal and external benchmarking, as well as other methods of enterprise performance management.

During the projecting of this model some elements and experience of applying an internal benchmarking by companies BASF, Kodak, Xerox, and also of some the large industrial enterprises of aerospace and food industries were used [3–7]. Taking into consideration the differences in existing procedures of benchmarking execution at different enterprises, the fact that the number of stages in them varies from four to 33 says about their significance, so we have tried to create as flexible

and versatile model as possible in order to be capable to extend and adapt to any functioning conditions and eliminate the basic defects of existing models.

The proposed model of internal benchmarking can be graphically represented schematically as a sequence of phases and stages of its implementation (Figure 2).

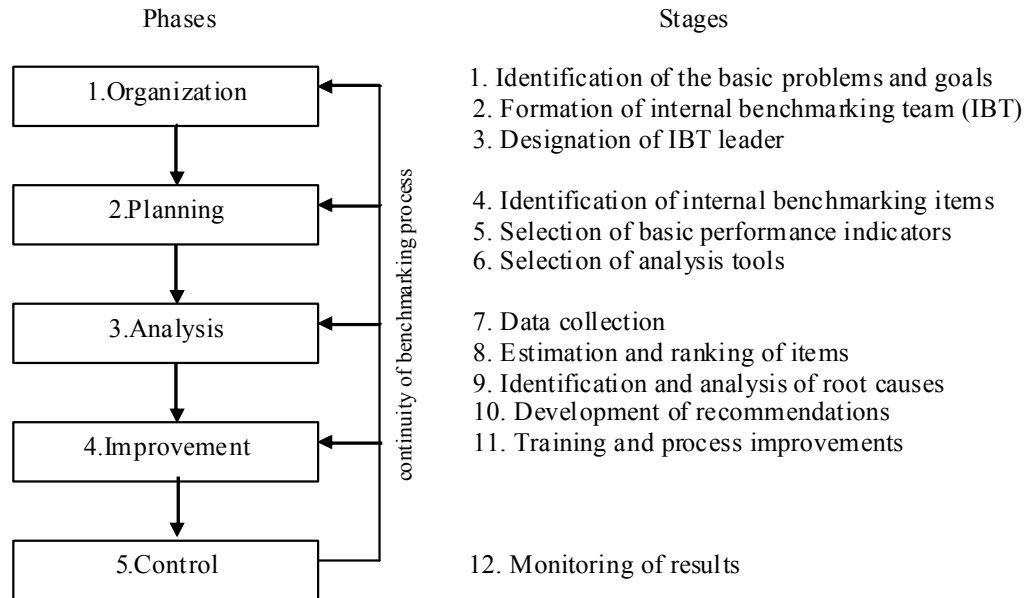


Figure 2. Model of internal performance benchmarking

Each stage of the model of internal performance benchmarking is explained below.

Stage 1. Identification of the basic problems and goals. In this stage the enterprise management needs to identify and articulate its basic problems and to determine whether the problems can be addressed internally without the use of external benchmarking, contacts, or consultants. Specifically, for the deficiencies identified, there must be functional units within the enterprise that have overcome these deficiencies and whose processes can be emulated by the weaker operating units. This issue may be addressed using an algorithm developed in [8]. The algorithm determines the potential benefits of internal benchmarking by answering the following questions: 1) within the enterprise are there processes similar to the problem processes? 2) are the technologies for those processes adaptable to the problem processes? 3) are those processes considerably better than the problem processes? 4) are those practices transferable? If all 4 questions have an affirmative answer then there is significant potential benefit from internal benchmarking, but if even one of them is in the negative the enterprise should pursue external benchmarking to improve productivity.

In the case of an affirmative answer, broad internal benchmarking goals may be established. For example, if the firm's problems are insufficient productivity coupled with an increase in raw material consumption in Division A, but Division B has excellent productivity and raw material usage efficiency, then a broad goal of internal benchmarking might be improved materials usage efficiency via the elimination of waste and "bottlenecks" inside Division A.

Stages 2 and 3. Formation of IBT and Designation of IBT leader. Here the firm must select and prepare experts who will join the internal benchmarking team (IBT). At least one of the selected participants should specialize in each of the basic problems revealed during the previous stage. The IBT develops the plan including definition of roles and duties of each member, the articulation of project stages, and realistic dates. The IBT must be monitored and managed by a top executive, for example, the deputy director who bears the responsibility for the team's results.

Stage 4. Identification of internal benchmarking items. Specific processes and operations that contribute to the basic problems identified during Stage 1 are identified. For example, inefficiency in the primary processing of materials may be identified as a principal cause of increased raw material consumption. These specific issues are then listed.

Stage 5. Selection of basic performance indicators. The basic indicators which permit the comparative analysis of various processes within the company during benchmarking are selected. Here some Key performance indicators (KPI) that concern each process on the list of specific benchmarking target items may be used. For example, unit output rate (units per minute), raw material scrap during a particular processing step, or labour hours per unit produced might all be KPI related to a productivity issue.

Stage 6. Selection of analysis tools. In this stage the IBT defines what analysis tools can adequately determine the reasons for problems and can be used to compare performance and establish benchmarks. Good tools for this analysis might be the Root cause analysis (RCA) toolkit, "5 Why's", an Ishikawa diagram, or Pareto analysis. Various parametric or non-parametric methods of efficiency analysis may be used, e.g. the DEA with application of KPI.

Stage 7. Data collection. The necessary information (inputs, outputs, duration of operations, KPI, etc.) is collected for each benchmarking target item. Data are grouped by common features (e.g. similar processes) and prepared for analysis.

Stage 8. Estimation and ranking of items. The data are analyzed using the

selected analysis method for each target item. On the basis of these measures the specific target item list is prioritized. If the DEA is used, we recommend using the DEA super-efficiency model to prevent the complexities associated with full ranking. The result of this stage should be the prioritization of the specific benchmark items (processes, operations), and their confirmation or the identification of additional target items.

Stage 9. Identification and analysis of root causes. In this stage the enterprise determines the root causes of problems and causal factors using the information about problem objectives and RCA tools. Also the experiences of the benchmark divisions and processes are studied and the factors contributing to their success come to light.

Stage 10. Development of recommendations. In this stage a list of actions that are necessary for elimination of the basic problems and achievement of the benchmarking goals is developed. Potential impact on cost, time, resource requirements, and net improvements are identified.

Stage 11. Training and process improvement. On the basis of the recommendations developed by the IBT, the managers make concrete decisions directed to improve the efficiency of lagging items and the elimination of their backlog of the leading items. Such actions, depending on the root causes of a solved problem, can include technological, organizational measures, and motivational tools described above, e.g. corporate training and coaching.

Stage 12. Monitoring of results. Enterprise senior management monitors the results of the actions taken and juxtaposes them with the goals and the original basic problems. If the goals are not reached and problems are not solved, the sequence of benchmarking stages is traced to find mistakes. Detection of mistakes is the basis for a return to that phase (stage) for correction, e.g. to the stage of data collection if we have detected inaccuracies in the data about items.

In the case of a successful implementation of internal benchmarking and the achievement of the goals, the process is repeated, but already with new problems, new goals, and possibly with new team members. Thus, the process is closed and its continuity is ensured.

Despite all the advantages of internal benchmarking, its capabilities are limited by own ideas, technologies and resources of the enterprise. At some point in time, this continuous process ceases to provide economic benefits and cost of its implementing has not recouped at the expense of improvements, which are becoming less relevant. Then various types of external benchmarking performance should replace the internal benchmarking.

Thus, variable performance benchmarking that underlies developed mechanism of enterprise performance management, should be provided by methodological tools that enable to combine the advantages and opportunities for both internal and external performance benchmarking. One of these tools must be an algorithm that allows establishing the feasibility of implementing a particular type of benchmarking in specific economic situation.

Author's version of the algorithm to choose between internal and external benchmarking, depending on a number of conditions that characterize a particular economic situation, is presented in [8]. This algorithm performs a function of timely switching an attention of the team from the internal to the external environment and thereby avoids many of the problems and excessive costs that could arise if we can not successfully implement internal performance benchmarking. The choice of a type of external benchmarking depending on the conditions, goals and capabilities of the enterprise may be made by one of the form described in a previous study [1].

The proposed methodology of the implementation of variable performance benchmarking on enterprise uses a broad set of analysis tools and methods of performance management including KPI, RCA, DEA, etc. However, their use is necessary to consider the possibilities and size of the enterprise.

Given the opportunities of large enterprises, depending on the purpose and specifics of their work, besides the proposed methodology for performance benchmarking, they can actively use other methods for improving the enterprise performance directed to improve the quality, a level of maintenance, logistics systems, etc. All of them can combine with the proposed methodological tools and models thanks to the flexibility and versatility of the latter.

Using the proposed models in the performance management of small business is possible if there is economic effect of their implementation, i.e. If the cost of their implementation will not exceed the benefits they bring to enterprises. Therefore here before its introduction into the economic system it is necessary to conduct a preliminary feasibility study.

Practical results

As the results show the practical implementation of the proposed models (model of personnel motivation, models of internal performance benchmarking) on the six food companies of the south of Ukraine, which vary by kind of activity (confectionary, sugar, meat-processing, and bread-baking plants), organizational-legal form and number of employees, these innovations are able to provide high rates of growth of production efficiency and performance improvement (Table 2).

Company	Number of employees	Annual change, %					Cost of implementation per employee, UAH
		Labor productivity	Output-materials ratio	Energy efficiency	Wastage	Average wage	
1	1 253	18.6	13.3	13.9	-21.8	12.4	304
2	511	88.6	64.7	22.1	-49.2	12.7	224
3	484	40.5	24.9	19.4	-38.6	13.7	246
4	312	39.3	21.9	16.8	-30.1	14.5	251
5	116	21.8	19.1	15.2	-24.0	16.2	262
6	54	18.9	14.3	14.8	-25.8	18.1	330

Table 2. Results of implementation of proposed models on food companies

All data were provided by each company's management. Specifically, we measured changes of the following indicators:

(1) *Labour productivity* is defined as the ratio of total output to the number of employees, where total output is the sales dollar value of all goods produced;

(2) *Output-materials ratio* is defined as the ratio of total output to the value of purchased raw materials, spare parts, and out-purchased intermediaries used for production;

(3) *Energy efficiency* is defined as the ratio of total output to energy input where energy input is the monetary value of all electricity, oil, gas, and gasoline used in plant operation;

(4) *Wastage* is defined as total dollar value of damaged, out of date, reduced, or generally unsaleable items (goods, materials, intermediaries, and spares), that are thrown away and written off as a loss.

(5) *Cost of implementation per employee* was calculated by totaling the cost of implementing the models on enterprise, i.e. wages for the IBT team, managers, bonuses, information and other costs, and dividing this total by the number of employees.

The best results were obtained for the medium enterprises with number of employees from 200 to 1000 people. However, it should be noted that all observed enterprises shown higher rates productivity growth in comparison with the growth of wages, and positive changes in other performance indicators: average labor productivity of all companies increased 18-89%, output-materials ratio grew 13-65%, energy efficiency raised 14-22%, and wastage declined 21-49% while average wage grew only 12-18%. The average cost of implementation was 275 UAH per employee. This suggests that the developed models are effective and able to improve the efficiency of enterprises without significant costs for their implementation.

This conclusion is confirmed by calculations of the economic efficiency of implementing models on the formula (4.1): the values for these companies are within the interval [2.4 ... 5.3]. This means that the proposed innovations (the introduction of the models) provide enterprises the cost savings, which is in several times higher than the costs of implementing them.

Despite the financial and economic crisis, these trends were continued into 2009. Hence, our models provide the stability and continuity of the process of improving the efficiency. They significantly help to enterprise managers to implement the basic task of performance management.

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ZARZĄDZANIE WYDAJNOŚCIĄ PRZEDSIĘBIORSTWA W PRZEMYŚLE SPOŻYWCZYM

Abstrakt: Artykuł poświęcony jest rozwojowi ważnych elementów systemów zarządzania wydajnością przedsiębiorstwa. Autor proponuje by podzielić cały personel przedsiębiorstwa na trzy kategorie: główny personel produkcyjny, pracowników pomocniczych i kadra inżynierska, menedżerowie, urzędnicy i inni pracownicy. Opracowany został model motywacji personelu i model wewnętrznego porównania skuteczności. Opisane zostały wyniki udanego wprowadzenia tych modeli do przedsiębiorstw przemysłu spożywczego na Ukrainie.

食品行业的企业业绩管理

摘要: 本文致力于发展企业绩效管理系统的重要组成部分。笔者建议将企业的全体员工分为三类:

主要生产人员; 附属公式人员和工程技术人员; 经理、文员和其他人员。本文提出员工激

励的模型以及员工自我绩效标杆模型。本文对成功引进这些模型的乌克兰的食品企业的结

果进行描述。