

S U M M A R I E S

Economic Reality and Prospects of Serbian Economic Recovery as a Prerequisite for Successful Defense

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The economic reforms of the Republic of Serbia have, after 2001, initiated the transformation of institutions. However, they still remain insufficiently functional. The new Constitution has been adopted, as well as dozens of reform legislation; value added tax has been introduced; and the social policy reform has been launched. However, the market economy in the Republic of Serbia does not yet function in a sustainable manner, not even at the level of advanced transition countries, because the interference of politics is largely decisive for the economic position, especially that of enterprises and institutions in the public sector.

The economic power of the state is a decisive factor in the ability to use the Serbian Armed Forces in accordance with their assigned missions and tasks, as the Armed Forces, being an important state institution, are allocated a part of the state budget.

Key words: economic development, institutional changes, reforms, public sector

A Proposal of the Military Operation Cost Model

Spasoje Mučibabić

The decision-making process requires necessary consideration of the costs of execution, expressed by the cost price. The cost price is always a limiting factor, but may also be a crucial one in the decision-making. In addition to the necessity of making an optimal decision on the use of forces in an operation for the purpose of achieving the desired final situation, it is very important to achieve the objective at as little cost as possible. Limited and generally insufficient resources represent a factor that imposes a constant need for cost-effective, rational and efficient use of the available resources.

The paper presents a methodological approach to the estimate of a military operation cost price. Operations of the Armed Forces are directed at the military-strategic level, and planned and executed at the operational and tactical level. The military-strategic level considers military engagement in a campaign, which includes several operations for the purpose of reaching the identified military-strategic objectives and achieving the desired final situation.

Considerations of the military involvement and the planning of military operations require a comprehensive analysis of all factors that affect the decision making. One of the factors to which special attention is addressed in the process of the operational planning is the operation cost. The model of operation cost estimate greatly helps reach a realistic operation cost.

Key words: military operation cost, expenses, operational capabilities, operation planning, decision making, model of operation cost estimate

The Cost of a Military Operation – a Criterion Approach

Božidar Forca

The purpose of the armed forces is to carry out their assigned missions and tasks through a wide range of operations, which may be combat and non-combat ones. The doctrinal theory of the Serbian Armed Forces has redefined the concept of operations. This has greatly contributed to an easier approach to the evaluation of operations through their cost price. In the world there is no single model of calculating the cost of a military operation, which would apply to all types of operations prepared and executed by the military. This paper discusses four criterion approaches to calculating the cost of a military operation, as follows: (1) using the operation factors, as identified by Operations Doctrine, (2) using the phases of operation, and (3) using the standards set by the EU for calculating the costs of peacekeeping missions and operations, and (4) experiences of the US Armed Forces.

Keywords: military operations, factors of military operations, phases of a military operation, EU standards for peacekeeping missions and operations, military operation cost

Managing the Risk of Military Projects and Undertakings

Petar Jovanović, Filip Jovanović and Ivana Berić

The paper presents some options of project risks management in military projects and programs. Military projects and programs are usually very complex and risky, and therefore it is necessary to manage the risk in the process of military projects implementation. The paper proposes the use of some of the well-known methodologies for managing the project risks, as applied in various projects. Particularly, it points out the need to prescribe a special procedure or a directive, and highlights examples from the US Department of Defense.

Key words: project, management, risk, planning, the military

Organization as a Process Function of an Operation Project

Rade Slavković and Mile Jelić

Management considers activities in the operation management as projects and enables the objective to be efficiently and effectively achieved, which requires a scientific approach both to the operation as a complex project and to the management of these projects. The organization of the work on the project/operation is determined by the assigned mission, tasks and objectives to be achieved by the operation. Considering the organization principles of the Serbian Armed Forces (SAF), the principle of modularity in particular, as well as the principles of the use of SAF, it is necessary to define the proper organization of the operation management. A functional organization of work in the SAF units' commands enables an effective and efficient implementation of the operational planning process (military operations projecting) and the operation/project management.

Key words: organization, operation, project, functional organization

Criteria and Models of Operation Cost Projecting

Vojislav Đorđević and Miloš Gajić

The operation cost projecting is a major challenge of the project management. Also, modeling is an irreplaceable method when seeking to project an effective and efficient operation using the cost estimate. The purpose of modeling is to support the commander and staff in deploying the potentials and capabilities of the operation forces in conditions of limited resources availability. As a form of the cost analysis, the operation model needs to be operationalized to help achieve its purpose: the support to the commander/staff/teams in reaching the conclusions and decisions on the mode of using the forces in the operation.

Key words: method, modeling, project, operation, action, cost

Cost of War through the History of Warfare

Zoran Knežević and Jadranko Jukić

Since early development stages of the human civilization there has been a clear tendency of a constant increase in the production costs of weapons of war, along with the rapid growth of their various types. This resulted in a drastic increase in the costs of war in general.

In particular, significant increase of the cost of war occurred during World War I. Compared to the wars of the early 18th century, the costs of war at the beginning of the 20th century, i.e. in only 200 years, had increased by more than three thousand times. Such costs could hardly be afforded even by the most powerful industrialized countries of the world. These costs were dramatically increased during World War II by about 5.5 times. The indirect economic costs, which increased by more than 10 times, should also be added. Completely new types of weapons appeared, which were more complex and significantly more expensive.

At the beginning of the third millennium, countries continue to spend enormous amounts of money on weapons, most notably Saudi Arabia, Iraq, Israel, Iran, Russia, USA, France, Great Britain, and Japan.

Keywords: costs of war, increase of the cost of war, new types of weapons, armament

Planning the Operation Expenses

Rade Žugić and Milanko Kovačević

Defense is one of the highest priorities of any state. The state plans and defines the defense policy, and the responsibility for defense activities performance is held by the Ministry of Defense and the Armed Forces. The state, starting from its strategic missions and economic power, allocates funds for preparation and performance of defense activities.

The conduct of operations, as the basic and fundamental form of the use of military forces in wartime and peacetime, represents the key (basic) form of the defense activities performance. In order to achieve the objective of an operation, it is necessary to provide proper resources. The planning and financing system is a good foundation for establishing an optimal and balanced relation between the objective of an operation and the available funds, through planning and calculation of realistic costs. It is based on the classification of expenses according to the functional model of cost distribution. Further operationalization of this model should provide realistic information about the expenses in each phase of the operation, especially during the planning phase which is decisive for making an adequate decision. In our circumstances, the planning and financing system is not yet at the necessary level, precisely due to vaguely defined basic planning elements (norms, standards, criteria, and units of standardization). The normative regulation of planning elements and the integration into the necessary information system will help create conditions for realistic and efficient planning of operation expenses and functioning of the Armed Forces.

Key words: military operation, planning, expenses, cost-effectiveness, cost price, norm, standard, criterion, strength

Financial Management in the Process of Planning for Deployment of the Serbian Ministry of Defense and Armed Forces' Members to Multinational Operations

Goran Radovanović and Saša Stefanović

It is now three years since the model of the program budgeting has been applied to financial assets allocated from the budget of the Republic of Serbia to the financial plan of the Ministry of Defense. Such an approach has managed to inspire deliberations at the strategic political and strategic military level on the prerequisites and measures that need to be taken in order to enable more rational spending of financial assets, and thus raise effectiveness and efficiency of MoD and SAF members' contribution to EU-led missions to a higher level. In order to fulfill the ambitions projected by the Long-Term Plan and Development of the Defense System of the Republic of Serbia, the number of UN and EU-led operations and the number of MoD and SAF members participating in them have increased year after year. The military budget reductions will additionally aggravate the fulfillment of the set objectives, making the financial aspect of planning the involvement of MoD and SAF forces in multinational operations and their actual engagement more significant. Optimal models for calculating the cost price of MoD and SAF members' participation in multinational operations need to be found, and the factors influencing the cost price of national contingent contribution to multinational operations need to be determined, bearing in mind the national legislation and the practice of functioning in the international environment within the area of operations.

Key words: financial management, financial resources, management, program, planning, use, multinational operations, mission, budget, contributing nation, UN, EU

Optimization of Military Operation Cost Price by Using Multi-Criteria Analysis Method

Mališa Žižović and Ksenija Kelemenis

The military operation is defined as a complex project, which is implemented as a planned process, in which objectives of diverse importance are achieved, with limited resources, within a specific area, and for a specific time.

The cost price is always a limiting factor, but may be a crucial one in decision-making. In addition to the necessity of making an optimal decision on the use of forces in an operation for the purpose of achieving the desired final situation, it is very important to achieve the objective at as little cost as possible.

The paper presents a multi-criteria analysis (MCA) method, specially developed for this problem, which is used for the optimization of the cost price.

A number of variants of action N_i have the outputs/results that can be presented as quantitative values Y_{ik} , which have the probability of occurrence p_{ik} and different cost price C_{ik} .

Now the effectiveness can be calculated as a mathematical expectation, as well as the cost price of the variant N_i as the mathematical expectation of the sum of the products of the price multiplied by the probability of its occurrence. The aim is to achieve as greater effectiveness and as lower cost price as possible. Optimal variant is the one which has lower cost price than all those variants that are more effective, and the effectiveness greater than all those variants that are less expensive.

Key words: cost price, military operation, optimization, Multi-Criteria Analysis (MCA) method

Cost Optimization of Artillery Fire Support Using the Global Positioning System

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The paper describes a solution for the optimization of the artillery-rocket fire support by using the global positioning system to determine the targets and elements of combat deployment of the support units, by day and by night. Also, Trimble Pro XR modern means of positioning and formation equipment are used for a final comparative analysis. The theory of probability, the theory of errors, and the theory of firing are applied in order to get the results of the analysis. The solution is a significant reduction of the support costs reflected in the decrease in consumption of missiles per targets fired at. The application of the global positioning system in the topographic and geodetic preparation ensures several times faster and more precise action, which reduces the overall cost of operations.

Key words: optimization, artillery-rocket fire support, global position system, theory of firing

Basics of Military Operation Costs Estimate

Saša Milutinović

An estimate of costs is a judgment, opinion, forecast, or prediction of how many resources need to be preplanned or provided in order to perform a certain process. An operation cost estimate is a forecast of the probable future value of the operation elements process and is based on an estimate of expenditures of respective activities. In order to make a proper estimate of operation costs, it is necessary to know the techniques of cost estimate and the calculation elements.

Having in mind that the spending of one type of resources creates new values, resources or capabilities during the operation planning, special attention is paid to costs and their estimate. To evaluate the costs and identify the expenditures required to execute the operation plan is often essential for successful work. The cost estimate can be made using methods and techniques of the cost estimate. These methods and techniques provide a critical mass of information necessary for decision making in planning, estimating and reporting the costs for the future period. The paper describes the cost estimate technique based on activities.

Calculation elements are: norms, standards, criteria, and units of standardization. Their application is a requirement for precise interpretation of needs. They are designed for value-based sizing of elements of the operation plan in relation to resources and can be instruments by which basic conditions to be provided for the implementation of planned tasks and activities can be systematically identified in advance.

Keywords: costs; cost estimates; calculation elements; resources; value-based sizing

Influence of Contemporary Military Doctrines and Strategies upon Efficiency and Effectiveness of Military Operations

Miroslav Talijan, Radovan Ilić and Goran Radovanović

The paper defines and analyses contemporary military doctrines and strategies and their influence upon efficiency and effectiveness of military operations. After the introduction, the following significant points of influence of contemporary doctrines and strategies upon efficiency and effectiveness of military operations are described: (1) concept, characteristics and types of military operations; (2) contemporary war doctrines and strategies in the world; (3) implications of military technology development and war doctrine upon financial aspects of a modern operation; (4) an example of financing the security and defensive military operations (Athena), and (5) financing the costs of the Serbian Armed Forces' contribution to multi-national operations. The last part of the paper presents short conclusions reached after the consideration of this very complex and specific topic of influence of military doctrines and strategies upon efficiency and effectiveness of military operations.

Key words: influence, contemporary doctrines and strategies, efficiency and effectiveness, military operation

Contribution of Intelligence to Operation Cost Determination

Branimir Marković and Dano Mavrak

During the operation planning, the problem emerges of reliable estimate of the financial resources necessary for its execution. The cost price of an operation is a quantitative indicator, expressed in certain units of currency, showing all the costs that are somehow related to a specific operation. The dynamic character and correlation of different factors imply that each operation is performed in a different operational environment. Without understanding of complex operational environment, the determination of the cost may be a complete failure, even if the calculation is performed by best economic experts.

The paper explains the way in which the elements of the operational environment may affect the cost of the operation, and how intelligence contributes to a more accurate cost calculation and rationalization. By analyzing the operational environment through the models explained, it is possible to foresee its impact on the cost of the operation.

Key words: operation, cost, intelligence, operational environment

Impact of Informational Dimension and Information on the Operation Cost

Mića Miladinović and Branko Šipka

Despite the disappearance of the bipolar world, the mankind has not yet become free from challenges, risks and threats to peace and security. Armed conflicts have remained a part of reality, and new security challenges, risks and threats have emerged, both of military and non-military nature. An analysis of current armed conflicts reveals that there are some changes.

The problem of the enemy visibility and identification is increasingly present. Availability and mass deployment of highly sophisticated equipment and technology brings us into the era of electronic and information warfare, with the use of precise, destruction and long-range weapons.

The operational environment is a set of conditions in which forces are used in an operation, based on the commander's decision, and which have an impact on its final outcome. The operational environment consists of dimensions, such as physical, economic, social, technological, informational, military, time, and political. A military operation cannot be planned and carried out without specific factors, namely: objective, forces, space, time, and information.

To execute the operations, it is necessary, among other things, to provide sufficient financial resources. When it comes to the operation cost and the impact of all factors on the operation, it is certain that the informational dimension and the information are worthy of being analyzed. There are difficulties and it is not easy to obtain accurate indicators of the extent to which informational dimension and information affect the cost of operation. However, it can clearly be noted that the informational dimension and the information may contribute both to the reduction and the increase in the operation cost.

Keywords: operation, informational dimension, information and the operation cost

Adaptive Neural Network for the Selection of Course of Action as a Prerequisite of the Cost Price Estimate of an Offensive Army Operation

Darko Božanić, Samed Karović and Dragan Pamučar

Military operations are very complex and dynamic process. A very important factor for mission accomplishment in this process is the selection of the course of action, based on which the forces are used and the cost is calculated. In order to ensure quality evaluation of the developed courses of action, the paper develops an adaptive neural network. This model processes a collection of data relevant for the evaluation of the course of action, with an aim to obtain a quantitative value of the course of action in an offensive Army operation, making the final choice easier, and thereby creating pre-conditions for the calculation of this operation costs.

Key words: course of action, decision-making, fuzzy logic, adaptive neural network

Negotiations in Military Operations and the Impact of Negotiations on the Operation Cost

Ksenija Kelemenis, Zoran Obradović, Katarina Živković and Marija Radović

Negotiations are today very much used in solving the problems in all areas of conflict. Quality negotiations may help reduce the cost of operations.

Key words: negotiation, conflicts, operations, cost

Model Program for the Calculation of Tactical Level Operations Cost

Predrag Mladenović, Samed Karović and Mitar Kovač

Through an analysis of an operation at the tactical level, the paper offers an answer of how much the capabilities to perform missions and tasks cost in the conditions of restrictive financing, taking into account the current condition of organizational systems, the condition of the environment, and the projection of required capabilities. All the expenditures and spending incurred to create results have a nature of costs. They need to be based on a quantitative component of costs expressed as a certain value or valued at respective cost prices. After the introduction, the paper deals with matters important for consideration of the cost price of operations with an emphasis on presenting

the costs of achieving the required capabilities to perform the operations of tactical level, as follows: 1) tactical level operations; 2) program for the calculation of the tactical level operations cost; 3) the tactical level operations cost price.

Finally, conclusions are presented, which were made during developing this very complex and pioneering project, primarily aimed to define the cost price and to assess its impact on the performance of the tactical level operations.

Key words: tactical level operations, cost price, program

Cost Calculation Model for a Tank Battalion Fielded in an Offensive Operation

Jadranko Jukić and Zoran Knežević

Armored units, since their introduction, and especially after World War II, represent the main maneuver and attack power of modern armies due to their main characteristics (armor protections, mobility, and fire power).

In some armies, only the units equipped with tanks are considered as armored units, but in some armies they include also the units equipped with armored personnel carriers and mechanized infantry combat vehicles. In modern armies, infantry units are largely equipped with infantry fighting vehicles, mainly wheeled ones. In the Serbian Armed Forces, armored units consist of tank and mechanized battalions included in the Army brigades.

Tank and mechanized battalions are equipped with tanks and infantry fighting vehicles. They represent main attack power of the brigade and they conduct armored, anti-armor, anti-artillery and anti-rocket actions in combat operations.

Regardless of the organizational-formation structure, fielding even the smallest tank battalion in different operations is very expensive due to the use of their heavy weapons and high consumption of fuel and ammunition.

The paper describes the most important parameters required to calculate costs of the tank battalion involvement in an offensive operation (without attached units, without calculation of the fire support provided by artillery and air force units, and focusing on the operation execution phase), such as personnel, command, movement and maneuver, weapons and ammunition, service support and force protection.

The final part of the paper offers a possible cost calculation model for the use of a tank battalion in an offensive operation by parameters, taking into account the factors that define it more closely. Due to the scope of the paper, it is impossible to fully describe the impact of operational environment and the operational model on the cost, because it would have to be the subject of further scientific analysis and a paper of larger scope. The cost calculation model offered might also be applied to other types of battalions, with the respective factors being changed by parameters.

Key words: cost price, tank battalion, offensive operation, parameter, factor, calculation model

Cost Calculation Model for a Combat Operation of the Serbian Armed Forces

Milan Mihajlović, Rade Slavković and Saša Stojanović

Successful countering of modern challenges, risks and threats requires making optimal decisions about how to use the forces, often during combat operations, to accomplish the assigned missions and tasks. Optimality is reflected in maximum rationalization of the operation costs, or in the selection of the mode of performing the operation, which will contribute to successful implementation of the mission at the least cost possible. Limited and, as a rule, insufficient funds impose a continuing need for cost-effective, rational and efficient use of the funds available. Therefore, the place and role of the cost of operations in the decision-making process in peace and in wartime, should be given special importance, especially bearing in mind that the costs are one of the most important economic categories.

The methodology of calculating the cost of a military operation varies depending on the economic systems of the countries that perform the operation, their level of development, the type of operation, etc. Its cost price depends on several elements: the objective of the operation, type, duration, resources required for the achievement of the objective, etc. The regulations, under which the material and financial operations are performed in peacetime, provide their performance in wartime as well, but with necessary adjustment to specific war situation. This applies to all government institutions and the economy of Serbia, and hence to the defense system as well. The defense spending is planned in peacetime, according to the approved procedure. Pursuant to the above, operations planning from the viewpoint of expenditures and costs should be done in compliance with the regulations under which material and financial operations are carried out in peacetime.

The paper aims to present the way to determine the cost of a combat operation in terms of making optimal decision, which ensures the accomplishment of the task of using the forces in an operation at optimal cost. The cost price of a combat operation refers to the consumption of human and material resources. The implementation of activities aimed at effective provision, deployment and use of human and material resources creates a precondition for achieving the objectives of the operation.

Keywords: model, cost price, combat operation, the Serbian Armed Forces

Operational Capabilities of the Armed Forces as a Criterion for the Operation Cost Price Calculation

Božidar Forca

Since the end of the Cold War, the view of the purpose, missions and method of preparation and use of the armed forces has changed. Many challenges, risks and threats require the armed forces to have diverse operational capabilities. Typically,

in the neighboring countries, and member states of the Partnership for Peace Program, these capabilities are referred to as key operational capabilities. The name and number of key operational capabilities are very similar in the theory and practice of foreign armed forces.

The Serbian Armed Forces accepted the development model based on military capabilities. Acquiring and maintaining these capabilities, as a general requirement, as well as a requirement for a specific operation, has proved as one of the key criteria for the calculation of the operation cost. The paper describes an approach to defining the key operational capabilities and the need of their theoretical and practical upgrade, so that they could be effectively used for the calculation of the military operation cost price.

Key words: operational capabilities, criterion, operation cost

Cost Calculation Model for the Preparation of the Serbian Armed Forces' Declared Units to Contribute to Multinational Operations

Hajradin Radončić

Peacekeeping operations have an irreplaceable role in establishing, building and maintaining peace in crisis-struck regions worldwide. The operations are conducted according to pre-developed plans and predefined models of use, which are made separately for each mission.

The countries contributing their forces to peacekeeping operations deploy personnel, technical resources, special-use assets, and, when necessary, specialized personnel for which some compensation can be obtained.

According to the above, the paper presents a model of calculating the costs of preparation of the Serbian Armed Forces' declared units to contribute to peacekeeping operations.

Key words: Serbian Armed Forces, multinational operations, declared units

Long-term Financial Sustainability of Airspace Control and Protection Operation – Calculation Model

Ivan Petrović, Milan Kankaraš and Predrag Gordić

The paper presents the calculation model of an airspace control and protection operation cost price. The airspace control and protection operation is one of the most complex military operations performed by the armed forces both in peace and in wartime. This operation is performed by forces included in the air defense system. Its

importance comes from the fact that it is a prerequisite of European integrations, as well as a security obligation of any state to protect people, property, and other material resources and the environment against asymmetric and other potential airborne threats.

This task, which is an international obligation, is performed by each state independently, or by hiring armed forces of neighboring states, to which they allocate significant financial assets (dozens millions of Euros). Also, by performing the airspace control and protection operation, significant funds are obtained through international agency "Euro-control".

Therefore, it is especially important to calculate the long-term financial sustainability of performing the airspace control and protection operation by own forces.

The paper is focused on conceptual definition of the airspace control and protection operation and the classification of the forces that perform the operation. Also, the paper presents the software KOSTMOD as a tool for calculating the long-term financial sustainability of the operation conducted by available forces, as well as by modeled forces equipped with modern weapons systems and equipment.

Key words: long-term financial sustainability, operation, airspace, air defense system, KOSTMOD

Cost Calculation Model for Operational Capabilities at the Multinational Operations Execution Stage

Mitar Kovač, Dejan Stojković and Vlada Mitić

The paper presents a model of operational capabilities cost calculation at the stage of operation execution, using example of the operational capabilities of forces in multinational operations, which can help calculate the financial resources required.

Taking into consideration the standards and conditions of mission performance of the Serbian Armed Forces in multinational operations, as well as the resources required for maintenance and use of operational capabilities, the model enables an estimate of capability costs, and hence an estimate of the operation costs. Capability costs are viewed in terms of human resources, weapons and military equipment, and infrastructure.

The presented model, with modifications and adjustments, may be applied for the operational cost calculation for all types of operations, but also for the calculation of the capability development cost and an estimate of long-term defense spending. As such, the model may be used in planning the development and in planning the use of forces. A problem occurring in the input data collection phase, referring to the accuracy of the data, may be identified as a disadvantage of the model.

Keywords: defense planning, operational capability, multinational operations, operational costs