Strategic management system and methods of controlling as key elements of military expenditure policy-making process

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Abstract

Purpose – The purpose of this paper is to propose a conceptual approach to determining an optimal strategy development process and controlling of the defence spending, by utilizing the decision-making system adopted in the Republic of Estonia.

Design/methodology/approach – The author offers a part of the Balanced Scorecard model named "Management and Control Perspective" as one of the improvement tools for the system of planning military expenditures and effective utilization of budgetary funds.

Findings – The results show that the Balanced Scorecard application, using the "utility function", will allow the Estonian Defence Forces to overcome important barriers to strategy implementation by interrelation of military planning and budgeting processes.

Research limitations/implications – One suggestion for further research might be established as a way of improvement and development of methods directed to application of the utility function in the decision-making process. This approach will improve calculations of strategic perspective plans and will reveal the essence of the budgetary policy on the whole by taking into consideration expenses features of the business and non-profit organizations.

Practical implications – By using the Balanced Scorecard the paper offers a new strategic method of planning and controlling the military expenditure in the Estonian Defence Forces.

Originality/value – The present paper provides direct evidence of the alternative methods forecast measures and the possibility of using mathematical models in the strategic planning process.

Keywords Estonia, National economy, Public finance, Expenditure, Armed forces, Utility function, Balanced Scorecard, Military expenditure, Budgeting, Strategy

Paper type Case study

1. Introduction

The formation of the defence budget is an important question for the state policy. Military expenditures are the integral component of the state budgets in the overwhelming majority of the countries all over the world. Their amount varies "country to country" and this indicator fluctuates from 0.5 to 10 percent of gross domestic product (GDP). The formation of the defence budget has its own special features in each particular state.

For example, Estonia – is a small country, which has formed its defence forces from zero point and has practically no heavy armament (tanks, heavy artillery, defence forces – co-operation aircraft, etc.). In addition, Estonia has no funds for the acquisition of such armament. It is right to mention here that Estonia, as well as other NATO member states, was obliged to assign about 2 percent from GDP for defence expenses.

In January 2009, the New Defence Development Plan for 2009-2018 (Estonian Ministry of Defence, 2009) was adopted. The defence planning foreseen by it is twofold – strengthening the initial self-defence capability and contributing the international security might be separate fields by definition but yet inseparable

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and strongly interrelated tasks in practice. The new plan is to harmonize the national defence planning in Estonia with the NATO planning cycle and will be reviewed every four years.

The development plan focusses on a number of important spheres including the following: increasing the initial defence capability, participation in international operations, increasing host nation support, the reorganization and development of the defence league, and continued improvement of service quality. Estonia also wants to improve the efficiency of the recruitment system within the framework of the development plan while ensuring a continued increase of wages and motivations for defence force members (Estonian Ministry of Defence, 2009).

The military budget as itself is the portion of the Republic of Estonia discretionary main budget that is allocated to the Ministry of Defense, or more broadly, the portion of the budget that goes to any defense-related expenditures. In particular, the military budget is planned each year. It is based on long-term and mid-term development plans, as well as the state budget strategy and the budget law. The military expenditure planning process occurs "stage by stage" and passes all necessary levels.

By linking the long-term (ten years) and mid-term (four years) development plans and one-year planning documents, Estonia has ensured the possibility of a capacity-based, systematic development of military national defence. A long-term strategic overview has been now provided, which allows for assessing the expedience of resource consuming supply procurements and investments in infrastructure against the priorities of developing military capacities and availability of resources that are required for capacity development (personnel, equipment, infrastructure) (Estonian Ministry of Defence, 2009).

The basic priorities and tasks are formed at political and strategic levels (by the Ministry of Defence and by the Headquarters of the Estonian defence forces); the detailed planning of the budget occurs at tactical and operative levels (by military structures and by units of the defence forces).

The main issue and one of the weakest sides of the existing system is that there are no straight methods and mechanisms of detailed planning and control of military expenditure at all, the certain strategy of management in particular. Also an absence of the detailed analysis of the state budget execution leads to a poor control of resources and grows into the "rash money wasting." In this connection the author highlights a necessity of pointing several new contributions to the existing management system.

Integrating the Balanced Scorecard with the organization's planning and budgeting process is critical for creating a strategy-focussed organization. Most organizations use the budget as their primary management system for establishing targets, allocating resources, and reviewing performance. Yet more than half of surveyed companies indicated that their budgeting and performance review processes were done separately from the strategic planning process. With budgets serving as the primary means used to exercise control in organizations, management attention becomes riveted on achieving short-term financial targets (Kaplan and Norton, 2000).

The performance of each of the strategic options can be reported in the Balanced Scorecard (Kaplan and Norton, 1996), in order that their relative merits can be assessed. This sets performance indicators for each of the main organizational objectives, usually grouped under such headings as "citizen and user results," "process improvement result," "organizational learning and development results," and "financial results." While this technique was originated for reporting in the private sector, it has now also become popular in public sector organizations in the UK and USA (Bovaird and Löffler, 2009, p. 72).

In this paper the author considers strategic planning and controlling in the public sector using different approaches. This paper examines the process perspective (the functional component of the Balanced Scorecard) as a new alternative method of budgeting that focusses on the conceptual analysis change concerning military long-term goals and tasks.

Empirical evidence supporting this study was gathered from results, which are based on real financial figures received from the mathematical modeling. In addition, the present paper will present the utility function modifications and methods of selection as improvement tools of the whole defence spending process. Special attention will be given to cardinal utility, which is used in various models as well as the manner in which probabilities are incorporated (Schoemaker, 1982).

By taking into account all obtained results, the author is convinced that the Balanced Scorecard model will help to improve the system of budgeting and will optimize the state spending on the whole. Management control systems appear important in building the targets of a new strategy to various constituents. As a rule, one of the main and most challenging tasks of building a balanced system of management and controlling of military resources is to choose right indicators from the vast number of options that reflect the key factors performance for each of the strategic areas of the development.

All proposed methods will be established as one consolidated system of strategic budgeting (or Strategy Maps) by reflecting the special features of the strategic management of military resources.

The author is convinced that the state budgeting process should always take into account all the specific features, which define an essence of the military goals and tasks. As the pressures from the outside grow, organizations are led to find ways to either diffuse or eliminate this pressure by changing their practices (Powell and DiMaggio, 1991).

The conceptual analysis and practical experience directed to the execution and controlling of the budgetary funds existence show that the given topic is very important and vital for the defence forces.

2. Literature review

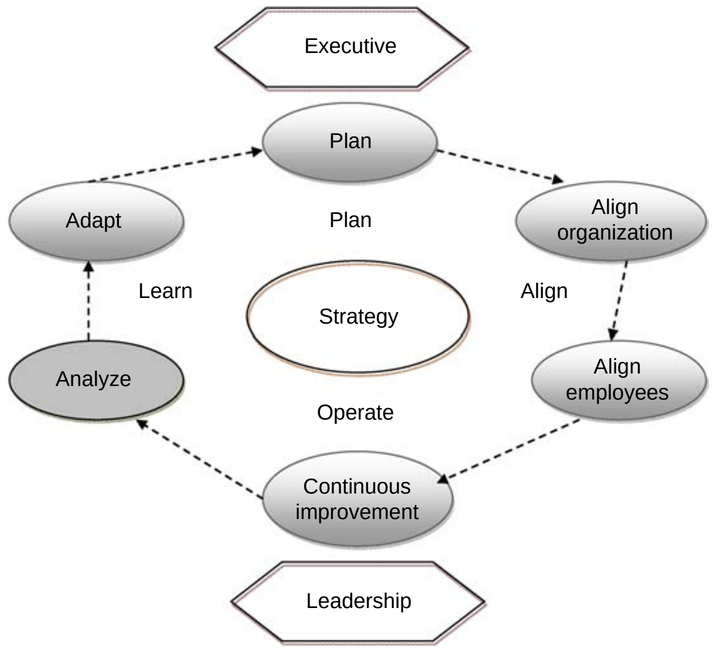
The Balanced Scorecard, since its introduction in 1992, has evolved into the centerpiece of a sophisticated system to manage the execution of strategy. The effectiveness of the approach is derived from two simple capabilities:

(1) the ability to clearly describe strategy (the contribution of Strategy Maps); and

(2) the ability to link strategy to the management system (the contribution of Balanced Scorecards).

The net result is the ability to align all units, process, and systems of an organization to its strategy. Figure 1 describes a simple management framework for the strategy execution. The approach adds several important features to the classic "plan-do-check-act" closed-loop, goal-seeking process introduced by Deming in the quality movement (Kaplan and Norton, 2006).

According to Peeter Lorents (2006), before starting with the main activity or a process all the preparatory processes should be monitored, evaluated, and analyzed.



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Source: Kaplan and Norton (2006)

Figure 1.
Strategy map

He underlines that control is an act or a process according to which a situation coincides with the planned tasks. In other words we should answer to another main question: does the system (its development stage or current state) correspond with our planned goals and objectives or not (Lorents, 2006).

It is no exaggeration to consider expected utility theory as the major paradigm in decision making since the Second World War. It has been used prescriptively in management science (especially decision analysis), predictively in finance and economics, descriptively by psychologists, and has played a central role in theories of measurable utility (Schoemaker, 1982).

Various choice problems are studied within a framework of decision-making analysis where using utility assessment allows one to realize choice efficiency and avoid inappropriate solutions (Noghin, 2005).

The multicriteria choice problem attempts to find a set of selected alternatives and elements such as an Edgeworth-Pareto principle and can be formulated as a statement that any set of selected alternatives is a subset of the Pareto set. In other words every chosen alternative must be Pareto-optimal. To prove this principle, it is necessary to restrict the class of multicriteria choice problems under consideration by imposing special requirements on the variables mentioned above (Noghin, 2005).

In addition, our research is devoted to important behavioral decision aspects that are currently ignored in the utility theory. In turn the author suggests to add the behavioral dimension to the utility model. This implementation will expand an essence of the utility model and will allow organizations to be motivated by the main behavioral aspects (cost/quality, time, etc.).

Finally, the discussion section synthesizes the divergent strands of research, which have a potential to transform the utility model into the powerful strategy planning system in the future (Schoemaker, 1982).

3. Theoretical background and methods of utility function

The mathematical form of an expected utility theory is originated by Cramer (1728) and Bernoulli (1738), who sought to explain the so-called St Petersburg paradox1 (Schoemaker, 1982).

According to Amos Tversky (1967) there are several advantages in distinguishing cardinal utility measures constructed under certainty, denoted $v(x)$, from those constructed under risk, denoted $u(x)$. First, it emphasizes that there exist different types of cardinal utility, even within each category, which only have to be related monotonically. Second, by examining $u(x) = f(v(x))$, an Arrow-Pratt type measure of intrinsic risk aversion may be defined and empirically measured, namely $-f''(v(x))/f'(v(x))$ (Bell and Raiffa, 1979). Third, the construction of $u(x)$ may be simplified by first examining the nature of $v(x)$, especially in the case of multiattribute utility (Schoemaker, 1982).

Moreover, choice, as itself, is impossible without a concept of a person, who makes this choice in order to achieve his/her personal goals. This person (or team) who makes a choice and is responsible for all consequences is a decision maker (further, DM). The DM strives to reach a definite goal that can be expressed numerically in terms of maximization (or minimization) of a real-valued criterion function defined on space X (Noghin, 2005). In simplistic terms, an objective goal is a set with certain criteria and input variables that can be measured.

In fact, the mathematical formulation of the problem could be presented in next way. Further details are elaborated in several sources: Schoemaker (1982), Noghin (2005), Gal *et al.* (1999), Belton and Stewart (2002), Intriligator (1975), and Gorbunov and Kozin (2007).

Thus, we assume that there are m real-valued functions:

$f1, f2, \ldots, f_m, m \geqslant 2$ defined on the set of alternatives X. These functions are said to be optimality criteria or goal functions (Noghin, 2005).

The real-valued functions $f1, f2, \ldots, f_m$ compose a vector criterion (Noghin, 2005):

$$f = (f1, f2, \ldots f_m) \tag{1}$$

For every alternative $x \in X$, the m-dimensional vector (outcome).

$y = f(x) = (f_1(x), f_2(x), \ldots, f_m(x)) \in \Re^m$ is an image of x, where R^m is the m-dimensional real vector space. This space is called a criterion space or a space of outcomes (Noghin, 2005).

Pareto Axiom (in terms of alternatives). For any pair of alternatives $x', x'' \in X$ we have $f(x') \geqslant f(x'') \Rightarrow xXx'f''$.

Dealing with the quantitative information on the relative importance of criteria, we mean that all criteria $f1, f2, \ldots, f_m$ have numerical values. Thus $yi = fi(x) \in R$ for every $x \in X$ and all $i = 1, 2, \ldots, m$.

The advantage of using quantitative performance criteria is to provide a relative measure of sourcing effectiveness that directly measures the financial effectiveness of a solution. It can be used for estimating and "what if" scenario planning – a very useful criteria in national defence planning.

The first stage of the research is devoted to constructing economic and mathematical models that encapsulate the essence of utility. In general, the goal function (function no. 2) has the form (Gorbunov and Kozin, 2007):

$$F = f(P; K; Z; N; T \ldots) = w(P) + w(K) + w(Z) + w(N) + w(T) \tag{2}$$

where, f $(P; K; Z; N; T; \ldots)$ is the set of the identified feasible indicators: f is the total assessment of the utility of element of decision making; w the coefficient of total value; P the cost estimation (budget execution); K the quality assessment of executing processes (possibility of strategic goals and tasks execution); Z the cost estimation (budget execution) and quality ratio; N decision-making process; and T time spent on strategic goals and tasks execution.

The second stage is presented as an information gathering process and applied analysis. The third stage is dedicated to the criteria transformation mode into partial utility parameters such as decision-making process (Intriligator, 2002).

Management and control perspective, which is posed on the top of the system and lying inside a strategic planning process, will be realized by using a mathematical model (utility function) in order to make a process itself more transparent and effective. This approach is particularly useful for forecasting prognoses.

For this reason, the analysis and proposed methods might develop a system of strategic controlling (or Strategy Map) by taking into account the specifics of the strategic management of military resources. Figure 2 shows a step-down procedure, which represents the transition from high-level strategy to budgeting for local operations.

The analytic hierarchy process provides a comprehensive and rational framework for structuring a problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions (Figure 3). Once the hierarchy is built, the DM systematically evaluates its various elements,

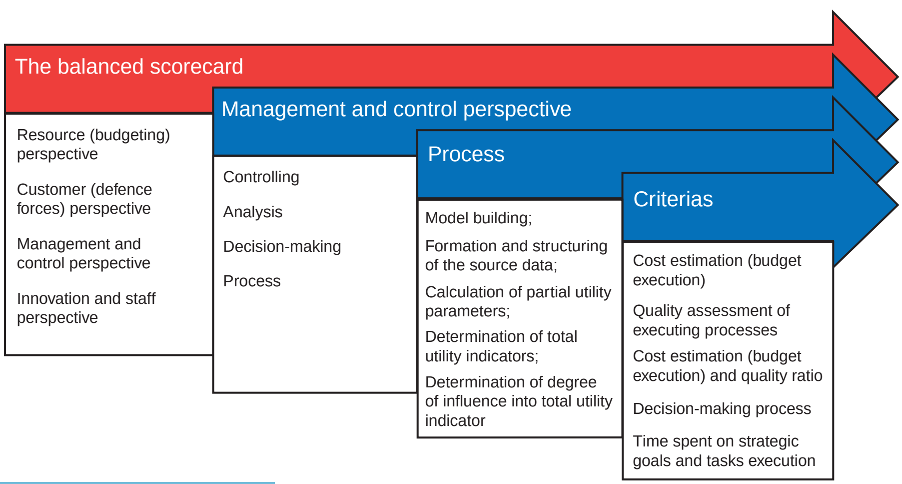
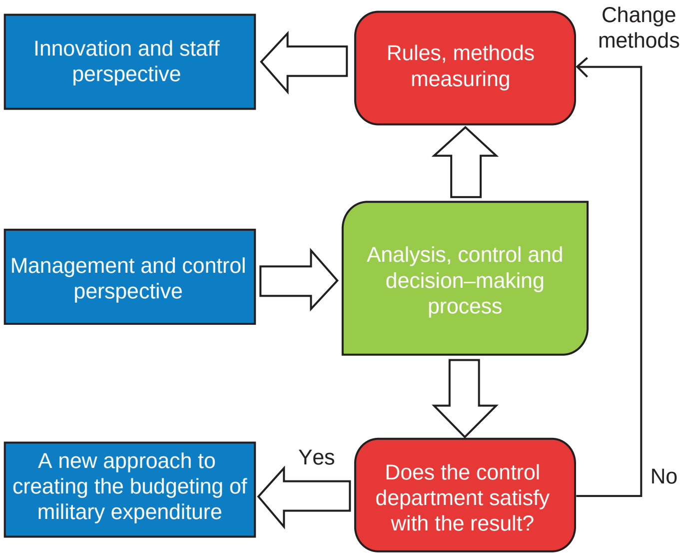


Figure 2.
The strategic map of step-down procedure (management and control perspective)

Source: By author



Source: By author

Figure 3. The strategic map of the analytic hierarchy process

comparing them to one another in pairs. In making the comparisons, the DM can use concrete data about elements relative meaning and importance. The analytic hierarchy process concerts these evaluations to numerical values that can be processed and compared over entire problem (Haarstric and Lazarevska, 2009).

4. The resource-based view: physical, human, and organizational capital resources

Management control systems appear important in building the targets of a new strategy to various constituents. As a rule, one of the main and most challenging tasks of building a balanced system of management and controlling of military resources is to choose right indicators from the vast number of options that reflect the key factors performance for each of the strategic areas of the development.

According to Jay Barney (1991) in the firm resources may be included assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness (Daft, 1983). In the language of traditional strategic analysis, firm resources are strengths that firm can use to conceive of and implement their strategies (Learned *et al.*, 1969; Porter, 1981; Barney, 1991).

In our case we included three classified categories of organization's resources: physical capital resources (Williamson, 1975), human capital resources (Becker, 1964), and organizational capital resources (Tomer, 1987). Physical capital resources include the physical technology used in a firm, a firm's plant and equipment, its geographic location, and access to raw materials. Human capital resources include the training, experience, judgment, intelligence, relationships, and insight of individual managers and workers in a firm. Organizational capital resources include a firm's formal reporting structure, its formal and informal planning, controlling, and coordinating systems, as well as informal relations among groups within a firm and between a firm and those in its environment (Barney, 1991).

The organization's planning, operations, and control processes allocate resources, drive action, monitor performance, and adapt the strategy as required. Even if enterprises develop a good strategy and align their organizational units and employees to it, misaligned management systems can inhibit its effective execution. Planning and control systems alignment exists when the management systems for planning, operations, and control are linked to the strategy (Kaplan and Norton, 2006) (Figure 4).

Further it is necessary to point that the Balanced Scorecard in the Estonian defence forces comprises four perspectives: resources (budgeting), management and control, innovation and staff, and customer (Estonian defence forces) (Figure 5).

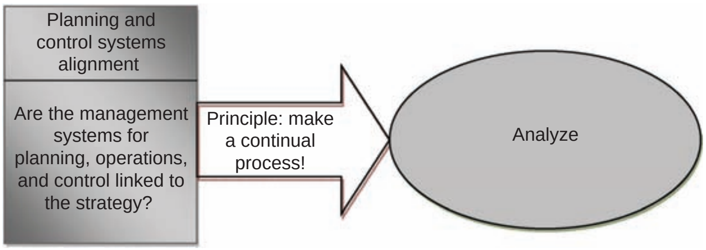


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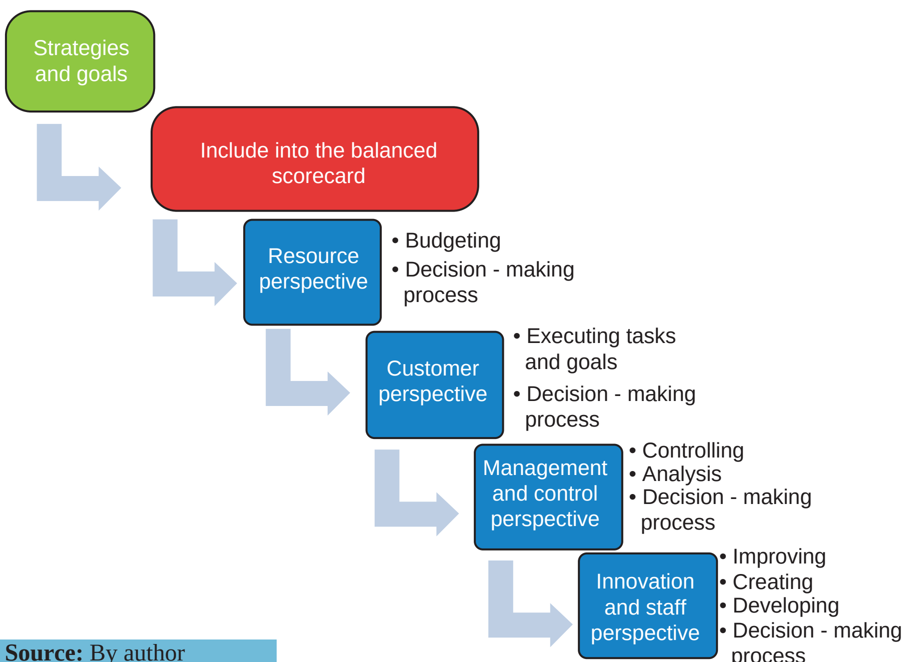
Figure 4.
Planning and control systems alignment



Source: By author

Figure 5.
The Balanced Scorecard for the Estonian defence forces

The process perspective will be used as an example and in our case – management and control perspective, which will allow us to consider statements and strategic tasks application.

5. The "utility function": a new approach to optimal strategic planning process in the Estonian defence forces

In accordance with an available literature review, data and parameters calculations Schoemaker (1982), Noghin (2005), Gal *et al.* (1999), Belton and Stewart (2002), Intriligator (1975), Gorbunov and Kozin (2007), and in line with the general new approach (Figure 4) we have examined the decision-making process directed to the selection of strategic elements from the variety of planned military resources.

It is necessary to mention here, that our example is intentionally oversimplified for illustration purposes. However, in practice, most needs can be accommodated by carefully defining and collecting the information used in the calculations.

And on the basis of a second function (function no. 2) and the utility-based performance measures toward to the strategic planning we will present the maximum value of every component and the total sum (total amount) of the utility assessment.

In order to understand how to use the proposed model, the author defines some required information:

(1) the target period – four years;

(2) the strategic planning process begins from an analysis and review of all needed aspects and tasks – one year; and

(3) strategic goals and tasks formation – initial stage, which determines the direction of the whole process; the purpose-oriented strategic programs will include a few different plans (projects); and finally, it is necessary to choose an optimal project in accordance with received estimations and results (Tables I and II).

In accordance with non-disclosure agreements: assume that we have four plans (Project no. 1, Project no. 2, Project no. 3, Project no. 4), where the sum of each budget (total amount of budget) is:

(1) strategic plan (Project no. 1) – €XXX;

(2) strategic plan (Project no. 2) – €XXX;

(3) strategic plan (Project no. 3) – €XXX; and

(4) strategic plan (Project no. 4) – €XXX.

Further all these four plans will be taken as an initial data for our research.

In the next section the author proposes to divide the overall utility function into several components, which in turn are forming the uniform model: cost estimation, quality assessment of executing processes, cost estimation and quality ratio, decision-making process, time spent on strategic goals and tasks execution.

5.1 Cost estimation (total planning sum)

Typically, calculation of the partial utility parameters concerning military expenditures is a two-step process. The first stage involves the calculation of coefficients – the best value of budget's sum ΔP is defined by the function no. 3 (Gorbunov and Kozin, 2007):

$$\Delta P = (P - P_{\min})/(P_{\max} - P_{\min}) \quad (3)$$

Table I. The partial utility coefficient matrix[a]

Coefficient of utility	Strategy no. 1 Project 1	Strategy no. 2 Project 2	Strategy no. 3 Project 3	Strategy no. 4 Project 4
Total planning sum (€)	XXX	XXX	XXX	XXX
The coefficient of optimal cost (ΔP)	0.5712	0.0000	0.8885	1.0000
The coefficient of partial utility of optimal cost (Q_p)	0.1737	1.0000	0.0313	0.0000
The coefficient of partial utility of optimal quality (Q_k)	*6.2400*	*6.2504*	*6.2454*	*6.2464*
Evaluation of cost/quality	*12,590.3241*	*11,929.5465*	*12,935.2224*	13,058.2166
The coefficient of optimal evaluation of price/quality (ΔZ)	0.5854	0.000	0.8910	1.0000
The coefficient of partial optimal evaluation of cost/quality (Q_z)	0.1649	1.0000	0.0305	0.0000
The coefficient of partial optimal evolution of decision-making process (Q_n)	*0.9091*	*0.6818*	*0.8182*	*0.9545*
The coefficient of spending time (ΔT)	0.0000	1.0000	0.8929	0.6429
The coefficient of partial utility of spending (Q_t)	1.0000	0.0000	0.0299	0.1323

Source: Made by the author

Table II. The consolidation matrix of utility coefficients[a]

Coefficient of utility	Strategy no. 1 Project no. 1	Strategy no. 2 Project no. 2	Strategy no. 3 Project no. 3	Strategy no. 4 Project no. 4
W_{Q_p}	0.1442	0.8299	0.0260	0.0000
W_{Q_k}	0.2498	0.2502	0.2500	0.2500
W_{Q_z}	0.1380	0.8365	0.0255	0.0000
W_{Q_n}	0.2703	0.2027	0.2432	0.2838
W_{Q_t}	0.9710	0.0000	0.0290	0.1285
F_{total}	1.7731	2.1193	0.5737	0.6623

Source: Made by the author

where ΔP is the coefficient of optimal cost; P the current value of total amount of budget; $P_{\min}$ the minimal value of all proposed total planning sums; $P_{\max}$ the maximum value of all proposed total planning sums.

At the second stage, the values of ΔP should be compared with estimated coefficients of partial utility of other factors. In order to make this calculation the author offers to use the transformation function (3) for the factor "cost" through the values of ΔP, which will compute the coefficient of partial utility Q_p (function no. 4, Gorbunov and Kozin, 2007):

$$Q_p = (1 - \Delta P)/(1 + \Delta P)^2 \tag{4}$$

where Q_p is the coefficient of partial utility of optimal cost; ΔP the coefficient of optimal cost.

The maximum value of the partial utility of optimal total budgeting sum belongs to Project no. 2 – 1,000.

5.2 Quality assessment of executing processes (possibility of strategic goals and tasks execution)

In our case the quality might be assessed by using subjective numerical values, which are presented in absolute or relative terms. Moreover, the coefficients of partial utility concerning the quality of executing process addressed to the main tasks is assigned by every department and military personnel.

The quality of execution will be estimated by each component using the scale or so-called "the satisfaction scale":

(1) unsatisfactory;

(2) partly satisfactory;

(3) satisfactory;

(4) average;

(5) above average;

(6) good; and

(7) excellent.

The coefficient of optimal quality (ΔK) is carried out using the function no. 5 (source: made by the author):

$$\Delta K = \sum_{i=1}^{Z} R / \sum_{i=1}^{N} \sum R_i \quad (5)$$

where ΔK is the coefficient of optimal quality; R_i the current value; Z the total sum of current value; N the total value of participants.

The parameters of quality (Q_k) is carried out using the conversion formula directed to the factor "quality" and transformed into the partial utility (function no. 6, Gorbunov and Kozin, 2007):

$$Q_k = (1 - \Delta K)/(1 + \Delta K)^2 \quad (6)$$

Q_k is the coefficient of partial utility of optimal quality; ΔK the coefficient of optimal quality.

Table I shows that the most appreciated quality represents Project no. 2 – 62,504.

5.3 Cost estimation (budget execution) and quality ratio

The calculation of the partial utility concerning the correlation between "cost/quality" will be conducted using the results of "cost" and "quality." In accordance with it, indicators of "cost" or its coefficients will be shared with indicators of "quality" (coefficients). Optimization of the choice is based on coefficient of optimality ΔZ determined by the function no. 7 (Gorbunov and Kozin, 2007):

$$\Delta Z = (Z - Z_{\min})/(Z_{\max} - Z_{\min}) \quad (7)$$

where ΔZ is the coefficient of optimal cost/quality ratio; Z the current value of cost/quality; $Z_{\min}$ the minimal value of all proposed values; $Z_{\max}$ he maximal value of all proposed values.

The obtained values were comparable to estimated coefficients of partial utility concerning other factors, which are necessary to calculate the coefficient of partial utility Q_z. For this manipulation the transformation function no. 8 (Gorbunov and Kozin, 2007) (cost/quality through the values of ΔZ) will be used:

$$Q_z = (1 - \Delta Z)/(1 + \Delta Z)^2 \tag{8}$$

where Q_z is the coefficient of partial optimal evaluation of cost/quality; ΔZ the coefficient of optimal evaluation of cost/quality.

In order to compose the initial data table, it is necessary to use the coefficients of partial utility and actual values of the budget's sum. The given analysis has revealed that despite the high quality estimates and the most appreciated evaluation of cost/quality, which was established by Project no. 4, the general indicators of the partial utility (coefficients) were owned by the Project no. 2.

In this respect, such assessment might have a certain amount of influence on effective financial plan choice but only at the time when other factors are not a priority.

5.4 Decision-making process

In principle, every process (planning, controlling, or estimating) is including different decision's components. Traditionally, the process is passing under a certain "scenario" called the bottom-up approach. However, the distribution of limits or decisions held by Ministry of Defence and the Headquarters of the Estonian defence forces. In our case we examine estimates of the decision-making process based on last year annual statistics and the prognosis of change related to the budget execution or plans. And it is obvious that modifications and corrections can appear at all stages of the planning process. However, all these invasions affect certain categories of expenses, time limits, and material resources, which in turn are not taken into consideration at the final analysis of the task performance and budget execution. In other words, less changes we have, the more effective a project will be and on the contrary.

The monitoring process is based on "ideal" prognosis. The ideal prognosis as a baseline is setting a selection standard or average data statistics. The choice of the partial utility will be conducted in accordance with function no. 9 (Gorbunov and Kozin, 2007):

$$Q_n = N_{pc}/N_p \tag{9}$$

where Q_n is the coefficient of partial optimal evaluation of decision-making process (the number of decisions); N_{pc} the "real" number of decisions; N_p the number of the prognosis of decisions.

The result has shown that the best value of decision-making process belongs to Project no. 4.

5.5 Time spent on strategic goals and tasks execution

The calculation of the partial utility concerning the time spent on strategic goals and tasks should be based on statistics reports. In our case we use next segment of time spent for these purposes, particularly – (budget execution: annual statistics for the last year).

Further indicators (based on statistical data analysis) will give a full picture of the budgeting process. Calculations will be conducted in accordance with function no. 10 (Gorbunov and Kozin, 2007):

$$\Delta T = (T - T_{\min})/(T_{\max} - T_{\min}) \tag{10}$$

where ΔT is the coefficient of optimal spending time; T the current value of spending time; $T_{\min}$ the minimal value of total spending time; $T_{\max}$ the maximum value of total spending time.

The partial utility values concerning the time spent on strategic goals and tasks will be established using the function no. 11 (Gorbunov and Kozin, 2007):

$$Q_t = (1 - \Delta T)/(1 + \Delta T)^2 \tag{11}$$

where Q_t is the coefficient of partial optimal evaluation of spending time; ΔT the coefficient of optimal evaluation of spending time.

The made calculations have shown that the highest optimal value belongs to Project no. 1.

In order to obtain an objective total estimation of utility concerning the selection of optimal financial plan, it is necessary to find average values of separate parameters. And all coefficients of the partial utility will lead to the one general denominator (function no. 12 Gorbunov and Kozin, 2007):

$$W_{Q_i} = Q_i / \sum_{i=1}^{N} Q_i \tag{12}$$

where W_{Q_i} is the coefficient of total value; Q_i the coefficient of partial utility for each indicator; N the number of strategies (projects) $\sum_{i=1}^{N} Q_i$ the total current value.

After reduction of all studied criteria for a single equivalent of mathematical model, it is appropriate to express one integral form (function no. 13, Gorbunov and Kozin, 2007):

$$F_{total} = W_{Q_p} + W_{Q_k} + W_{Q_z} + W_{Q_n} + W_{Q_t} \tag{13}$$

where f_{total} is the total assessment of the utility (set of elements which have influence to the decision making); W_{Q_p} the total coefficient of partial utility of optimal total amount of budget (total planning sum); W_{Q_k} the total coefficient of partial utility of optimal quality; W_{Q_z} the total coefficient of partial utility of optimal of cost/quality; W_{Q_n} the total coefficient of partial utility of optimal of making decision process; W_{Q_t} the total coefficient of the time spent on strategic goals and tasks execution2.

In accord with Table II, the Project no. 2 has the maximum value of an indicator of utility.

6. Conclusion

Traditional budgeting has had many critics in recent years with those critics doubting its relevancy in the rapidly and frequently changing business environment. The need to utilize a more flexible form of budgeting to reflect that changing environment is lying on the surface. In this case the author recognizes this need for rapid reaction, implementation, and circulation of plans by introducing the Balanced Scorecard linking it with utility function principles is an imaginative approach to strategy implementation. This approach might be used not only in Estonia but it is universally relevant to military budget DM around the world. Needless to say, the defence budget management systems differ on an international basis. However, the uniqueness of the Balanced Scorecard lies in its adaptability oneself to new or different conditions. The four perspectives which comprise the Balance Scorecard (financial, customer, internal, innovation, and learning) might be formed according to the specifics of the country/organization and even a small research group. As well as the utility function via insertion necessary factors or indicators.

The research reviewed in this paper suggests that the utility function can be used in the strategic planning process. The main chapters of the research have considered a range of techniques covering the internal environment of military resources management and the evaluation of strategic options in particular. The coefficient method as a component of the process perspective model has proved that budgetary funds can be planned and distributed according to goals and objectives. This technique can be very productive at the redistribution of means if military tasks undergo any changes.

In part it depends on the ability of given organizations to conform to, and become legitimated by, environmental institutions. In institutionally elaborated environments, sagacious conformity is required: leadership (in a university, a hospital, or a business) requires an understanding of changing fashions and governmental programs. But this kind of conformity and the almost guaranteed survival which may accompany it – is possible only in an environment with a highly institutionalized structure. In such a context an organization can be locked into isomorphism, ceremonially reflecting the institutional environment in its structure, functionaries, and procedures (Powell and DiMaggio, 1991).

In our case we deal with a public organization which is most influenced by institutional pressures because outputs are very difficult to evaluate and the flow of resources is more shielded from sudden interruption by collective action problems. And the most obvious solution is to change is to adopt those routines and structures that are defined by law or government agencies as legitimate. To do so may ensure survival by minimizing conflict (normative isomorphism by Powell and DiMaggio, 1991).

In addition, this paper presents a successive introduction into a theory of relative importance of criteria. First of all, the expression "one criterion is (relatively) more important than another with a pair of positive parameters" is defined. The corresponding definition has simple logic and is clear not only for researchers but also for those persons who are responsible for a choice and inexperienced in mathematics. The last circumstance is important if we take into account the fact that information on the relative importance is often elicited from these persons. And the better they understand a sense of the relative importance the more exact information they can represent for researchers (Noghin, 2005).

Also our study examines the deployment of the Balanced Scorecard and the performance measurement system that enables executive management to align performance indicators with the goals and strategies of the organization (Lipe and Salterio, 2000). The best solutions are offered just by the Balanced Scorecard model and by its functional component process perspective (in our case the management and control perspective), which makes military expenditure planning process more effective. This model will allow the Estonian defence forces to overcome important barriers to strategy implementation by interrelation of military planning and budgeting processes.

Management control systems are critical levers for strategic change and renewal. Managing the strategy process in ways that are appropriate to the circumstance can greatly improve the odds that a venture can succeed. The strategic planning process should use initiatives to help the organization achieve its strategic objectives, not as ends in themselves. Opponents of this view will say that public sector and non-profit organizations are especially guilty of often confusing initiative completion as the target rather than improvements in mission objectives and agency effectiveness.

Moreover, it is possible to implement a feedback by analyzing planned and actual data, as well as variations. In other words, the new Strategic Maps will create suitable conditions for effective solutions of strategic objectives and military tasks, and will optimize processes and military spending as a whole.

The future research might improve and develop methods of using utility function in the decision-making process. This approach will give an opportunity to streamline future calculations of strategic perspective plans and the development of the budgetary policy by taking into account expenses features related to business and non-profit organizations.

Notes

1. "The St Petersburg paradox is a classical situation where a naïve decision criterion (which takes only the expected value into account) would recommend a course of action that no (real) rational person would be willing to take. The paradox can be resolved when the decision model is refined via the notion of marginal utility (and it is one origin of notions of utility functions and of marginal utility), by taking into account the finite resources of the participants, or by noting that one simply cannot buy that which is not sold (and that sellers would not produce a lottery whose expected loss to them were unacceptable)."

2. This criterion is an independent factor and cannot be calculated into the WQP, because it is an independent value, which is allocated by a separate position.

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