APPROACH OF ASSESSMENT THE OVERALL NECESSITY OF BUSINESS PROCESSES IMPROVEMENT

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Abstract

In the present paper an approach has been presented, through which it can determine the necessity of improvement of each one business process in the organization. The need for developing and implementation of this approach is revealed. Through it starts the process of optimization of business processes and passes through the remaining steps. The paper continues with explanation how the comparison between the set forth goal of processes improvement and the actual processes is made. The essence of functioning of the approach is presented. The formulas through which it can be calculated coefficients of „efficiency of positive dimensions" and coefficients of "efficiency of negative dimensions" are described. Algorithm and methodology of calculating the coefficients "rate of overall efficiency" and coefficients "rate of single-dimension efficiency" and "multi-dimension efficiency" which are necessary for determining the general necessity of improvement are reviewed.

Keywords: business process; optimization; necessity of improvement; coefficient of efficiency; algorithm; deviation; methodology.

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Introduction

The function of each enterprise is to carry out transformation of inputs (raw materials and supplies), through the production factors (buildings, machines, labor), into a product/service designated to satisfy the customer's need (Anglov, 2008). Transformation is related to the running of various business processes (Harmon, 2007), processes (Deckler, 2003), (Harmon, 2007), (Haist, 2001), (Harrington, 1991), (Ould, 2006), (Lowenthal, 2003), (Süssenguth, 1992) united in production cycles. The main characteristics of all those processes are the creation of added value during the progress of the production (Harrington, 1991). Each organization should design and optimize its business processes in such a way that to be able to maintain high level of competitiveness and market position improvement (Gaitanides M., 2004). The improvement is done mainly in four aspects: process's logic improvement; spatial improvement; quantitative and time improvement (Buschholz, 1994), (Krüger, 1993), (Lohoff P., 1993), (Schmidt, 2001). At the same time, factors of the external [6, p.10] and the internal environment, such as change of the labour legislation, change of the license and taxation rates, increase of the ecological requirements, etc. have ever bigger effect on the companies. Early detection of those changes is achieved through the functioning of an early warning system (Bedenik N.O., 2012), (Bickhoff N., 2004). In order to handle the changed external and internal conditions of the environment, as well as with the challenges ensuing therefore, the organization most often resort to modifications in the production and managerial structure (Grigori D., 2011). This inevitably affects the business processes running in them and provokes the necessity of taking measures for their reorganization and improvement. The optimization should be carried out with the help of methodology in conformity with the company structure, as well as with the strategy chosen.

In order to implement the optimization of the critical business processes in the organization, it is necessary to determine whether actual need of improvement exists. This can be done by applying the approach of defining of general necessity of improvement. To that end, it is necessary the processes to be presented as vectors, building two vectors for each business process – real and target ones. Their building could be reviewed as a preparatory stage of the business processes optimization. The real vector represents an aggregate of all activities and sub-processes building the business process (Brüggemann, 1994). Each activity, sub-process or process is represented as a partial vector with the relevant coordinates. The coordinates describe the real values of the parameters characterizing various aspects of process effectiveness (Papula 2001). By summing up the vectors the common (resultant) vector is obtained. The target vector has been built by marking the coordinates of the goal on the coordinate system, the dimensions of which are defined by the parameters monitoring by the early warning system. From the initial point of the coordinate system to the point marking the desired improvement a vector is built, called target vector. If comparison between the vector which represent the real process and the vector which represent the target process shows deviation in favor of the target vector, then it is necessary to perform a thoroughgoing analysis and improvement of the relevant process. Otherwise, it is assumed that the parameters of the existing company process are better than the goal set forth; therefore, improvement is not needed. The comparison between coordinates of real and target vectors enables the determination of the overall necessity of processes improvement, as well as establish of the efficiency of the existing business processes compared to the target process. In order to achieve overall and sustainable improvements, it is necessary the business processes optimization to pass sequential the following steps:

- ✓ assessment of the overall necessity of business process improvement;
- ✓ assessment of the necessity of sub-process improvement;
- ✓ assessment of the priority of sub-process improvement;
- ✓ application of the improvement tools;
- ✓ performance of simulation of the improvements.

The aim of the present paper is to present an approach of assessment the overall necessity of business processes improvement in the organization as a part of the process of business processes optimization.

Identification of the overall necessity of business processes improvement

The identification of the necessity of processes improvement starts with graphic presentation of the real and the target processes. It is aimed at visualization of both vectors' (processes') dimensions. Various parameters characterizing the efficiency of the business processes may be selected as dimensions, such as costs of running the process, products quality, quantity of production, quantity of scrapped products, etc. The choice of parameters to be used as dimensions of the coordinate system is in compliance with the underlying strategy of the organization, the improvement goal set forth, as well as with the necessity to follow up the deviations in their values. Figure 1 shows the real process (resultant vector) and an idealized target process (target vector), the sub-processes or activities building them, with the relevant coordinates.

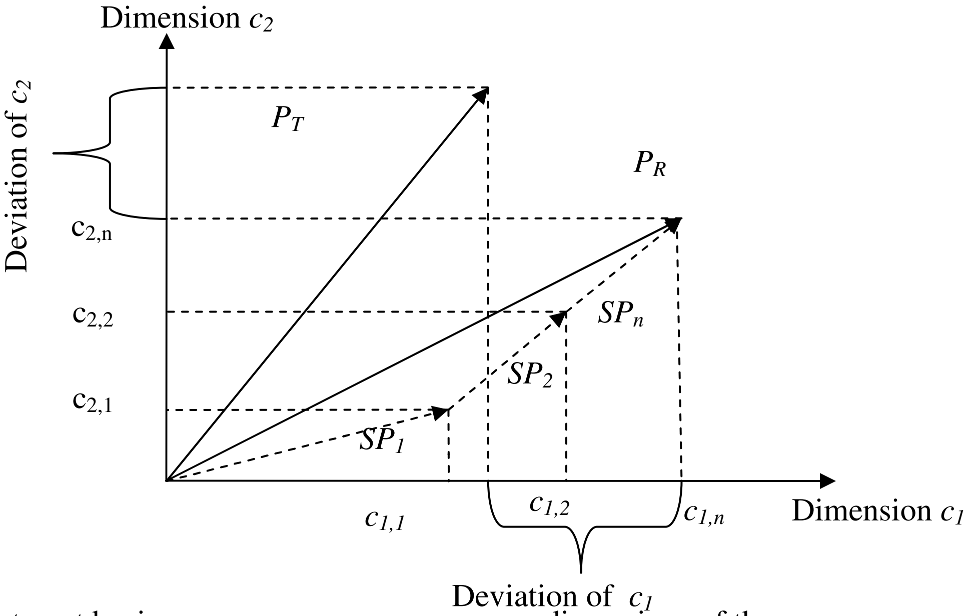
In order to identify the necessity of the real process improvement, it must calculate "coefficient of overall efficiency"[1], which is denoted by "ER_o". The calculations of all coefficients pass through a defined algorithm (Figure 2.). It is describing as the mathematical correlation between the dimensions, as well as the interpretation at the various values for "ER_o".

"EP_p" is a coefficient of efficiency of positive dimensions and it reflects the quotient of the positive characteristics of the coordinates of the target vector to the resultant one.

$$EP_{p,i} = \frac{\sqrt{\left[\Sigma_{j=1}^{n}\left(P_{j,pos,T}\right)^2\right]}}{\sqrt{\left[\Sigma_{j=1}^{n}\left(P_{j,pos,R}\right)^2\right]}}, \quad (1)$$

where n – number of the examined processes.

[1] With how much each process must improve is determined upon the calculation of the efficiency of the sub-processes. It is defining in case of available general necessity of improvement.



P_T – target business process
P_R – real process
$SP_1, SP_2, \ldots SP_n$ – real sub-process
$SP_{i,j}$ – coordinates i to vector j
c_i – dimensions of the processes
$j = 1 \ldots n$ – number of considered sub-processes
$i = 1 \ldots m$ – number of considered dimensions

Figure 1. Real and Target process visualization

Positive dimensions are these, the values of which should be increased as a consequence of the improvement, and negative – those, the values of which should be reduced[2].

"EP_n" is a coefficient of efficiency of negative dimensions and it is calculated as the quotient of the negative dimensions of the vectors' coordinates.

$$EP_{n,i} = \frac{1}{\dfrac{\sqrt{\left[\Sigma_{j=1}^{n}\left(P_{j,neg,T}\right)^2\right]}}{\sqrt{\left[\Sigma_{j=1}^{n}\left(P_{j,neg,R}\right)^2\right]}}}. \quad (2)$$

The algorithm is divided into three blocks. In block "*A*" whether dimensions are positive or negative is checked. Also the value of "$EP_{p,i}$", "$EP_{n,i}$" are calculated. In block "*B*" whether dimensions are trade-off are determined. According to that circumstance the value of coefficients "ER_{SD}" (rate of single-dimensions efficiency), "ER_{MD}" (rate of multi-dimensions efficiency) or "ER_o" (rate of overall efficiency). In block "*C*" general necessity of improvement is determined by comparing the calculated values of the coefficient "ER_o" to one.

The logical actions in block "*A*" start with the input of the real and the target vectors' coordinates values. The nature of each dimension is checked. If the improvement is expressed into increasing value of relevant dimension, must be

[2] Differentiating the vectors' parameters into "positive" (e.g. "quality", "quantity", etc.) and "negative" (for instance "time", "costs", etc.) is done on an earlier stage of the improvement. The differentiation is done in accordance with the strategic goals of the organization.

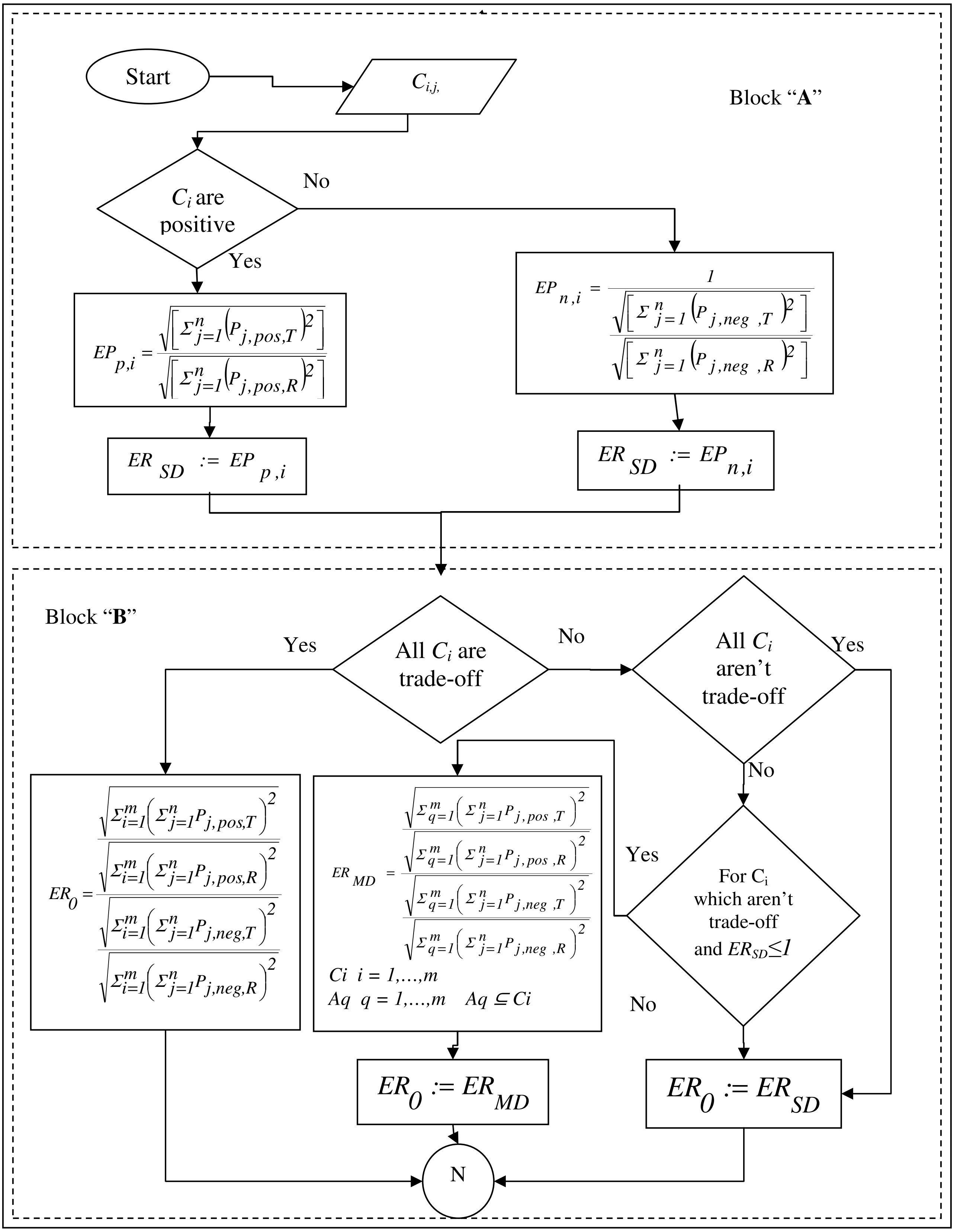
proceed with calculation of the coefficient of efficiency of positive dimensions – "$EP_{p,i}$". The coefficient of efficiency of negative dimensions ("$EP_{n,i}$") is calculated, provided that all characteristics of the processes must be reduced during the improvement. "ER_{SD}" accepts the value of "$EP_{p,i}$" or "$EP_{n,i}$" depending on the character of the dimensions and passes to block "*B*" of algorithm.

Block "*B*" starts by checking whether all dimensions are trade-off or no. In this situation it is assumed that the deviations in the various dimensions are balanced among them, since the characteristics of the process (vector) contribute to different extent for the achievement of the business process's goal. If the condition is met, the coefficient "rate of overall efficiency" is calculated under the formula:

$$ER_0 = \frac{\dfrac{\sqrt{\Sigma_{i=1}^{m}\left(\Sigma_{j=1}^{n}P_{j,pos,T}\right)^2}}{\sqrt{\Sigma_{i=1}^{m}\left(\Sigma_{j=1}^{n}P_{j,pos,R}\right)^2}}}{\dfrac{\sqrt{\Sigma_{i=1}^{m}\left(\Sigma_{j=1}^{n}P_{j,neg,T}\right)^2}}{\sqrt{\Sigma_{i=1}^{m}\left(\Sigma_{j=1}^{n}P_{j,neg,R}\right)^2}}} \qquad (3)$$

and passes to block "*C*" of the algorithm. Otherwise, the check for lack of offset between the characteristics of the business process is made. If this is so, "ER_o" accept the value of "single-dimension coefficient of efficiency" and in the subsequent part of the algorithm it is compared to one. It is assumed that if one of the dimensions needs to be improved, then the entire real business process needs improvement. There is a third case in which, part of the dimensions are trade-off, and part of them – aren't. Then, subsequent verification of dimensions which aren't trade-off is made. If the condition "one of these dimensions doesn't need improvement" is not met, again "ER_o" accept the value of "ER_{SD}" and in the subsequent part of the algorithm it is compared to one. Otherwise, the coefficient "ER_{MD}" is calculated only for those dimensions that are offset. For this purpose, the dimensions of business processes are divided into two sets – superset "C_i" describing all dimensions and subset "Aq" describing only dimensions that are trade-off. "A_q" is subset of "C_i" (all examined dimensions) and his elements assume values for $q = 1,...., m$. The coefficient "ER_{MD}" is calculated like "ER_o", but only for those dimensions that are offset. In the next step "ER_o" accepts the value of "multi-dimension efficiency coefficient" and passes to the final block of algorithm.

In block "*C*" the already calculated coefficient value is compared to "one" (Table 1.). With coefficient of "rate of overall efficiency" greater than "one", the target process is more efficient than the real one. Therefore, it is necessary to take immediate measures of its improvement. This is done in the subsequent stages of the optimization process. The processes, where "$ER_o>1$" is defined as critical for the organization. Where "$ER_o=1$" the real process is as effective as the goal set forth. In this case improvement is not necessary. The monitoring of those processes must continue. If the value of "$ER_o<1$" conclusion that the real process is more efficient than the target one is drawn. It follows that the current process is not critical for the organization, it is better than the target one and improvement is not necessary. In this case, the process of improvement stops.



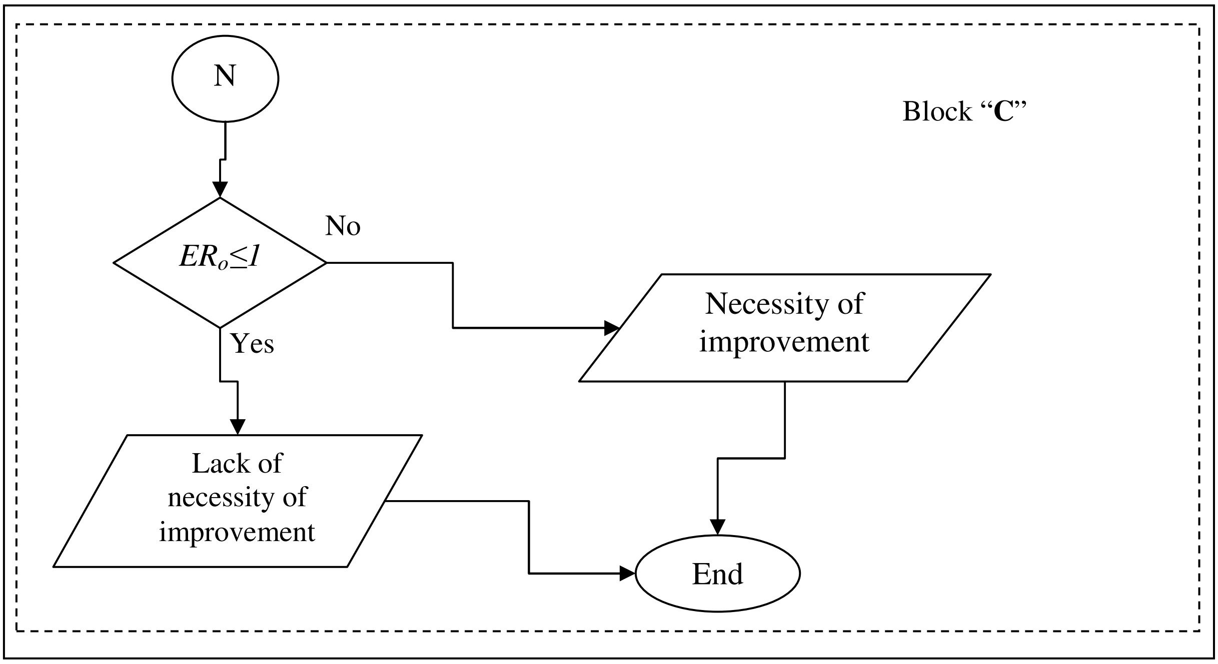


Figure 2. Algorithm for calculation of necessity for improvement

Table 1.
Interpretation of "ER_o"

Correlations		Interpretation
$ER_o \geq 1$	$P_{Target} > P_{Real}$	Real process is more inefficient than the target one. There is necessity of improvement.
$ER_o = 1$	$P_{Target} = P_{Real}$	Real process is as efficient as the target one. There isn't necessity of improvement.
$ER_o < 1$	$P_{Target} < P_{Real}$	Real process is more efficient than the target one. There isn't necessity of improvement.

Conclusion

In this paper an approach that can determine the overall necessity for improvement of business processes was presented. It is based on establishing the efficiency of the real business processes compared to the set forth target efficiency by the calculation of the "coefficient of overall efficiency". Depending on the derived value, a conclusion is drawn whether optimization of the real process is necessary. The identification of the necessity represents the starting point of processes optimization commencement. The main advantage upon the application of this approach is that the dimensions, under which the optimization is done, can be m-number as per the actual necessity. Also, the calculation procedures for the determination of the coefficients have been substantially simplified. The presentation of the entire method as algorithm, make possible to examined and evaluated all possible combinations in the values of the initial coefficients – "EP_p" (positive efficiency) and "EP_n" (negative efficiency) and of the resultant coefficient "ER_o" (rate of overall efficiency). This way integrity of the monitoring and representativeness of the defined conclusions is achieved. Main shortage of the described approach is that upon increase of the examined process dimensions the visualization shall be hindered.

The identification of the overall necessity of business processes improvement represents the first stage of the optimization process. The achievement of optimal business processes supposes the improvement process to pass a few additional steps, namely: assessment of the necessity of sub-processes improvement; assessment of the priority of improvement; application of the improvement tools; performance of simulation of the improvements. The realization of said stages of the optimization process could lead to the achievement of efficient and stable improvements of the processes in the organization.

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ПОДХОД К ОПРЕДЕЛЕНИЮ ПРЕДЕЛЬНОЙ НЕОБХОДИМОСТИ СОВЕРШЕНСТВОВАНИЯ БИЗНЕС-ПРОЦЕССОВ

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Аннотация. В настоящей работе представлен подход, с помощью которого возможно определить необходимость совершенствования каждого из бизнес-процессов в организации. Раскрывается необходимость разработки и реализации этого подхода, через который начинается процесс оптимизации бизнес-процессов и проходит на последующие стадии. Статья основывается на объяснении, как провести сравнение между поставленной целью улучшения процессов и фактически выполненных процессов. Представлена сущность функционирования подхода. Описаны формулы, через которые он может быть рассчитан: коэффициент «эффективности положительного измерения» и коэффициент «эффективности отрицательных размеров». Рассматриваются алгоритм и методика расчета коэффициентов «уровень общей эффективности», коэффициент «уровень одномерной эффективности» и «многомерной эффективности», которые необходимы для определения общей необходимости улучшения.

Ключевые слова: бизнес-процессы; оптимизация; необходимость улучшения; коэффициент эффективности; алгоритм; девиация; методология.