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Measurement of Scorecard Balance

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ABSTRACT

The purpose of this scientific article is to test the method of quantitative measurement balance scorecard that provides a determination of the degree of implementation of business strategy in the tactical period, and enable them to diagnose problems of implementation. Balanced scorecard is an integral part of the strategic plan of the enterprise that requires careful analysis and monitoring of the results obtained by this technology. Methodological bases of this research study are general statistical methods, dynamic ratio index and the coefficient analysis, the method of paired comparisons. The results of the study: 1) the proposed model the normative model of the enterprise to measure the effectiveness of the implementation of business strategy into tactical period; 2) an example of implementation of algorithm of development of a normative model of the enterprise; 3) the proposed method of the dynamic standard as a tool for strategic analysis of the company. The practical significance of research results consists in possibility of application authoring for the monitoring of enterprise development strategies, as well as the prospects of applying the method of the dynamic standard for building normative models of monitoring of development strategies of regions, municipalities and city districts.

KEYWORDS
balanced scorecard; performance of the implementation of the enterprise strategy; integrated statistical measuring; firm, strategy

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Introduction

Balanced scorecard as a tool to measure the performance of all enterprises currently uses the main attention among leaders and managers. Balanced scorecard enables the assessment of an enterprise according to certain factors, as well as new opportunities for management of various enterprise strategies. Balanced scorecard evaluates qualitatively and quantitatively the activities of enterprises, for example such sectors as consumer, business, innovative and financial. Balanced scorecard is created for analyzing the performance of the whole enterprise, so this system is triggered to obtain certain answers to questions such as the assessment and opinion of customers to the enterprise; the internal processes of the Corporation and their effectiveness – what is their

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situation and how to improve it; the means of achieving the improvement of the status of the enterprise, especially the market of competitors with innovation and capital; – assessment of the company from the owners.

History of enterprise management through the development of systems and models of indicators has nearly 100 years. One of the first attempts was the model of DuPont, which became widespread in large corporations (DuPont model, 1920). In the Francophone countries of 1932 applies in the analysis of enterprise management model Tableau de bord. Problems of development of systems of indicators to assess the effectiveness of their activities successfully involved well-known scientists such as R. Norton & Kaplan D. (1996), M. Martinsons, R. Davison & D. Tse. (1999), B. A. Lyons (2003), H. Norreklit (2003), B. Paladino (2007) & R. J. Schonberger (2008).

R. Kaplan and D. Norton(2001a) have created the brand "Balanced Scorecard" for the first time provided the solution of such control problems as the imbalance between strategic and tactical levels of enterprise management, accounting for the effects of intangible assets on the performance of the enterprise, control over the implementation of the strategy of the enterprise (Norton R., Kaplan D., 1996). The balance of performance in this case is understood as the presence in their system of financial and non-financial performance of the company, the job of interaction and causality. However, when evaluating the performance of the strategy, the management of the enterprise solves the problem of evaluating a balanced achievement of its targets because the achievement of one target does not mean that there will be other targets. The imbalance in achieving the objectives of the enterprise leads to the problems of implementation of the overall strategy, therefore, it is important to promptly find out the critical indicators from the point of view insufficient or too rapid growth of their values relative to other indicators and to take necessary measures. To solve these problems, it is proposed to develop a normative model that allows to obtain a quantitative level of balance in the indicators relative to each other and to identify the lagging or leading indicators. The proposed methodological development is based on the methodology of R. Kaplan and D. Norton and allows one to carry out monitoring of implementation of the strategy on the basis of integral statistical measures, representing the percentage completed of the target ratios of indicators in the total amount specified in the strategy (Norton R., Kaplan D., 1996).

Scientific issue

Measurement of the balance of achievement of target indicators in the implementation of business strategy.

Practical relevance

The proposed algorithm is to build a normative model and method of calculation of the statistical integral meter can be used to develop normative models to assess the balance of achievement of target indicators during monitoring of development strategies of enterprises, regions, municipalities and city districts.

Materials and Methods

The essence of the method of the dynamic standard is the formation in accordance with some objective (e.g., maximization of profit of the company, increase in the cost of equity, increase effectiveness of the implementation of the

strategy of the enterprise), groups of indicators characterizing the purpose and, to the greatest extent, reflecting the real state of the object of research in dynamics. The quantitative composition of indicators should be no less than (not less than 6 and no more than 25). The method of the dynamic standard is the procedure of selection of economic indicators and their ordering. The idea of harmonization of indicators of dynamics of economic systems belongs Syroezhin I. M. (1980).

In modern scientific works and publications such authors as N. N. Zakharchenko (1993), Zavgorodnyaya A. V. (1999), R. L. Zhambekov (2000), T. A. Burtseva (2012) & Svetunkov S. G. et al., (2012), you can also find examples of the consideration of the normative (optimal) ratio of the measures of movement performance.

Syroezhkin I. M. (1980) noticed that not comparable static characteristics of the national economy are comparable in dynamics. The proposed dynamic standard (days) - is organized by pace (coefficients, indexes) growth (or base chain) set (system) of indicators, such that maintaining for a long time interval specified in a dynamic normative order of indicators provides the maximization of integral evaluation. Form of expression the ordering of the indicators is the ranking of performance (assigning grades), if not all indicators are able to link strictly in order, the presentation days to serve the count of preferences and/or the corresponding matrix of preferences, in this case the integral meter has the form of a normative model. The quantitative level of the integrated meter (integrated assessment) in this case is the ratio of the number of performed correlations between growth rates (indices) of growth of actual indicators characterizing the specific object under study, to the number of set relations in a normative model. Accordingly, the resulting quantitative levels vary in the range from 0 to 1, the closer the value is to 1, the more quantitative the valuation level.

The algorithm for constructing normative models is disclosed in detail in the work of J. A. Pohostinsky (1999). The normative model differs from the matrix of preferences the fact that it indicators categorized by the transitive property, this allows to always obtain a single measurement result.

Advantages of the method over other methods of building an integrated measure, for example, multidimensional average, are that it: first, it provides a complex convolution directly incommensurable indicators, reflecting different aspects of the functioning of the economic system (presented in ordinal scale of measurement); second, it makes possible to obtain integral evaluation, which is an integral meter, which characterize the system by studying the property as a whole taking into account the relationship of phenomena within it; third, the normative model, each figure retains its own role and there is no effect of cancellation "positive" and "negative" changes captured by different indicators; and fourth, it has a high information capacity, which allows to obtain a dynamic integrated assessment based on a large number of indicators at a short time sample of observations, for example, only two periods to build an evaluation and three periods to sort the indicators and their groups (factors), its relative growth.

Results

To understand the algorithm of development of normative models and obtain quantitative degree of balance of achievement of target indicators of strategy implementation the company will look at an example.

Let the conditional enterprise balanced scorecard (BSC) has the form (Table 1) and contains 8 key performance indicators (KPIs). The matrix of preferences to construct a normative model of the effectiveness of the implementation of the strategy of the enterprise and obtaining an integrated estimation of efficiency of realization of strategy of the enterprise (Table 2).

Table 1. BSC of the N enterprise

Perspective	Kpi	Goal
finance	F1. return on non-current assets F2. return on current assets	Increase in figures
clients	C3. profitability of sales	Increase in figures
processes	P4. capital productivity, P5. the turnover of circulating assets, P6.the capitallabor ratio	Increase in figures
personnel	P7. productivity P8.the profitability of labor	Increase in figures

Table 2. Matrix of (E) preferences

Indicator of dynamic standard, P	Income	Profit	Fixed assets	Floating assets	The average number of employees
Income	**0**	1	1	1	1
Profit	-1	**0**	1	1	1
Fixed assets	-1	-1	**0**	0	1
Floating assets	-1	-1	0	**0**	0
The average number of employees	-1	-1	-1	0	**0**

Formalization of a matrix of preferences were tested using pairwise comparisons in accordance with set KPIs and targets (see Table. 1). If, in accordance with the target installation rate in the row of the matrix needs to grow faster than the rate in the column below for the kpi target was performed setting the "growth" that is put in matrix 1 at the intersection of row and column, while the symmetrical choice is -1. Otherwise, the -1, while the symmetric place put 1. If relationships between the indicators is not set, then put a zero on the diagonal always in the matrix are zeros. Thus, in the matrix set 8 targets for all kpi. For example, the indicator of profitability of sales to increase (see Table. 1), that is, on the basis of its formula calculation (profit/revenue), earnings growth should be higher than the revenue growth, it is growth of the indicator "return on sales", so the string model for increased revenue is worth -1 in the column of profit and symmetric is 1 (tab. 2).

Formally, the matrix of preferences is set by a matrix ($E=\{e_{ij}\}_{nxn}$), each element of which reflects the normative relation between performance (faster/slower) the row and column of the matrix of preferences. The matrix E is described as follows:

$$e_{ij}\begin{cases} \mathbf{1}, if\ GR(P_i) > GR(P_j); \\ -\mathbf{1}, if\ GR(P_i) < GR(P_j); \\ \mathbf{0}, if\ the\ reference\ ratio\ between\ GR(P_i) and\ GR(P_j), \end{cases} \quad (1)$$

where i, j – numbers of indicators in days; P, P – indicators having the i-th and j-th numbers in the dynamic ratio, respectively; GR(Pi) > GR (Pj) and GR (Pi) < GR (Pj) – reference of ratio between rates (indices) growth.

Thus formed matrix E, after identifying additional relationships, is a normative model (Table. 3). The model and the matrix of preferences in our case are the same, this means that there are indirect relationships of indicators, not included in the matrix of preferences.

Table 3. Regulatory model (E) (similar to strategy map)

Indicator	Income	Profit	Fixed assets	Floating assets	The average number of employees
Income	0	1	1	1	1
Profit	-1	0	1	1	1
Fixed assets	-1	-1	0	0	1
Floating assets	-1	-1	0	0	0
The average number of employees	-1	-1	-1	0	0

Reflection of the results of the adopted and implemented managerial decisions in the enterprise is the actual relation matrix of indicators P*i*. The closer the actual ordering of the indices to a given normative order in the model, the higher the level of the integrated impact assessment of implementation of the strategy of the enterprise. The matrix of actual correlations of growth performance ($F=\{f_{ij}\}_{nxn}$) is described as follows:

$$f_{ij}\begin{cases} \mathbf{1}, if\ GR(P_i) > GR(P_j); \\ -\mathbf{1}, if\ GR(P_i) < GR(P_j); \\ \mathbf{0}, if\ GR(P_i) = GR(P_j), \end{cases} \quad (2)$$

where i, j – numbers of indicators; Pi, Pj – indicators having the i-th and j-th numbers, respectively; GR(Pi), GR (Pj) – actual rate (index) of growth of the i-th and j-th indicators, respectively.

For example, the data about activity of the enterprise N are characterized by the following indices of growth (tab. 4).

Table 4. Indexes of growth of indicators of the enterprise in two years' time

Indicator of dynamic standard	Last year	This year
Income	1,4	1,5
Profit	1,6	1,3
Fixed assets	1,3	1,6
Floating assets	1,2	1,3
The average number of employees	1,1	1,2

Then the matrix of actual correlations of dynamic indicators of the standard are of the form (Tables. 5, 6):

Table 5. The matrix of the actual ratios of F for the previous year

Indicator of dynamic standard	Income	Profit	Fixed assets	Floating assets	The average number of employees
Income	0	-1	1	1	1
Profit	1	0	1	1	1
Fixed assets	-1	-1	0	1	1
Floating assets	-1	-1	-1	0	1
The average number of employees	-1	-1	-1	0	0

Table 6. The matrix of the actual ratios of F for the current year

Indicator of dynamic standard	Income	Profit	Fixed assets	Floating assets	The average number of employees
Income	0	1	-1	1	1
Profit	-1	0	-1	0	1
Fixed assets	1	1	0	1	1
Floating assets	-1	0	-1	0	1
The average number of employees	-1	-1	-1	0	0

An integrated assessment of the impact of enterprise strategy implementation is the estimation of proximity of actual and normative models set in order the rates (indices) growth indicators (Y).

$$Y = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} b_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{n}\left|e_{ij}\right|} \quad \text{,where } \boldsymbol{b_{ij}} \begin{cases} \mathbf{1}, \boldsymbol{if\ e_{ij}} = \mathbf{1}\ \boldsymbol{simultaneously\ with\ f_{ij}} \geq \mathbf{0}; \\ \boldsymbol{or} \\ \boldsymbol{if\ e_{ij}} = -\mathbf{1}\ \boldsymbol{simultaneously\ with\ f_{ij}} \leq \mathbf{0}; \\ \mathbf{0}, \boldsymbol{otherwise} \end{cases} \quad (3)$$

n is the number of indicators in DD; i, j - numbers of indicators in DD; b_{ij} - element of the matrix of coincidence of actual and reference ratios of growth rates ($B = \{b_{ij}\}_{nxn}$); e_{ij} - element of the matrix NM, f_{ij} is the element of the matrix $F=\{f_{ij}\}_{nxn}$.

Score Y varies from 0 to 1. Equal to 1 if all regulations set the ratio of the rate of improvement is actually implemented. Equal to 0, if the actual order of indices is opposite to the normative order of indicators in the model. The closer Y is to 1, the greater the proportion of regulatory relationships between indicators implemented in reality.

Calculate the evaluation of the effectiveness of the strategy implementation in two years. For this, we are going to define a matrix of coincidences (Tables. 7, 8).

Table 7. The matrix of matches for the previous year (b^b)

Indicator of dynamic standard	Income	Profit	Fixed assets	Floating assets	The average number of employees
Income	0	0	1	1	1
Profit	0	0	1	1	1
Fixed assets	1	1	0	0	1
Floating assets	1	1	0	0	0
The average number of employees	1	1	1	0	0

Table 8. The matrix of coincidences for the current year (b^0)

Indicator of dynamic standard	Income	Profit	Fixed assets	Floating assets	The average number of employees
Income	0	1	0	1	1
Profit	1	0	0	1	1
Fixed assets	0	0	0	0	1
Floating assets	1	1	0	0	0
The average number of employees	1	1	1	0	0

By the formula (1) of the previous year = 14/16= 0,875, and Y for the current year = 12/16= 0,75. Thus, for the current year decreased the effectiveness of the implementation of the strategy for ΔY = -0,125.

The generated model can be considered as the factor system, so this methodology can be used for BSC. The influence of each indicator on Y growth, which is the effective rate, determined by the formula:

$$\Delta Y(P_i) = \frac{\sum_{j=1}^{n} b^0{}_{ij} - \sum_{j=1}^{n} b^b{}_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{n}\left|e_{ij}\right|}$$

where, $\Delta Y(P_i)$ - the increase in the assessment caused by the dynamics of the ratio of the growth rate of the i-th indicator with others; n - number of indicators; i, j - numbers of indicators; $b^0{}_{ij}$, $b^b{}_{ij}$ - the elements of the matrix of coincidence of actual and reference ratios of rates (indices) growth in current and base periods, respectively; e_{ij} - matrix element of the reference relationships between the growth indicators.

Let us find a decomposition of the growth evaluation in terms of: ΔY (profit)=(3-3)/16=0;
ΔY (Revenue)=(3-3)/16=0; ΔY (non-current assets)=(1-3)/16=-0,125; ΔY (current assets)=(2-2)/16=0; ΔY (average headcount)=(3-3)/16=0.

Thus, the negative impact associated with the term "production" as the dynamics of non-current assets had a negative effect on balance performance.
You can apply this methodology to identify effects of groups of indicators, if you put them $\Delta Y(P_i)$, that is, to factors that are not all characterized by a balanced scorecard, and the part that is in the methodology of the BSC is called a "strategic subject".

Discussions

This article is focused on the creation of various methods for monitoring a balanced planning system. Research aimed at studying the strategic directions of a balanced planning system is sufficient among foreign authors, and also less than among domestic.

R. S. Kaplan and D. P. Norton (1992 -2004) in his works fully considered the balanced planning system. They had different ideas on planning the business with the help of a balanced planning system. The strategy of internal development of enterprises and their quantitative and qualitative indicators with the active participation of a balanced planning system, in their opinion, is the main purpose, among other actions against the company. That is, objectives and strategies, in a way, in the main, depend on a balanced planning system. Problems their research covers topics such as the balanced system of planning and the nuances of working with it; balanced planning system as a regulator of the performance of the enterprise; balanced planning system as a management strategy and the envisaged measures to the management; balanced planning system as a replacement for previously existing own strategies or potential solutions non-functional strategies; - balanced system of planning was also seen as an innovation in the environment of the new business; orientation and balance business prosperity with balanced planning system; the measurement of intangible assets through the introduction of technology, a balanced planning system.

T. A. Burtseva (2009, 2010, 2012) examines the effectiveness of a balanced planning system on the example of investments. Investment policy among her works plays a major role, through the financial side and the development of strategies to attract investment. For the sake of successful performance of enterprises in certain regions, for example, municipal, she proposes a model through the monitoring of a balanced planning system. That is, the issue of the question of investment policy among different regions employ a balanced planning system. The assessment of the development and effectiveness of management of economic systems, it is assumed her different methodology, including a balanced planning system. Even among these studies there are no offers and exercises about improving the technology.

Conclusion

In this work, the presented results allow to claim that the proposed methodological developments can be applied to a large variety of tasks related to monitoring of development strategies of enterprises and other objects of strategic planning. The decline in balance performance or growth with their help received a quantitative rating, which in turn allows you to implement monitoring of effectiveness of implementation of the strategy in the tactical period. This methodology does not require serious mathematical tools, however, if growth of indicators is necessary to apply automated processing for calculation of the estimates, so the author uses his own computer program and implemented the development of regulatory models for integrating quantitative evaluations of the investment attractiveness of the region, the city and municipal district.

Disclosure statement

No potential conflict of interest was reported by the authors.

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