

# Conceptual Model of Assessing the Effect of Business System as a Result of Implementation of it Projects on it Services Creation and Application

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**Abstract:** *The paper deals with the conceptual model for assessing the effect of business system as a result of implementing IT projects for creation and application of IT services to achieve a balance between the strategic goals of the enterprise and the set and parameters of the applied IT services by structuring financial and economic targets (revenue growth, decrease of operating expenses, etc.) from top to bottom according to the scheme: "business strategy – strategic goals – critical success factors – business processes – IT services" and aggregation of IT effects caused by the use of IT services (increase of calculations efficiency, elimination of unnecessary business operations, reducing the terms of formation of accounting documents, etc.) from the bottom up into significant efficiency factors that can be expressed in the form of quantitative economic benefits of the company.*

**Keywords:** *strategic goals, business processes; IT services, economic effect.*

## INTRODUCTION

It is possible to increase business efficiency and reduce costs by achieving business goals, as well as by improving business processes efficiency through the use of IT services (Information Technology services).

To do this, it is proposed to link the business strategy of the enterprise, business tasks and business processes for business tasks implementation as well as IT efficiency factors obtained through the introduction of IT services. Such a goal-setting should be performed from top to bottom and integrated into IT designing process according to the following scheme: business strategy — goals — tasks — business processes — IT services. At the lowest level, it is necessary to identify in detail the qualitative improvements in business processes through the use of IT services and aggregate these improvements from the bottom up into significant efficiency factors that can be expressed in the form of quantitative economic benefits of the company.

IT service in a corporate environment is a service that an IT Department or external provider delivers to the business units of the enterprise to support their business processes [1].

IT service is an activity of IT solutions operation, ensuring the implementation of business processes.

IT solutions are the effective solutions based on IT.

IT service is characterized by content, scale, availability, level (service recovery time), productivity, and cost. Defined in this way, IT service is the end product of IT system. If these parameters are monitored, IT service becomes measurable.

The introduction of IT services into the enterprise architecture facilitates the modeling of the economic effect of the business system. This is because the business makes demands to IT services, but not to IT systems. Accordingly, counting an IT system as a cost object, the relationship between the business requirements for IT services and the costs of creating and managing IT infrastructure becomes unobservable.

The business system will be understood as a complex of human, material and non-material resources that form a set of business processes. In turn, business processes ensure the exchange of financial, material and information flows between the business system and the external environment as well as between the business system elements in order to achieve business goals.

*The business system goals* are defined by the requirements of the profitability, development strategies and owner requirements. The main goal of the business system is to increase the business value, which is a universal indicator of its efficiency, and resistance to changes in economic conditions. Having SMART goals makes it easier to stay on track to success and keep motivated. SMART stands for: *Specific, Measurable, Achievable, Relevant, and Time-bound.*

Examples of the business system goals are: entering new markets; increasing the share of occupied markets; reducing costs; improving product quality; improving customer satisfaction; improving employee satisfaction; increasing revenue from IT investments; reducing launch time for the sale of a new product or service; meeting customer requirements and expectations for budget and time; compliance with laws, regulations, industry standards and contractual obligations, etc.

The business system goals, on which the efficiency of its functioning depends, are determined by the *business*

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strategy of the enterprise. For successful achievement of strategic goals, monitoring and feedback of the strategic management process is to be established. To do this, the company's strategic goals, which are quantified by *Key Goal Indicators (KGIs)*, are decomposed into a set of *Critical Success Factors (CSFs)* – the basic requirements or conditions that must be met to achieve the established goals and organization's mission. Achieving the main goal – improving business performance – will occur through the implementation of objectives in each of the key areas identified by Critical Success Factors (*CSFs*). The relationship between goals and Critical Success Factors is shown in Fig. 1.

RESULTS & DISCUSSIONS

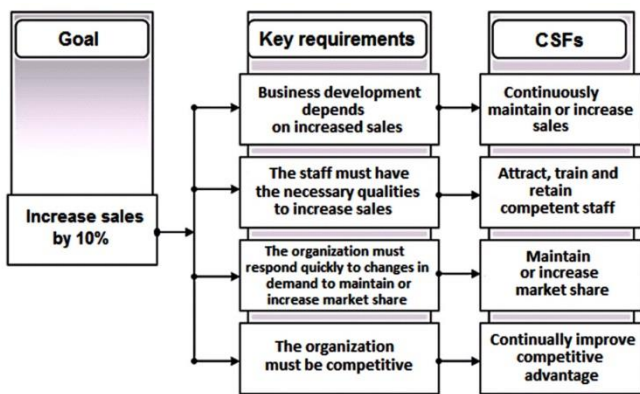


Figure 1 – The relationship between goals and Critical Success Factors

To evaluate the implementation of Critical Success Factors (*CSFs*) a set of Key Performance Indicators *KPIs* (calculated indicators used by an organization to measure its effectiveness in terms of *CSFs* execution) is being developed. These indicators quantitatively evaluate Critical Success Factors *CSFs*, and can be specified by formulas or other calculation methods.

Business processes lead to the achievement of the enterprise goals through the Critical Success Factors and have their own Key Performance Indicators *KPIs*: time-to-market and development of new products, client request processing, delivery of goods, responding to claims; operating costs; the average labor intensity of the product manufacture; the proportion of timely completed orders; the growth of labor productivity; the share of measurable business processes; the ratio of profits to marriage costs, etc.).

They are assigned normative values to ensure that Critical Success Factors are met. Thus, the Key Performance Indicators of Critical Success Factors achievement are obtained by aggregating Key Performance Indicators of business processes.

There can be more than one *KPI* per *CSF*. A *KPI* can be financial or non-financial.

For each *CSF* there must be at least one *KPI* measurement and one Key Goal Indicator *KGI*.

The Key Goal Indicators *KGIs* are metrics that show management whether business goals have been achieved through business processes, and to what extent.

*CSFs* and *KPIs* method is widely used to determine exactly where to focus the efforts of the organization to enable it to achieve its vision and strategic objectives [1, 4]. For the formation of *CSFs* and *KPIs* indicators it is necessary:

1. Define strategic goals.
2. Analyze each goal – what *CSFs* influence it.
3. Identify the business processes to achieve success for each *CSF* and determine the current values of business process *KPIs* that quantify each *CSF*.
4. Determine the normative values of  $KPIs^{norm}$ , ensuring the achievement of strategic goals.

Consider the process of identifying *CSFs* and *KPIs* (Fig. 2):

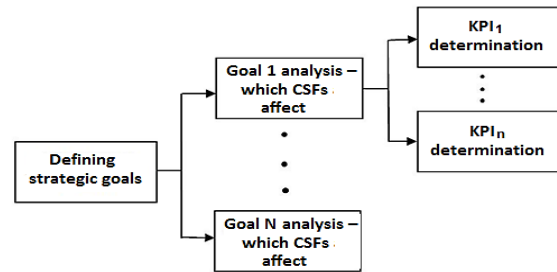


Figure 2 – Process of identifying *CSFs* and *KPIs*

The business system operates in accordance with the business strategy implemented by the balanced scorecard *BSC*, which translates the mission and the overall strategy of the company into a system of goals, as well as indicators that determine the degree of achievement of these goals within the four main projections:

- 1) *Finance* (financial development goals and results of the company – turnover, profit, profitability, etc.);
- 2) *Customers and markets* (the objectives of market presence and customer service quality indicators: the development of markets and sales territories, lead time, etc.);
- 3) *Business processes* (requirements for the efficiency of business processes: cost, time, number of errors, risks, etc.);
- 4) *Innovation and development* (goals of finding new technologies and staff development).

Steps to determining the effect of the business system as a result of the use of IT services [2]:

1. For a set of goals  $I (i \in I)$  measurable criteria for their achievement i.e. Key Goal Indicators  $KGI_i (\forall i \in I)$  are defined, for example, an increase in sales by 10%;
2. The goals are decomposed into Critical Success Factors  $CSF_k (\forall k \in K)$  – the basic requirements or conditions that must be met to achieve the established goals of the organization and realize its mission (for example, if you set the goal “increasing customer loyalty”, then the Critical Success Factors will be the quality of goods and the quality of customer service);



3. The achievement of the common goal of improving business efficiency occurs due to the implementation of the tasks in each of the key areas identified by the Critical Success Factors  $CSF_k$ . The degree of implementation of critical success factors is measured by Key Performance Indicators  $KPI_k$  ( $\forall k \in K$ );

4. Business processes  $BP_j$  ( $\forall j \in J$ ) lead to the achievement of the enterprise goals through Critical Success Factors and have their own Key Performance Indicators  $KPI_j$  ( $\forall j \in J$ ). They are assigned normative values  $KPI_j^{norm}$  ( $\forall j \in J$ ) to ensure that Critical Success Factors are met. Thus, the Key Performance Indicators of Critical Success Factors  $KPI_k$  are obtained by aggregation of Key Performance Indicators of business processes  $KPI_j^{norm}$  [3]:

$$KPI_k = \sum_j \alpha_j KPI_j^{norm} x_{j,k} \quad k = \overline{1, K}, \quad j = \overline{1, J}, \quad (1)$$

$x_{j,k} = 0$ , if  $KPI_j$  is not included in the integral indicator  $KPI_k$ ;

$x_{j,k} = 1$ , if  $KPI_j$  is included in the integral indicator  $KPI_k$ ;

where  $KPI_k$  is an indicator that measures the degree of  $CSF_k$  implementation;

$\alpha_j$  is a transformation coefficient of business processes Key Performance Indicators units  $KPI_j$  into Critical Success Factors Key Performance Indicators units  $KPI_k$ ;

$KPI_j^{norm}$  is a normative business process performance indicator  $BP_j$ .

5. Non-financial indicators  $KPI_k$  are translated into financial results by cause-effect chains. In the most general form, the logic is as follows: the better we have with staff qualifications and technologies, the easier it is for us to maintain business process efficiency, which in turn contributes to quality customer service and the realization of competitive advantages, and the latter leads to the planned financial indicators.

6. To obtain the maximum effect of the business system  $E$  from the implementation of the strategy, it is necessary to define a set of such values of Key Goal Indicators  $\{KGI_i\}$  for a variety of purposes  $I$ , so that the criterion characterizing the degree of achievement of these goals takes the maximum value under the conditions of fulfillment of the specified constraints caused by external economic  $EC$  (Environmental Constraints), and resources constraints (operational, labor, and financial)  $R_p$  ( $\forall p \in P$ ) required to implement business processes  $BP_j$ , i.e.

$$E = \sum_i \beta_i (KGI_i | EC - const, R\_current_p \geq 0 \text{ для } \forall p), \quad i = \overline{1, I}, \quad (2)$$

$$KGI_i = \sum_k \gamma_k CSF_k x_{i,k}, \quad i = \overline{1, I}, \quad k = \overline{1, K} \quad (3)$$

$$\{R_p\} \leq \{R\_current_p\}, \quad (4)$$

$x_{i,k} = 0$  if  $CSF_k$  does not affect the achievement of  $KGI_i$  goal;

$x_{i,k} = 1$  if  $CSF_k$  affects the achievement of  $KGI_i$  goal, where

$KGI_i$  is a key indicator of the goal  $i$ ;

$\beta$  – is a transformation ratio of a key indicator of the business goal  $i$  measuring units into effect measuring units;  $EC$  is a vector of parameters of the external economic environment;

$R\_current_p$  is a resource  $p$  limit;

$CSF_k$  is a Critical Success Factor;

$\gamma_k$  is the transformation ratio of the Critical Success Factor  $CSF_k$  measuring units into Key Goal Indicators  $KGI_i$  units.

7. Business processes automation as a result of IT project of IT services creation or modernization leads to improvement of business process performance indicators  $KPI_j$  ( $\forall j \in J$ ):

$$\Delta KPI_j = s_j KPI_j, \quad j = \overline{1, J}, \quad (5)$$

where

$s_j$  is the sensitivity coefficient of the  $j$ -th business process;

8. Improving the efficiency of business processes in the context of the main  $BSC$  projections leads to the achievement of the company's goals.

9. Then the effect of the business system  $E^*$  from the use of IT services is defined as a function of the value of strategic goals minus the Total Cost of Ownership of IT-Services  $TCO\_ITS_m$  ( $\forall m \in M$ ), calculated over the lifetime of the business system (Total Life Cycle,  $TLC$ ) under the conditions and limitations of 1 - 5:

$$E^* = \sum_i \beta_i KGI_i - \sum_m TCO\_ITS_m \rightarrow \max \quad i = \overline{1, I}, \quad m = \overline{1, M}, \quad (6)$$

$$TCO\_ITS_m = Cost\_Infr_m + TLC(Cost\_Ctrl_m + Cost\_Work_m), \quad (7)$$



where

$m$  is the index of IT service;

$Cost\_Infr_m$  is a cost of resources;

$Cost\_Work_m$  are current operating costs plus the cost of creating and maintaining of information repositories;

$Cost\_Ctrl_m$  is a cost of IT service management.

Changes of IT service indicators for business processes (availability, productivity, level of loading, capacity, quality, etc.) are connected with the change of  $TCO\_ITS_m$  and  $KPI_j$  of business processes, and through them with changes in  $CSF_k$  and  $KGI_i$ , affecting the value of the business system

effect  $E^*$ . In this case, the costs of IT services are considered indirect and are referred to the cost of the main products of the business system.

Using expert estimations of the basic parameters of the model and conducting computer simulations, it is possible to choose the most appropriate set and level of IT services. At the same time, investments can be directed both to the creation of IT services for business and to the development of IT infrastructure to improve the performance of IT services or reduce the cost of their implementation.

The method of analyzing the effectiveness of business processes is functional-cost analysis of business processes ABC (Activity Based Costing). The sensitivity of business processes to the use of IT services is determined by experts.

The above conceptual model for assessing the effect of the business system as a result of the implementation of IT projects for the creation and application of IT services is focused on creating an optimal IT infrastructure, within which the effective functioning and achieving the maximum effect  $E^*$  of business system is possible. A distinctive feature of this model is the structuring of financial and economic target indicators from top to bottom according to the scheme "business strategy – goals – Critical Success Factors – business processes – IT services" and aggregation of IT effects caused by the use of IT services from the bottom up into significant efficiency factors in the form of quantitative economic benefits of the company.

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