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Filling assessment model of strategic cost management system (SCMS)

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Summary: The article presents a filling assessment model of SCMS, developed for the reflection of actual content of enterprise strategic cost management system, which can be used in real-time mode. It is proposed to use the mathematical apparatus of set theory and tools for working with sets in hyperspace for practical construction and use of such model. Ref. 7.

Streszczenie: Artykuł przedstawia model oceny wypełnienia SCMS, opracowany w celu odzwierciedlenia rzeczywistej zawartości systemu zarządzania kosztami strategicznymi przedsiębiorstwa, który może być wykorzystywany w trybie czasu rzeczywistego. Proponuje się wykorzystanie aparatu matematycznego teorii mnogości i narzędzi do pracy z zestawami w hiperprzestrzeni do praktycznej konstrukcji i wykorzystania takiego modelu.

Keywords: cost management, strategic cost management system, cost management model, set theory, management functions

1. Introduction

The issues of cost management of an industrial enterprise, particularly strategic cost management, were researched by both domestic and foreign scientists

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(M. Bahrushina, C. Drury, J. Foster, S. Golov, V. Govindarajan, Ch. Horngren, G. Kozachenko, L. Napadovskaya, A. Orlov, Y. Pogorelov, J. Shank A. Upchurch, et al.) The review of theoretical and empirical achievements of these authors makes it possible to state that the practical tools of enterprise strategic cost management are insufficiently investigated and require their scientific decision.

2. Problem statement

The purpose of the study is to develop a filling assessment model of SCMS, designed for the reflection of actual content of enterprise strategic cost management system, which can be used in real-time mode.

3. Materials and research methods

Studying the issues of cost management models and strategic cost management system, it should be clarified that the model itself represents a certain image of an object, which is created with a specific purpose and indicated constraints. The model is not identical to the object and always involves certain simplifications and assumptions. Such simplifications define the scope of validity and correctness of the model and must be considered when developing and using it. When modeling the enterprise cost management and enterprise strategic cost management system, it should be considered the cost features as an object of management and cost management features. It is also necessary to determine such particular simplifications and assumptions as cost relevancy, certain time limit (a part of fixed costs may vary in long term period), focus on operating activity, availability of alternatives, rationality of managers' choice in absence of their opportunistic behavior.

The issues of cost management of an industrial enterprise, particularly strategic cost management, were researched by both domestic and foreign scientists (M. Bahrushina, C. Drury, J. Foster, S. Golov, V. Govindarajan, Ch. Horngren, G. Kozachenko, L. Napadovskaya, A. Orlov, Y. Pogorelov, J. Shank,

A. Upchurch, et al.) The review of theoretical and empirical achievements of these authors makes it possible to state that the practical tools of enterprise strategic cost management are insufficiently investigated and require their scientific decision.

The filling assessment model of SCMS is intended for use in real-time mode, as it reflects an actual content of an enterprise strategic cost management system by existing selected components. It is also appropriate to use

special tools for this model for the most complete reflection of the SCMS structure, the availability of individual elements and the like. Despite the fact that the form of the model will be represented by a hypercube, it is advisable to use the mathematical apparatus of the set theory and tools for working with sets in hyperspace for practical construction and use of such model. It is formed at a time and then can be used when necessary. However, in the case of reconstruction or substantial filling of the SCMS, the model can be used again to assess and display a new state of the SCMS.

The filling assessment model of the SCMS is structural. Its value is that the model allows to assess the SCMS filling with individual elements and on this basis to make a conclusion about its completeness or, vice versa, the need for additions and improvements. It can be done without assessing the SCMS structure in the correlation of its elements because this is a separate complex task. A certain limitation of this model, which is in its basis, is the emphasis on availability and content of the elements in the strategic cost management system. The correlation between the elements, which in the practice of the enterprise cost management quite significantly affects the results of the management, is not considered in the model. However, this limitation is made deliberately, as separate existing elements in the strategic management system should be implemented and embedded into the cost management content of the whole enterprise. So, the filling assessment model of the SCMS solves its own, although a little narrowed task and the same elements of the SCMS should find their application in a process model of the enterprise cost management. To prevent the duplication of links between the SCMS elements in various models the correlation between the elements is deliberately not marked. By its nature the model is descriptive and has a high flexibility. Its additivity is provided by adding one (or several) sections of the enterprise strategic cost management system. However, this leads to a multiplicative increase in complexity through the formation of new hypercube measurements and, accordingly, an exceptionally rapid growth in the number of the model elements, which require analysis, assessment and further filling, so that the complexity growth for this model is quite high.

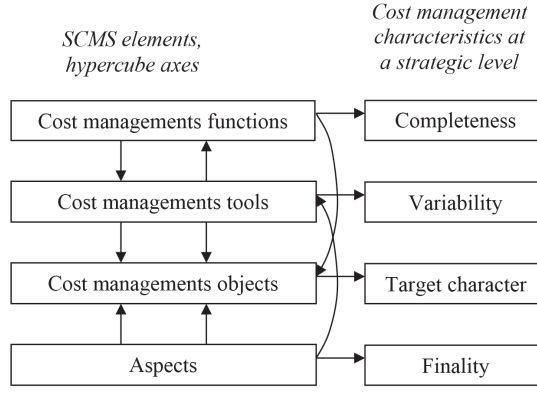
It is suggested to form the filling assessment model of the SCMS by constructing a hypercube of assessments and interpretation of their totality. The axes, on which it is proposed to construct the hypercube, should be clarified. Considering the studied elements of the enterprise strategic cost management system, the composition of the axes of the hypercube assessments is following (Fig. 1).

The composition of the proposed SCMS elements, which the hypercube axis are determined by, is due to the following. Considering cost frequency, it is widely used a functional approach to the enterprise cost management. In the case of large detailing each function correlating with the others can be highly detailed to the level of individual processes, which actually determines the possibility of use and process approach to the enterprise cost management at a pragmatic level.

Therefore, a required element of the enterprise strategic cost management system should be specific cost management functions. The composition of such functions is known and described in modern literature as a composition of cost management functions. The essence of each function is described in [5] with emphasis on information support functions and management impact, first and second level functions and so forth. In general, they include forecast, planning, rationing, organization, accounting, control, regulation, promotion, analysis, and strategy development.

The details of the enterprise cost management functions describe the cost management completeness, as they cover all the processes and projects on used resources and workers' efforts are directed. This allows us to identify problem areas on the enterprises which are researched and to focus the management on solving problems of current interest.

Fig. 1. The SCMS model elements



Controlling influence, also in cost management, is concretized in specific tools of cost management, which are cost management methods [5]. The enterprise cost management methods which can be applied are balanced score-

card BSC, strategic positioning analysis, cost factors analysis, value chain analysis (VCC method), accounting and cost analysis by types of activity (ABC method), analysis of product life cycle stages (LCC-analysis), cost benchmarking, cost alternatives analysis, functional-cost analysis, margin analysis, target costing, kaizen costing, break-even point analysis, management by responsibility centers.

These methods are described in detail, they set their use conditions, the possibility of joint use [5], and, therefore, it remains possible for the enterprise only to choose these methods and implement the organization of their use. Cost management tools in the enterprise strategic cost management system describe management variability. According to the well-known in cybernetics Ashby's principle, the variability of the controlling system should be higher than the variability of the system which is under the control [257]. These conditions make management possible and effective. Therefore, the high variability of the enterprise strategic cost management system, which is manifested in the necessary variety of used tools, is important and beneficial for the management.

The enterprise cost management has a clear "point of application", a set of specific management objects, which generally provide the target character of the enterprise cost management. The objects are specific processes and factors that generate enterprise costs. The structure of such objects should include logistics processes, manufacturing processes, product sales process, promotion process, transactions, manufacturing organization process, manufacturing management process [5].

Finally, the enterprise cost management must contain three essential aspects (in the context of combining all the other mentioned elements of the enterprise strategic cost management system). These aspects are target, information and active ones. The target aspect determines the establishment of goals, standards, regulatory values or content. It also sets the partial or complete enterprise cost management goal. The information aspect determines the availability of required information (for example, a cost object, a specific control function and used management tool), because necessary information is an essential requirement of effective managerial impact. The active aspect sets the specific control, specific actions and procedures. As for the combinations of separate management tools and functions, the information aspect reflects the resulting information characteristics and the active aspect is the effectiveness of such management tools.

The combining of the SCMS elements which are the basis for the constructing the hypercube axes, allows us to provide a set of assessments. De-

scriptive examples of them are "active aspect of the input material flow in the planning function using standard-cost", "information aspect of energy prices in the forecasting function using target-costing" and others. The assessment of all the hypercube elements allows forming a space of partial estimates of the SCMS filling assessment model. Analytical operations with such hypercube allow estimating the SCMS filling in general.

The assessment of the strategic cost management system filling is based on the use of tuple of four sets:

$$\langle F_{Y3}, T_{Y3}, Q_{Y3}, A\rangle. \tag{1}$$

Multiplicity of cost management functions:

$$F_{Y3} = \{f_{Y3}^{\langle i\rangle}\}_{i=1}^{10} \tag{2}$$

the tuple (1) is presented in the Table 1, where along with the description of its elements the weights of each element from the set of 10 weights are indicated:

$$\Lambda_{Y3} = \{\lambda_{Y3}^{\langle i\rangle}\}_{i=1}^{10}. \tag{3}$$

For the elements of the set (3) the conditions are met:

$$\lambda_{Y3}^{\langle i\rangle} = [\lambda_{Y3}^{\langle \min\rangle}; \lambda_{Y3}^{\langle \min\rangle}]_{\forall i = \overline{1, 10}} \text{ if } 0 \leq \lambda_{Y3}^{\langle \min\rangle} < \lambda_{Y3}^{\langle \min\rangle}, \tag{4}$$

$$\sum_{i=1}^{10} \lambda_{Y3}^{\langle i\rangle} = W_F \tag{5}$$

If the set of weights (3) is valuated (standardized), it should be taken $W_F = 1$ as a fixed constant for the condition (5). At the same time the maximum possible weight for each element of the set (2) is

$$\lambda_{Y3}^{\langle \min\rangle} < 1.$$

However, instead of the condition (4) it can be used the condition for discrete weights, if:

$$\lambda_{Y3}^{\langle i\rangle} \in \{0, 1\}_{\forall i = \overline{1, 10}} \tag{6}$$

When using the condition (6), the case $\lambda_{Y3}^{\langle i\rangle} = 0$ means that there is an i-th element in the set of cost management functions (2) or its inclusion into this

set. The case $\lambda_{Y3}^{\langle i\rangle} = 0$ means the exclusion of the i-th element from the set of cost management functions (2) or its practical insignificance for the system under consideration.

Multiplicity of cost management tools:

$$T_{Y3} = \{t_{Y3}^{\langle j\rangle}\}_{j=1}^{14} \tag{7}$$

in the tuple (1) is presented in the Table 2, in which the weights of each element of the set of 14 weights are indicated together with the description of the elements,

$$\Theta_{Y3} = \{\theta_{Y3}^{\langle j\rangle}\}_{j=1}^{14}. \tag{8}$$

For the elements of the set (8) the conditions are met:

$$\lambda_{Y3}^{\langle i\rangle} \in [\theta_{Y3}^{\langle \min\rangle}; \theta_{Y3}^{\langle \min\rangle}] \ \forall i = \overline{1, 10} \text{ if } 0 \leq \lambda_{Y3}^{\langle \min\rangle} < \lambda_{Y3}^{\langle \min\rangle}, \tag{9}$$

$$\sum_{j=1}^{14} \theta_{Y3}^{\langle j\rangle} = W_T \tag{10}$$

by some fixed constant W_T. This constant does not necessarily coincide with the constant W_F and fixed constant W_F.

Table 1. Elements description of the cost management functions set (2) and their weight

Element of the cost management functions set	Symbol	Weights
Forecasting	$f_{Y3}^{\langle 1\rangle}$	$\lambda_{Y3}^{\langle 1\rangle}$
Planning	$f_{Y3}^{\langle 2\rangle}$	$\lambda_{Y3}^{\langle 3\rangle}$
Valuation	$f_{Y3}^{\langle 3\rangle}$	$\lambda_{Y3}^{\langle 3\rangle}$
Organization	$f_{Y3}^{\langle 4\rangle}$	$\lambda_{Y3}^{\langle 4\rangle}$
Accounting	$f_{Y3}^{\langle 5\rangle}$	$\lambda_{Y3}^{\langle 5\rangle}$

Element of the cost management functions set	Symbol	Weights
Control	$f_{Y3}^{\langle 6\rangle}$	$\lambda_{Y3}^{\langle 6\rangle}$
Regulation	$f_{Y3}^{\langle 7\rangle}$	$\lambda_{Y3}^{\langle 7\rangle}$
Promotion	$f_{Y3}^{\langle 8\rangle}$	$\lambda_{Y3}^{\langle 8\rangle}$
Analysis	$f_{Y3}^{\langle 9\rangle}$	$\lambda_{Y3}^{\langle 9\rangle}$
Strategy development	$f_{Y3}^{\langle 10\rangle}$	$\lambda_{Y3}^{\langle 10\rangle}$

Table 2. Elements description of the cost management tools set (7) and their weight

Element of the cost management tools set	Symbol	Weights
Balanced scorecard BSC	$t_{Y3}^{\langle 1\rangle}$	$\theta_{Y3}^{\langle 1\rangle}$
Strategic positioning analysis	$t_{Y3}^{\langle 2\rangle}$	$\theta_{Y3}^{\langle 3\rangle}$
Analysis of cost-creating factors	$t_{Y3}^{\langle 3\rangle}$	$\theta_{Y3}^{\langle 3\rangle}$
Value chain analysis (VCC method)	$t_{Y3}^{\langle 4\rangle}$	$\theta_{Y3}^{\langle 4\rangle}$
Costs accounting and analysis by types of activity (ABC method)	$t_{Y3}^{\langle 5\rangle}$	$\theta_{Y3}^{\langle 5\rangle}$
Stages analysis by the product life cycle (LCC analysis)	$t_{Y3}^{\langle 6\rangle}$	$\theta_{Y3}^{\langle 6\rangle}$
Costs benchmarking	$t_{Y3}^{\langle 7\rangle}$	$\theta_{Y3}^{\langle 7\rangle}$
Cost-effectiveness analysis	$t_{Y3}^{\langle 8\rangle}$	$\theta_{Y3}^{\langle 8\rangle}$
Functional-cost analysis	$t_{Y3}^{\langle 9\rangle}$	$\theta_{Y3}^{\langle 9\rangle}$
Marginal analysis	$t_{Y3}^{\langle 10\rangle}$	$\theta_{Y3}^{\langle 10\rangle}$
Target-costing	$t_{Y3}^{\langle 11\rangle}$	$\theta_{Y3}^{\langle 11\rangle}$
Kaiser-costing	$t_{Y3}^{\langle 12\rangle}$	$\theta_{Y3}^{\langle 12\rangle}$

Element of the cost management tools set	Symbol	Weights
Break-even point analysis	$t_{Y3}^{\langle 13\rangle}$	$\theta_{Y3}^{\langle 13\rangle}$
Responsibility centers management	$t_{Y3}^{\langle 14\rangle}$	$\theta_{Y3}^{\langle 14\rangle}$

When the set of weights (8) is valuated or standardized it is advisable to take $W_T = 1$ as a fixed constant for the condition (10). The maximum possible weight for each element of the set (7) is $\theta_{Y3}^{\langle \max\rangle} < 1$. However, instead of the condition (9) the condition for discrete weights can be used, if

$$\theta_{Y3}^{\langle j\rangle} \in \{0, 1\}_{\forall j = \overline{1, 14}}. \tag{11}$$

When using the condition (11), the case $\theta_{Y3}^{\langle j\rangle} = 1$ means that there is a j-th element in the set of cost management tools (7) or its inclusion into this set. The case $\theta_{Y3}^{\langle j\rangle} = 0$ means the exclusion of the j-th element from the set of cost management tools (7) or its practical insignificance for the system under consideration. It should also be mentioned that the condition for the discrete weights (11) is usually made in parallel with the condition (6) for the elements weights of the cost management functions set (2). In fact, these conditions are indicators of including of certain elements sets (2) and (7).

The Table 3 shows a set of cost management objects:

$$Q_{Y3} = \{q_{Y3}^{\langle k\rangle}\}_{k=1}^{7} \tag{12}$$

in the tuple (1) along with the description of its elements the weights of each element from the set of weights are indicated:

$$\Psi_{Y3} = \{\Psi_{Y3}^{\langle k\rangle}\}_{k=1}^{7}. \tag{13}$$

For the elements of the set (13) there are similar conditions to those of (4), (5), (9), (10):

$$\Psi_{Y3}^{\langle i\rangle} \in [\Psi_{Y3}^{\langle \min\rangle}; \Psi_{Y3}^{\langle \min\rangle}]_{\forall k = \overline{1, 7} \text{ if } 0 \le \Psi_{Y3}^{\langle \max\rangle} < \Psi_{Y3}^{\langle \max\rangle}}, \tag{14}$$

$$\sum_{k=1}^{7} \Psi_{Y3}^{\langle k\rangle} = W_Q \tag{15}$$

by some fixed constant W_Q. This constant particularly does not have to coincide with the constant W_F or the constant W_T.

Table 3. Elements description of the cost management objects set (12) and their weight

Element of the cost management objects set	Symbol	Weights
Logistic processes	$q_{Y3}^{\langle 1\rangle}$	$\Psi_{Y3}^{\langle 1\rangle}$
Manufacturing processes	$q_{Y3}^{\langle 2\rangle}$	$\Psi_{Y3}^{\langle 3\rangle}$
Selling process	$q_{Y3}^{\langle 3\rangle}$	$\Psi_{Y3}^{\langle 3\rangle}$
Promotion process	$q_{Y3}^{\langle 4\rangle}$	$\Psi_{Y3}^{\langle 4\rangle}$
Transactions	$q_{Y3}^{\langle 5\rangle}$	$\Psi_{Y3}^{\langle 5\rangle}$
Manufacturing organization process	$q_{Y3}^{\langle 6\rangle}$	$\Psi_{Y3}^{\langle 6\rangle}$
Manufacturing management process	$q_{Y3}^{\langle 7\rangle}$	$\Psi_{Y3}^{\langle 7\rangle}$

Here it is also taken $W_Q = 1$ as a fixed constant for the condition (15) for the valuated or standardized set of weights (13). It is obvious that the maximum possible weight for each element of the set (12) is $\Psi_{Y3}^{\langle \max\rangle} < 1$. Of course, instead of the condition (14) it can be used the condition for discrete weights, if:

$$\Psi_{Y3}^{\langle j\rangle} \in \{0, 1\}_{\forall k = \overline{1, 7}}. \tag{16}$$

When using the condition (16) the case $\Psi_{Y3}^{\langle k\rangle}$ means that there is a k-th element in the set of cost management objects (12) or its inclusion into this set. The case $\Psi_{Y3}^{\langle k\rangle} = 0$means the exclusion of the k-th element from the set of cost management objects (12) or its practical insignificance for the system under consideration. It should also be mentioned that the condition for the discrete weights (16) is usually made in parallel with the conditions (6) and (11) for the weights of the elements of the cost management functions set (2) and the cost management tools set (7) respectively. In fact, these conditions are indicators of including of the certain elements sets (2), (7) and (12).

Many aspects:

$$A = \{a_l\}_{l=1}^{3} \tag{17}$$

in the tuple (1) are presented in the Table 4, in which the weights of each element of the set of weights are indicated along with the description of its elements:

$$B = \{\beta_l\}_{l=1}^{3} \cdot \tag{18}$$

The conditions for the elements of the set (18) are met:

$$\beta_l \in [\beta_l^{\langle \min \rangle}; \beta_l^{\langle \min \rangle}] \ \forall k = 1,7 \text{ if } 0 \le \beta_l^{\langle \max \rangle} < \beta_l^{\langle \max \rangle}, \tag{19}$$

$$\beta_1 + \beta_2 + \beta_3 = W_A \tag{20}$$

for some fixed constant W_A, which does not necessarily have to coincide with the constants W_F, W_T, W_Q.

Table 4. Elements description of many aspects (17) and their weight

Element of many aspects	Symbol	Weights
target	a_1	β_1
information	a_2	β_2
active	a_3	β_3

If the set of weights (18) is valuated (standardized), $W_A = 1$ is used as a fixed constant for the condition (20). The maximum possible weight for each element of the set (17) is $\beta_l^{\langle \max \rangle} < 1$. Instead of the condition (19) it can be used the condition for discrete weights if:

$$\beta_l \in \{0,1\} \ \forall k = \overline{1,3} \tag{21}$$

Using the condition (21) the case $\beta_1 = 1$ means that there is a l-st element in the set of aspects (17) or its inclusion into the set. The case means the exclusion of the l-st element from the set of aspects (17) or its practical insignificance for the system under consideration. It should be mentioned that the condition for discrete weights (21) is usually made in parallel with the conditions (6), (11) and (16) for the weights of the elements of the cost management functions set (2), the set of cost management tools (7), and the set of cost management objects (12) respectively. These conditions are actually the indicators for including certain elements of the sets (2), (7), (12) and (17).

The scale of evaluation of sets elements (2), (7), (12) and (17) is six-point (Table 5), that is:

$$f_{\text{У3}}^{\langle i\rangle} \in \{0, 1, 2, 3, 4, 5\}_{\forall i = \overline{1, 10}},$$

$$t_{\text{У3}}^{\langle j\rangle} \in \{0, 1, 2, 3, 4, 5\}_{\forall j = \overline{1, 14}}, \tag{22}$$

$$q_{\text{У3}}^{\langle k\rangle} \in \{0, 1, 2, 3, 4, 5\}_{\forall k = \overline{1, 7}},$$

$$a_l \in \{0, 1, 2, 3, 4, 5\}_{\forall l = \overline{1, 3}}.$$

Table 5. The descriptive characteristic of elements sets assessment

Assessment according to the proposed scale	The descriptive characteristic
0	No element
1	Separate components of the element are present, used partially and fragmentarily
2	Separate components of the element are present and used
3	Most components of the element are present and used
4	The element exists but some components need improvement
5	The element exists, is full and complete, is actively used in the cost management system

Given in the Table 5 descriptive characteristics of elements sets assessment allows to form an idea about the real SCMS filling. It can also estimate the completeness of filling elements and calculate the resulting indicator in the context set.

Thus, the set (2) is described by the hypercube in R10 with an edge of length 5. With the edges of the same length, sets (7), (12), and (17) are represented as hypercubes of spaces R14, R7, and R3 respectively.

Resultant (integral) sets indicator (2), (7), (12), and (17) is determined as:

$$I_F = \frac{\sum_{i=1}^{10} f_{\text{У3}}^{\langle i\rangle} \cdot \lambda_{\text{У3}}^{\langle i\rangle}}{\sum_{i=1}^{10} 5\lambda_{\text{У3}}^{\langle i\rangle}} = \frac{\sum_{i=1}^{10} f_{\text{У3}}^{\langle i\rangle} \cdot \lambda_{\text{У3}}^{\langle i\rangle}}{5W_F}, \tag{23}$$

$$I_T = \frac{\sum_{j=1}^{14} t_{\text{У3}}^{\langle j\rangle} \cdot \theta_{\text{У3}}^{\langle j\rangle}}{\sum_{j=1}^{14} 5\theta_{\text{У3}}^{\langle j\rangle}} = \frac{\sum_{j=1}^{14} t_{\text{У3}}^{\langle j\rangle} \cdot \theta_{\text{У3}}^{\langle j\rangle}}{5W_T}, \tag{24}$$

$$I_Q = \frac{\sum_{k=1}^{7} q_{уз}^{\langle k \rangle} \cdot \psi_{уз}^{\langle k \rangle}}{\sum_{k=1}^{7} 5\psi_{уз}^{\langle k \rangle}} = \frac{\sum_{k=1}^{7} q_{уз}^{\langle k \rangle} \cdot \psi_{уз}^{\langle k \rangle}}{5W_Q}, \tag{25}$$

$$I_A = \frac{\sum_{l=1}^{3} a_l \lambda_{уз}^{\langle i \rangle}}{\sum_{l=1}^{3} 5\lambda_{уз}^{\langle i \rangle}} = \frac{\sum_{i=1}^{10} f_{уз}^{\langle i \rangle} \lambda_{уз}^{\langle i \rangle}}{5W_A}. \tag{26}$$

It is obviously that the resultant indicators (23) – (26) take values in the range from 0 to 1, and they can be represented and compared on a percentage scale (Table 6).

4. Results

Characterizing the qualitative gradations of the given sets, it is necessary to stress the following. The most rational solution is selection of three levels of the SCMS filling which a certain set of points of the corresponding hypercube will correspond to:

- unreasonably extreme is a level of the SCMS filling which does not allow to implement fully the process of strategic cost management. It provides only partial control and the opportunity to regulate the operational processes associated with costs formation;
- middle is a level of the SCMS filling, which allows to cover a large volume of operations for the formation of costs and their operational management and makes it possible to implement strategic cost management. However, this process can be quite slow and with a certain time lag;
- sufficient is a level of the SCMS filling, which allows to implement strategic cost management tasks fully.

Table 6. Qualitative gradation of the resulting indicator parameters of the SCMS sets filling

Qualitative gradation				Filling level
Functions	Tools	Objects	Aspects	
<30%	<10% or >50%	<30%	<30%	Unreasonably extreme
30%-70%	10%-30%	30%-70%	30%-70%	Middle
>70%	30–50%	>70%	>70%	Sufficient

If the set of functions, objects and aspects are fully covered by the parameters of the above gradation, the set of tools is slightly different. This is due to the possibility of a situation in which the excess number of tools used will not give the expected effect, but rather will lead to new costs and obstacles in making management decisions. Therefore, the use of between 30 and 50 per cent of the tools listed in the set should sufficiently ensure the balanced operating of the SCMS without creating new obstacles and generating additional costs.

Considering the existing system of qualitative gradations and the existence of three levels of the SCMS filling, it is advisable to offer the appropriate tools of interpretation of the model in the form of a gradation options table.

Taking into consideration the presence of a significant number of variant gradations, we characterize the main trends and the main limit variants of simulation results interpretation.

The most cardinal variants are 1 and 81 ones in which the SCMS filling is minimum (1 variant), or maximum (81 variants). Such variants are possible, although in practice they are quite rare, because in the first variant the company is almost doomed to "extinction", and in the case of 81 variants the system requires almost no actions, because it operates at full capacity and provides all the tasks of strategic management. So, if there is unreasonably extreme filling level of the three sets in the variant, it is a minimal SCMS filling, which requires integrated and diversified actions of management. In the radically opposite variant (for example, 54, 72, 81, and others) we can talk about a maximum SCMS filling, because three sets of four are presented at a sufficient level and the fourth set at the average or sufficient one.

The real functioning of domestic enterprises indicates a fragmentary SCMS filling, so there may be an unreasonably extreme level and a sufficient level for separate studied sets, so it is advisable to consider this situation as a fragmentary incomplete SCMS filling (variants 5–9, 11–13, and others). The main criterion is the existence of an unreasonably extreme filling level for two sets. If there is an unreasonably extreme filling level for one set, it is more appropriate to talk about the average level of SCMS filling (variants 14, 15, 17, 18, and others).

In our opinion, if there is no an unreasonably extreme filling level of at least one set and the sufficiency of content one or two sets, the situation can be interpreted as the existence of an acceptable level of SCMS filling (variants 41–42, 44–45, and others). So, in such situation the strategic management system does not work perfectly, but fully meets the needs of management with a sufficient efficiency level.

We should stress that in practice many cost management functions and control objects are usually presented at the middle level, and many tools and aspects are at the unreasonably extreme one. On one hand, this situation is due to the focus on operational processes and, on the other hand, to the existence of some years of experience.

Many aspects, in the author's opinion, mostly reflect the strategic component, as it provides the identification of management goals in different directions (including strategic ones), uses the resulting information and highlights the effectiveness of management tools. Thus, it is almost impossible to talk about the effectiveness of the SCMS without this. Effective management chooses appropriate tools under certain strategic goals. These tools should not be too many, because in this case the Pareto rule is actual, that 20 percent of the tools are able to provide a solution to 80 percent of the tasks, so in the appropriate set to solve the whole block of tasks the optimal level is considered to be 30–50 percent.

The interpretation of the results obtained using the proposed model should be based primarily on the balance and sufficiency of the filling level of all the SCMS components. Therefore, it is extremely difficult to reach a sufficient level for all the sets. The main aspect is to ensure a balanced interaction of the sets by eliminating the unjustifiably extreme level of sets filling. It will allow the SCMS to function with a sufficient efficiency. Management should always remember that only those strategic measures will be effective, the cost of which will be less than the expected result. Therefore, to maximize the filling of all components at any cost is a wrong way. As for the majority of domestic industrial enterprises it should firstly identify the target aspects of their operating and highlight achievable results of a variety of tools, choose the most optimum for a certain strategic perspective, and after that to transform the functional and objective SCMS filling in accordance with the developed strategy in order to maximize rapid and full achievement of general and particular strategic goals.

Concerning the overall assessment of the strategic cost management system filling, we should note the following. If each of the sets (2), (7), (12) and (17) has appropriate weights $\gamma_F > 0$, γ_t, $\gamma_F > 0$, $\gamma_Q > 0$, $\gamma_A > 0$ for which it is performed:

$$\gamma_F + \gamma_t + \gamma_F + \gamma_Q + \gamma_A = 1,$$

so, the resulting indicator is

$$I_{Y3} = I_F \cdot \gamma_F + I_T \cdot \gamma_T + I_Q \cdot \gamma_Q + I_A \cdot \gamma_A, \tag{27}$$

and $I_{Y3} \in [0; 1]$. Therefore, (27) is an overall assessment of the strategic cost management system filling and is also expressed in a percentage scale. It varies in the range of 0–30% it is unreasonably extreme level of the SCMS filling, 30–70% is the average level of the SCMS filling, 70–100% is a sufficient level of the SCMS filling.

5. Conclusions

The high variability of the enterprise strategic cost management system, which is manifested in the necessary variety of used tools, is important and beneficial for the management. According to the study developed by a filling assessment model of SCMS, designed for the reflection of actual content of enterprise strategic cost management system, which can be used in real-time mode.

Management should always remember that only those strategic measures will be effective, the cost of which will be less than the expected result. As for the majority of domestic industrial enterprises it should firstly identify the target aspects of their operating and highlight achievable results of a variety of tools, choose the most optimum for a certain strategic perspective, and after that to transform the functional and objective SCMS filling in accordance with the developed strategy in order to maximize rapid and full achievement of general and particular strategic goals.

Thus, the use of the proposed model will allow management to assess quickly not only the current situation of the SCMS filling, but also to predict changes in the level of its filling when making decisions on improving the SCMS filling for separate elements.

6. References

[1] Shank Dzh. *Strategicheskoe upravlenie zatratami* / Dzh. Shank, V. Govindaradzhan; trans. from English. SPb.: CJSC "Business Micro" 1999. 288 s.
[2] Roslender R. *Accounting for strategic positioning: Responding to the crisis in management accounting* / R. Roslender // British Journal of Management 1995, N 6, pp. 45–57.
[3] Hendriksen E.S., *Teoriya buhgalterskogo ucheta* / E.S. Hendriksen, M.V. Van Breda; per. s angl. pod red. prof. Ya. V. Sokolova. M.: Finansyi i statistika, 1997. 567 s.
[4] Minina E.A., *Informatsionnyie tehnologi, kak sostavlyayuschaya stoimosti*

predpriyatiya / E.A. Minina // InformatsIyna bezpeka: Materiali nauk.-prakt. konf., 26–27 ber. 2009 r. K.: DUIKT, 2009. S. 90–94.
[5] Kozachenko G.V., *Upravlinnya zatratami piIdpryemstva* : [monografiya] / Kozachenko G.V., Pogorelov Yu. S., MakuhIn G.A., K.: LIbra, 2007. 320.
[6] Kurilo O.B. *Mehanizm upravlinnya vitratami mashinobudivnih pidpriemstv* / O.B. Kurilo // Ekonomichniy prostir: Zb. nauk. prats DVNZ "Pridniprovska derzhavna akademiya budivnitstva ta arhitekturi". Dnipropetrovsk: PDABA, 2011. S. 269–280.
[7] Eshbi U. R. *Printsipyi samoorganizatsii* / U.R. Eshbi. – M.: Mir, 1966. 621 s.
[8] Arthur A. Thompson, Jr. A., *Strickland III. Strategic Management: Concepts and Cases*/ Twelfth Edition. McGraw-Hill Companies, Inc., 2007. 928 p.
[9] Anderson, Shannon W., Managing Costs and Cost Structure Throughout the Value Chain: Research on Strategic Cost Management (October 2005).