APPROACH OF ASSESSMENT THE NECESSITY OF SUB-PROCESSES IMPROVEMENT IN THE ORGANIZATION

Petko YANGYOZOV, Ivan DIMITROV
University "Prof. As. Zlatarov", Bulgaria

Abstract. 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 necessity of improvement of real sub-processes within the business process. To that end, it is necessary the processes to be presented as vectors, building two vectors for each business process – real and target ones. In the present paper an approach, through which it can determine the necessity of improvement of each sub-process within the business process has been presented. The need for developing and implementation of this approach is revealed. It is based to assessment the efficiency of sub-processes which build up business processes. The explanation, how the comparison between targets sub-processes and their corresponding real sub-processes are performed. The essence of functioning of the approach is presented. Algorithm and methodology of calculation of the "absolute goal" for improvement are discussed, through which the necessity of sub-processes improvement is ascertained.

Keywords: business process improvement, sub-process, business process optimization, necessity of improvement

1. 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 [1]. Transformation is related to the running of various business processes [2], processes [2, 3, 4, 5, 6, 7, 8] and activities [9, 10], united in production cycles. The main characteristics of all those processes are the creation of added value during the progress of the production [5]. 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 [11]. An approach is to solve the problem of arranging objects using international information networks, as a pre-condition for optimal system that makes use of the advantages of the common economic system of the European Union [12]. The improvement is done mainly in four aspects: process's logic improvement; spatial improvement; quantitative and time improvement [13, 14, 15, 16]. At the same time, factors of the external [17] 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 [18, 19]. 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 [20]. 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.

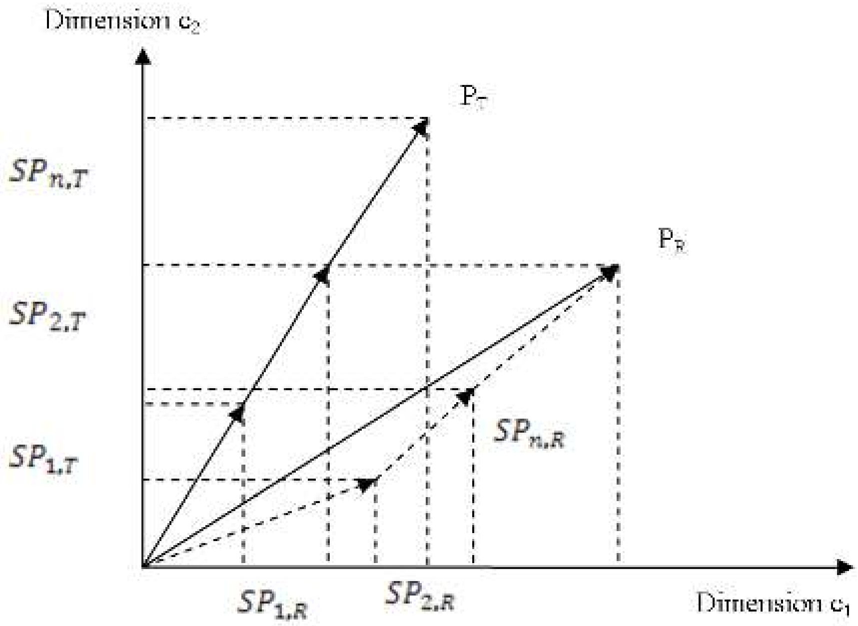
In order to implement the optimization of the critical business processes in the organization, it is necessary to determine whether actual need of improvement exists. This can be done by applying the approach of defining of necessity of improvement of real sub-processes within the business process. To 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 [21]. 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 [22]. 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 improvement for each business process. Furthermore, it can be assessment the necessity of improvement of each sub-process, which builds up the entire business process through establishing the efficiency of each sub-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 necessity of sub-processes improvement in the organization.

2. Identification of the necessity of sub-process improvement

The identification of necessity of the existing sub-processes or activities improvement is done by comparison between the partial real and target vectors. The type of the object depends on the rate of detail of the observation. The assessment of the necessity of sub-processes improvement starts with graphic presentation of the real and the target processes. It is aimed at graphic presentation of both vectors' (processes') dimensions. 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. They are visualized in Figure 1. It shows the real process (resultant vector) and an idealized target process (target vector), the sub-processes or activities building them, with the relevant coordinates.



P_T – target business process
P_R – real business process
$SP_{1,R}$, $SP_{2,R}$,…$SP_{n,R}$ – real sub-process
$SP_{1,T}$, $SP_{2,T}$,…$SP_{n,T}$ – target sub-process
$SP_{i,j}$ – coordinates i to vector j
c_i – dimensions of the processes
j = 1 ... n – number of considered sub-processes
i = 1 ... m – number of considered dimensions

Figure 1. Real and Target sub-processes visualization

In order to perform a correct comparison, it is necessary the target vector to be divided into partial target vectors, similar to the real business process. It is assumed that the target vector visualizes an "ideal" process, which similar to the existing process in the company is built up of certain number of sub-processes (partial target vectors). Their number and continuance are unknown. This information may be providing by the early warning system or by other specialized sources [23]. Upon lack of actual data about the target sub-processes, it is assumed that their number is equal to the number of the partial real vectors (n). The type of the object depends on the rate of detail of the observation. This is one of the possible ways for determination of the number and the continuance of the partial target vectors. Thus, each target sub-process ($SP_{n,T}$) can be calculated by division the coordinates of the target process (PT) and 1/n. “Averaged” partial target vectors, which are identical among themselves are created. The coordinates of each averaged target sub-process are derived under the following formula:

$$c_{i,n,T} = \frac{c_{i,T}}{n}. \quad (1)$$

In order to determine the efficiency of the sub-processes, it is necessary to calculate the difference of the coordinates of the partial target vector and the real vector which corresponds to it. This difference represents the “absolute” target of improvement for each sub-process. The newly created vector is noted by “Δ_{abs}” and coordinates ($d_{m,n}$). It is calculated under the following formula:

$$\begin{aligned}\Delta_{abs} &= \frac{1}{n}P_T - SP_{m,n,R} = \\ &= \left(c_{1,1,T}; c_{2,1,r}; \ldots; c_{m,n,T} - c_{1,1,R}; c_{2,1,R}; \ldots; c_{m,n,R}\right) = \\ &= \left(d_{1,1}; d_{2,1}; \ldots; d_{m,n}\right)\end{aligned} \quad (2)$$

The methodology can be presented as an algorithm consisting of two blocks (Figure 2). In block “A” the coordinate’s values of the “absolute” target for improvement (Δ_{abs}) are calculated. In block “B” each coordinate is compared to zero. This is the way to assessment the necessity of improvement of the real sub-processes. Further, it can be calculated with how many units the coordinates of the partial real vectors should be increased or reduced.

The logical actions in block “A” start with the input of the real and the target vector’s coordinates. Next, the difference of the coordinates of the partial target and real vectors is calculated - (Δ_{abs}). After performance of this step, a check of the nature of the dimensions is done. If all characteristics of the processes are positive (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. 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), algorithm continue to block “B”. Otherwise, all values of the new vector’s coordinates (Δ_{abs}) are multiplied by (-1). After those actions and calculation of the values of „$d_{i,j}$”, the block “A” of the algorithm ends.

In block “B” each of the already calculated coordinate is compared to zero (Table 1). If the coordinate of the newly created vector is bigger than zero, then the target process is more efficient than the real one. In this case, optimization of the respective dimension of the real sub-process is needed. In case „$d_{i,j}$” is less than zero, it means that the existing sub-process or activity is more efficient than the target one and improvement is not needed. In the third case „$d_{i,j} = 0$”, which means that the real sub-process or activity is as efficient, as the target one. Again optimization is not needed.

Table 1. Interpretation of “$d_{i,j}$”

correlations		interpretation
$d_{i,j} > 0$	$SP_{Target} > SP_{Real}$	The target sub-process$_j$ in dimension$_i$ is more efficient than the real one$_j$ There is necessity of improvement.
$d_{i,j} = 0$	$SP_{Target} = SP_{Real}$	The real sub-process$_j$ in dimension$_i$ is as efficient as the target one$_j$ There isn’t necessity of improvement.
$d_{i,j} < 0$	$SP_{Target} < SP_{Real}$	The real sub-process$_j$ in dimension$_i$ is more efficient than the target one$_j$ There isn’t necessity of improvement.

3. Conclusion

In the present paper an approach through which can be assessment the necessity of sub-processes was presented. It is based on determination of the efficiency of the real sub-processes compared to set up target efficiency, through the calculation of a vector describing the “absolute” target for improvement - (Δ_{abs}). Depending on the obtained values of the real vector’s coordinates, a conclusion whether optimization of the real sub-processes and activities is necessary is drawn. Subsequently, it can be determine the actual numeric value, by which to correct the coordinates of the real partial vectors under the relevant dimensions. 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. In order to determine (Δ_{abs}) only the subtraction operation is used, which simplifies the calculations.

The algorithmic presentation of the entire methodology makes it possible to review and evaluate all possible combinations of the coordinate values of the vector describing the "absolute" necessity of improvement. This way, integrity of the observation and representativeness of the defined conclusions is achieved.

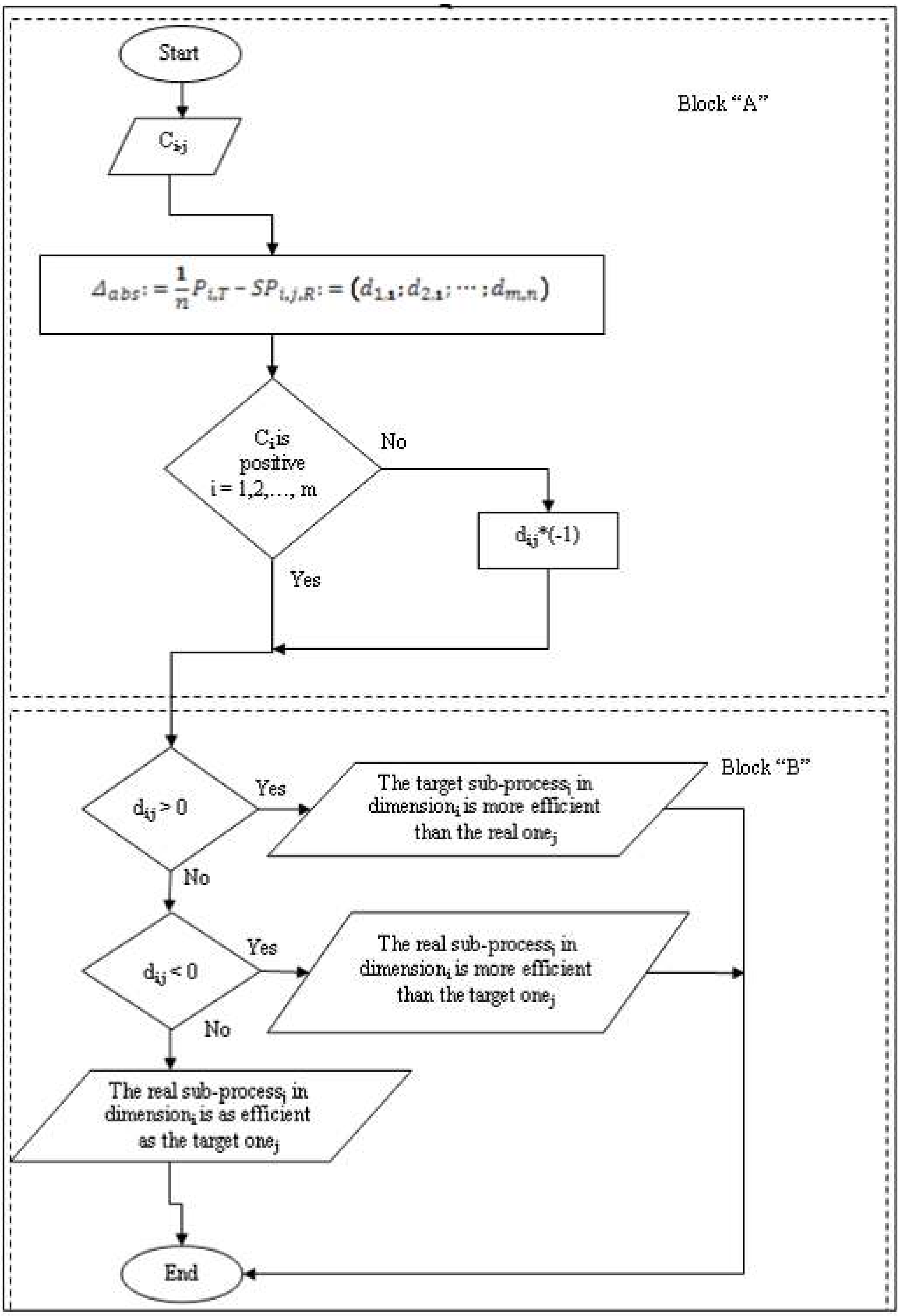


Figure 2. Algorithm for calculation of need for sub-processes improvement

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