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## **EVALUATION OF THE EFFECTIVENESS OF THE TELECOMMUNICATION COMPANY'S CLUSTER MANAGEMENT<sup>1</sup>**

***Abstract.** Effective management of the cluster in telecommunication company requires the system of performance indicators. The composition of these indicators is determined by the criterion of efficiency, specificity of activity of the company and features of its external and internal environment. The authors developed a balanced scorecard to evaluate the efficiency of enterprise management. It is adapted to the specificities of small communications companies. Testing of the system at the Russian enterprises reaffirmed its adequacy. There is recommendation on the use of the developed system in the practice of management.*

***Keywords:** balanced scorecard, small telecommunication companies, performance indicators, revenues and costs, internal and external environment, effectiveness of management.*

**JEL Classification: L30,L96**

### **1. Introduction**

Evaluation of effectiveness is one of the key tasks of management. Business competitiveness, sustainability of its development depends on the success of this task. Of particular importance is the assessment of the effectiveness in the crisis period. Modern Russian economy is in crisis. In this regard, the development of methods for assessing the effectiveness of management is of great importance. Systems of effectiveness's evaluation should be adapted to the specifics of a particular company or industry.

Telecommunication companies are grouped into clusters for the best use of their competitive advantage, taking into account the factors of external and internal environment. In small telecommunication company clusters are the segments of its network.

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The relevance of the research is the specificity of small telecommunications operators that consists of local scale, significant resource constraints, so the scientific recommendations on management measures must take into account these properties, and known models and methods to ensure the effectiveness of management require adapting to their circumstances.

Works of many scientists devoted to the improvement of management systems in organizations. There are studies of I. Ansoff (Ansoff, 2007), R. Kaplan and D. Norton (Kaplan and Norton, 1996), D. Hicks (Hicks, 2002), P. Druker (Druker, 2006), M. Meyer (Meyer, 2009), etc. This problem also occurs in earlier studies of authors (Plotnikov and Vertakova, 2014, Potapenko and Leontyev, 2013).

In the analysis of the effectiveness of management is an important task the correct definition of criteria and indicators, on the basis of the objectives of the study. If you select performance criteria, the following requirements should be met: fitness for purpose; the fullness of the reflection of the implications for the functioning of this criterion; measurable components of the criterion; the clarity of the physical, economic, social and/or other reason; minimum set of components; highly sensitive to managed properties ( Ansoff, 2007).

## **2. Balanced scorecard for small telecommunication companies**

Analysis has shown that the assessment of the effectiveness of management of small telecommunication business, taking account of their specific features, should be based on the construction of system of indicators characterizing all significant sides of activity of the company in a specific relationship with each other and provides necessary and sufficient information for management decision. Comparative studies have shown that these requirements meet the balanced scorecard (BSC) (Chow, Haddad, and Williamson, 1997).

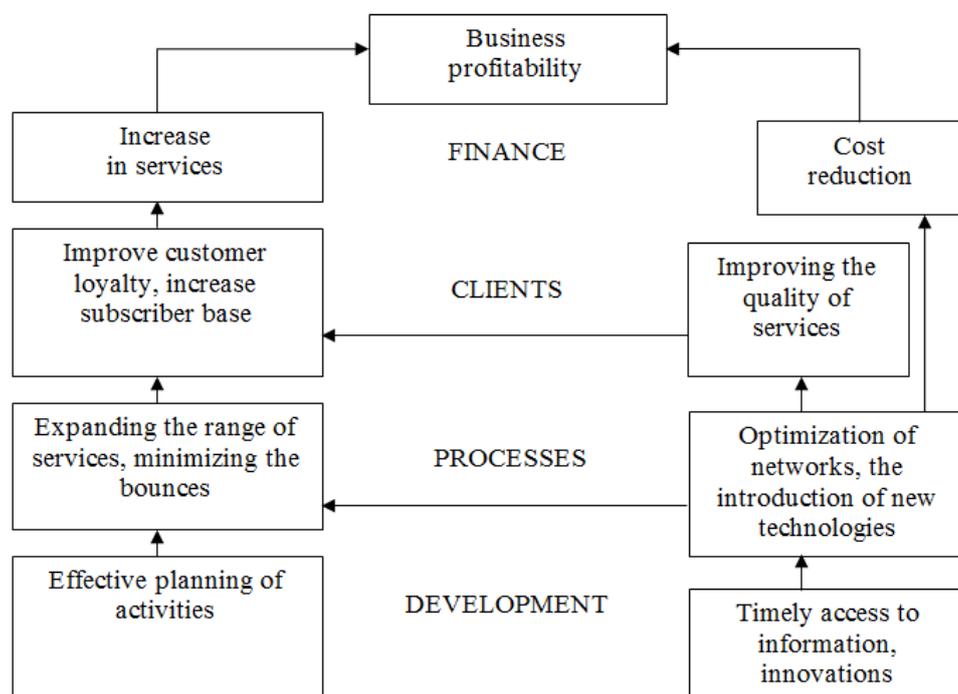
The study was formed the system of indicators (Figure 1, Table 1), which reflect the result of small telecommunication business and are influenced by various factors, its external and internal environment. BSC consists of four groups of indicators: "Finance", "Clients", "Processes", and "Development" (Kaplan and Norton, 1996). For each of the group there are targets and performance indicators.

The indicators of four groups of BSC are:

- Finance: Gross margin, Profitability of production costs, Profitability of segments, Return on investment;
- Clients: Average revenue per user, User's loyalty index;
- Processes: Revenue per line, Fixed-Asset Turnover, Labour productivity, Intensive using of the telephone network;
- Development: Share of income from innovative services in total sales revenue, Revenue growth from innovative services.

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It is clear that the broader the range of settings in which performance indicators remains within acceptable limits is, the higher "margin of safety", and the better protection against fluctuations of the different parameters (factors) that have influence on it. In this regard, to enhance the quality of assessment of effectiveness, we propose measures for the analysis of sensitivity of parameters of the BSC to the influence of factors of external and internal environment.



**Figure 1. Strategy map of small telecommunication operator**

**Table 1. Performance indicators of small telecommunication operators**

1. Indicators of the efficiency of the use of certain types of resource and cost	1.1. Labour productivity 1.2. Fixed-Asset Turnover 1.3. Cost of revenues
2. Indicators of the efficiency of the use of certain types of resources and capacities	2.1. The number of lines per one employee 2.2. Revenue per line 2.3. Costs of ordinary activities on one line

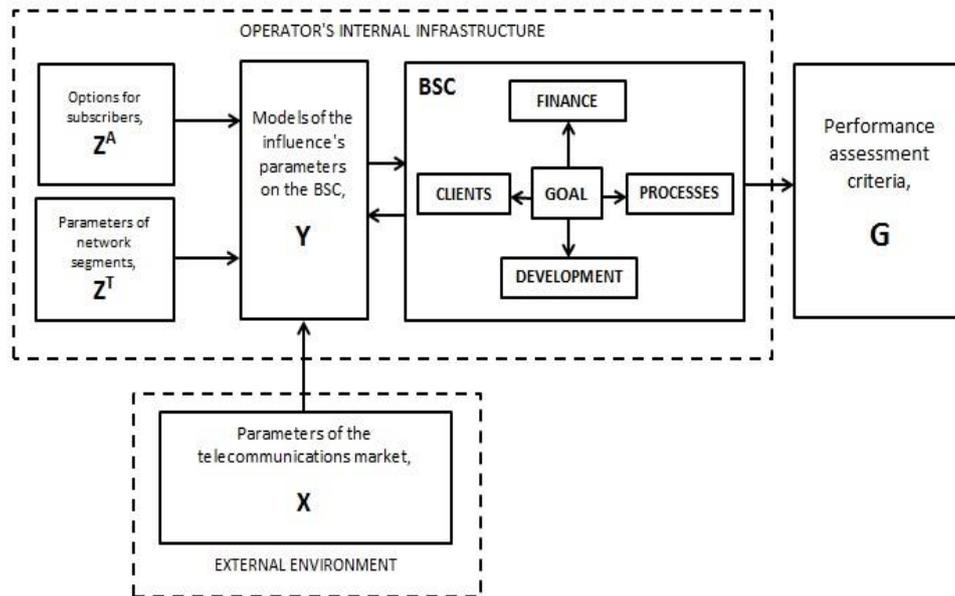
	2.4. Turnover from staff 2.5. The average cost per 1 employee 2.6. Intensive using of the telephone network
3. Indicators of the effectiveness of promising market segments	3.1. Share of income from innovative services in total sales revenue 3.2. Revenue growth from innovative services 3.3. User's loyalty index 3.4. Average revenue per user (ARPU)
4. General performance indicators	4.1. Gross margin 4.2. Earnings before interest, taxes, depreciation and amortization (EBITDA) 4.3. Profitability of production costs 4.4. Profitability of segments 4.5. Return on investment (ROI)

### 3. Performance evaluation model of small telecommunication companies

The proposed BSC is sufficient (corresponding to its objectives), it takes into account the specificities of the telecommunications industry and small businesses, not overloaded with indicators that positively affect the efficiency of decision-making-relevant aspect in the management of a small business and ensuring its competitiveness. On its basis we offer a generalized model of effectiveness evaluation (Figure 2). The model takes into account: the composition and extent of communication services, preferences and the level of preparedness of the consumer market to some services, the competitive environment of the market, regulatory environment, development of sectorial organizational and technological infrastructure, etc.

Taking into account the characteristics of small telecommunication business, the developed model to assess the impact on the efficiency of the management of not only summarized the characteristics of its internal and external business environment, but also elements of his techno-economic structure (services, areas, base stations, subscribers) (Kaplan and Norton, 1996).

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**Figure 2. The general model of performance evaluation of the operator**

Generalized mathematical model of evaluation of small business communication appears functional type, which is correlated with indicators, because it takes into account the revenues and costs in monetary or natural form:

$$E(t) = Y[\text{Revenues}(t), \text{Costs}(t), X(t), Z(t)] | G \quad (1)$$

Where: E is performance indicator, Y is the dependence of the input parameters of the indicator, Revenues is operator revenues, Costs is operator costs, X is the parameters of the external environment, Z is the parameters of the internal environment, G is performance assessment criteria, t is the period of analysis.

Telecommunication network of operator is a set of unified single technological process equipment (fixed assets) is used for routing, switching or transmission of information between network end points. The main production funds for the industry and the nature of the product (service) hold a dominant share of the total resources of the operator. Therefore their volume, composition, status and largely determine the end results of the operators, the number and quality of services, the degree of customer satisfaction.

Telecommunication network infrastructure consists of segments, as which understand logically or physically separated part of a telecommunications network (for example, area, district, house, host switching, subscriber's terminal equipment, etc.).

The specificity of the small telecommunication companies is substantial heterogeneity between segments of infrastructure, which leads to a differentiated assessment of their effectiveness, for which the thesis developed a special model. General view of the performance indicator for each segment is represented in the following form:

$$E_{ijkh...}(t) = f(\text{Revenues}_{ijkh...}(t), \text{Costs}_{ijkh...}(t)), \quad (2)$$

Where:  $i$  is index of service,  $j$  is index of area,  $k$  is index of the network segment,  $h$  is index of the subscriber. It should also be noted:

$$\text{Revenues} = \sum_{i=1}^{N^1} \sum_{j=1}^{N^2} \sum_{k=1}^{N^3} \sum_{h=1}^{N^4} \left( \sum_{q=1}^m c^q \cdot V_{ijkl}^q + c_0^q \right) \quad (3)$$

Where:  $N_1, N_2, N_3, N_4$  are the number of segments of each type;  $c$  is subscription fee,  $q$  is fixed rate,  $V$  is number of services (or number of subscribers),  $m$  is the number of tariffs for the segment,  $c_0$  is one-time activation fee;

$$\text{Costs} = \sum_{i=1}^{N^1} \sum_{j=1}^{N^2} \sum_{k=1}^{N^3} \sum_{h=1}^{N^4} (\text{Costs}^m + \text{Costs}^z + \text{Costs}^s + \text{Costs}^a + \text{Costs}^o + \text{Costs}^p) \quad (4)$$

Where:  $\text{Costs}^m$  is cost of materials,  $\text{Costs}^z$  is labor costs,  $\text{Costs}^s$  is social contributions,  $\text{Costs}^a$  is depreciation charges,  $\text{Costs}^o$  is calculations with network operators,  $\text{Costs}^p$  is other costs.

The unified structure and simplicity are the distinctive features of the developed model. And it adequately describes the characteristics of small operators. This allows you to use it not only in theoretical studies of effectiveness, but in practice management. It is also important to note that it uses the original data is available from the registers of managerial and financial accounting business..

#### 4. Results

In our research we used Key Performance Indicators (KPI) of four groups of BSC (Table 2), and for example, in this article, we present the results of the analysis only on two of the selected indicators.

The proposed model was evaluated the effectiveness of telecommunications network segments of small operators of Kursk region. (This region was chosen as an example, to check the adequacy of the model. Proposed by the authors of the approach to assessing the effectiveness is universal. It can also be used in other countries and regions)

As an indicator of the efficiency coefficient were used: intensive using of the telephone network, the profits from the services of telephony, the gross margin from telephone communication services, fixed-asset turnover from the telephone network, the payback period of investment in telecommunication network operator, the profitability of telephone services. Consideration of such a wide range of

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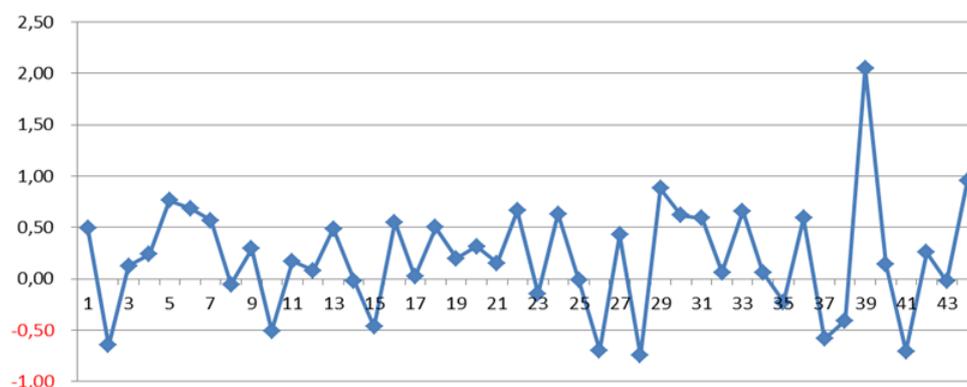
indicators allowed a comprehensive evaluation of the effectiveness of the management of the infrastructure of the small communications companies.

**Table 2. KPI of small telecommunication operators**

Indicator
Gross profit, $GP = \text{Revenues} - \text{Costs}$ , where Revenues – operator’s revenue, Costs – operator’s costs.
Profitability of the services, $E = \frac{P}{\text{Costs}}$ , where P – operator’s profit.
Gross margin, $GM = \frac{\text{Revenues} - \text{Costs}}{\text{Revenues}}$ .
Capital productivity, $F = \frac{\text{Revenues}}{C^F}$ , where $C^F$ – long term assets
Payback period of fixed assets, $\begin{cases} T = \frac{C^F}{P}, & P > 0; \\ T \rightarrow \infty, & P \leq 0 \end{cases}$
Indicator of intensive using, $K_{\text{int}} = \frac{V}{V_{\text{max}}} \cdot 100$ , where V – real volume of services, $V_{\text{max}}$ – maximum possible volume of services.
Loyalty index, $NPS = \% \text{ supporters} - \% \text{ critics}$
Average revenue per user, $ARPU = \frac{\text{Revenues}}{k}$ , where k – number of users.
Share of income from innovative services, $d_{\text{inn}} = \frac{\text{Revenues}_{\text{inn}}}{\text{Revenues}}$ , where $\text{Revenues}_{\text{inn}}$ – revenue from innovative telecommunication services.
Growth rate of innovative services, $t_{\text{inn}} = \frac{\text{Revenues}_{\text{inn}}^n}{\text{Revenues}_{\text{inn}}^{n+1}}$

As an example, figure 3 shows the profitability is one of the indicators of the effectiveness of small business communication for small telecommunication

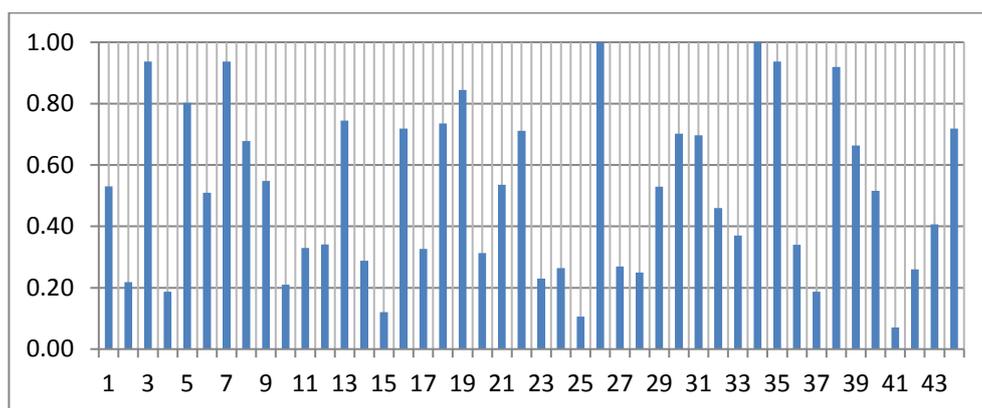
operator "KurskTelecom". Profitability across the entire network amounted to 0.24. The profit margins for 14 of 44 segments were negative.



**Figure 3. Profitability of segments**

You can also see that, in working condition, telephone network segments are not used with maximum of their technical and operating characteristics. Indicator of intensive using throughout the network as a whole indicates that the telephone network was loaded on 54% of its capacity (Figure 4).

Analysis of the data revealed the inefficiently managed network segments and develops recommendations to improve the management considered a small telecommunication companies. Found that the existing system of telephone services is such that the loss of some segments offset by some highly profitable. While the loss-making and inefficient segments do not in all cases, the strategically important for business, so it is a good idea to get rid of them.



**Figure 4. Indicator of intensive using of segments**

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Scientific results of this research is the development of theoretical and methodological foundations of development tools integrated dynamic estimation of economic efficiency of small telecommunication companies, based on the use of an adapted balanced scorecard.

### 5. Conclusion

- The balanced scorecard is an efficient mechanism for management in different corporations.
- The balanced scorecard has been developed for small telecommunication companies, which took into account their specificities and allows leaders to make effective management decisions.
- On the BSC's basis we offered mathematical model of evaluation, that contains intensive using of the telephone network, profit from the services of telephony, gross margin from telephone communication services, fixed-asset turnover from the telephone network, payback period of investment in telecommunication network operator, profitability of telephone services.
- On the basis of the proposed model there were calculations of the performance indicators on the basis of revenue and costs of operators. The model allows identifying inefficient segments and excluding them.

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