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**THESIS**

**COBB-DOUGLAS PRODUCTION FUNCTION AS AN  
APPROACH FOR BETTER RESOURCE ALLOCATION  
IN THE UKRAINIAN ARMED FORCES**

by

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June 2013

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BETTER RESOURCE ALLOCATION IN THE UKRAINIAN ARMED FORCES**

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## **ABSTRACT**

The purpose of this thesis is to analyze the defense and budget planning processes in the Armed Forces of Ukraine. Currently, there is a growing need to establish an effective system of defense planning in the armed forces as well as for integrating that system of planning with budget planning to create a single system. This integrated system would provide an opportunity to create reliable mechanisms that would enhance the efficiency and quality of budget management in the MoD and would make this process more flexible and transparent. The scientific value of the work presented in this thesis is in the critical analysis of the defense and budget planning state in the MoD and the armed forces. Also valuable is the research on effective methods for the improvement of these processes. The most significant areas of difficulty related to intermediate and long-term planning are identified, and the techniques for the macroeconomic analysis and forecasting of resource support for the armed forces based on the Cobb-Douglas production function are proposed.

In this thesis all stages of the defense planning and budgeting processes were studied, weaknesses in the allocation of defense resources revealed, and the mechanism for their effective use proposed.

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

AG	Advanced Group
CMU	Cabinet of Ministers of Ukraine
DF	Department of Finance of Ministry of Defense of Ukraine
GDP	Gross Domestic Product
GS	General Staff of the Armed Forces of Ukraine
LAC	Latin American Countries
MDDMP	Main Directorate for Defense and Mobilization Planning of the General Staff
MF	Ministry of Finance of Ukraine
MoD	Ministry of Defense of Ukraine
MOE	Measures of Effectiveness
NSDC	National Security and Defense Council of Ukraine
PMD	Plan of Maintenance and Development of Armed Forces
PPBS	Planning Programming and Budgeting System
TPMD	Tentative Plan of Maintenance and Development of Armed Forces
UAH	Ukrainian Hryvnia
VR	Verkhovna Rada of Ukraine (Parliament)

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# **I. INTRODUCTION**

## **A. MAJOR RESEARCH QUESTION**

The world is not going to be safer in the near future. Global economic, environmental, ethnic, religious, and other differences are growing, and no effective means of overcoming them has yet been found. Moreover, this century has seen the emergence of new conflicts being waged with new tools and rules of warfare to achieve new goals. As a result, states spend billions of dollars for defense needs to acquire material resources, to support personnel, and to conduct training.

The question arises: how can Ukraine effectively manage its national resources, including budgeting funds for defense? Also, what instruments or approaches for optimal algorithms and decision-making systems should be applied? A production function that was developed by Charles Cobb and Paul Douglas (called the Cobb-Douglas production function) can be used to analyze development within the Ukrainian Armed Forces and to predict future trends.

## **B. IMPORTANCE**

The importance of this research is that, in the current situation, there is a growing need to establish an effective system of defense planning in the Ukrainian Armed Forces as well as to integrate defense planning with budget planning. This would provide an opportunity to create reliable mechanisms to enhance the efficiency and quality of budget management in the Ministry of Defense (MoD). An integrated system would make this process more flexible and transparent. After the ultimate goals are identified during the defense planning process, it would be possible to monitor the status of their implementation.

It requires leadership at all levels of command and during all stages of the defense planning process to respond to changing circumstances and to make rational management decisions that will achieve the highest priority goals. However, before the budget proposal is submitted, it is imperative to determine how funds will be allocated among the following three categories: personnel, training, and equipment and infrastructure.

A scientific approach should provide an unbiased answer to all interested parties competing for state budget funding.

### C. PROBLEM AND HYPOTHESES

The state budget is only one source for financing the Ukrainian Armed Forces. According to Hitch and McKean national security depends on “the quantity of national resources available, now and in the future; the proportion of these resources allocated to national security purposes; and the efficiency with which the resources so allocated are used.”<sup>1</sup> Financing for the Ukrainian Army for the years 2006 through 2011 is shown in Table 1.

Years	Amount, defined by the State Program, million UAH	Amount of real financing, million UAH	Percentage of GDP	Directions of expenditures (million UAH in percentages according to the ministry of defense of Ukraine budget)					
				Subsistence of the Armed Forces of Ukraine		Training of the Armed Forces of Ukraine		Investment in infrastructure, weapons and equipment	
				million UAH	%	million UAH	%	million UAH	%
2006	8748.4	6407.4	1.18	4402	68.7	625.3	9.8	1380.1	21.5
2007	10283.4	8078.2	1.12	5973.2	73.9	789	9.8	1316	16.3
2008	11835.6	9495.2	1.00	7311	77.0	747	7.8	1437.2	15.2
2009	13044.8	8323	0.91	6988.2	84.0	732	8.8	602.8	7.2
2010	14140.3	10242.2	0.95	8933.4	87.2	551.2	5.4	757.6	7.4
2011	15368.6	12295.1	0.94	10673.6	86.8	520.2	4.2	1101.3	9.0

Table 1. State of the Armed Forces of Ukraine Financing from 2006–2011.\*

\* The financial indexes are represented without notice of expenditures of the Main Directorate of Intelligence of the Ministry of Defense of Ukraine.

<sup>1</sup> C. Hitch and R. McKean. *The Economics of Defense in the Nuclear Age*. (Cambridge, MA: Harvard University Press, 1967), 19.

Recently the State Program of the Armed Forces' Development 2006–2011 was finished. During those six years the underfunding of the State Program was 18.6 billion Ukrainian hryvnias (UAH), which is approximately one quarter of the whole amount for its implementation. Thus, from 2006 to 2011 the State Program was not fully implemented. The allocated amounts were sufficient mainly for the maintenance of the Armed Forces but not for training troops at the proper level or for maintenance of weapons and military equipment.<sup>2</sup> Implementation of activities of the Armed Forces' development received only 39% of the funding.

At the same time we have the new challenging task of solving defense problems under the Non-Bloc status of Ukraine. It requires increasing the effectiveness of command and control, upgrading the level of the personnel training, and improving resources and logistical support. How should the Armed Forces address these challenges, especially if the level of financing (that is, the share of the budget or gross domestic product (GDP)) is so low?

Another problem is allocating available resources among activities. If we compare the division of funds by functional appropriations we can see that we spend a huge amount of money on personnel. It means that the training expenditure is not sufficient, and the procurement of new equipment and infrastructure is residual. We can say that until now in Ukraine we have not had a clear solution on how to optimize the cost of defense, how to allocate resources via rational planning, and finally, how to improve overall efficiency. We can use many different tools for resource allocation analysis, and one of them is the Cobb-Douglas production function.

The Cobb-Douglas production function is widely used to represent the relationship of output and two inputs, and can be used both on macro and micro levels of economics. This thesis applies the Cobb-Douglas production function to explore the relationship between “labor” and “capital.” In this case “personnel” expenditure will represent “labor” and “equipment and infrastructure” will stand for “capital.” This

---

<sup>2</sup> President of Ukraine, Decree of 27.06.2008 № 598/2008, *On the Decision of the National Security and Defense Council of Ukraine of 30 May 2008 “On a defense review.”*  
<http://zakon4.rada.gov.ua/laws/show/598/2008>.

allocation is crucial not only for the development of the army but for the economy as a whole, and in the long run it will be reflected in state growth. It is also interesting to think about how to make growth sustainable, what factors determine fluctuation, and which factors will help build the virtual circle. Unfortunately, the Cobb-Douglas production function was not really developed in the context of government expenditure for defense, so my research has a portion of novelty. Before applying the Cobb-Douglas production function to establish a set of critical elements to define the balance for steady growth, it is necessary to do a literature review.

#### **D. LITERATURE REVIEW**

First of all, it is interesting to combine different sources that mention the Cobb-Douglas production function and that may be applicable for my thesis. A production function is a mathematical expression that describes a systematic relationship between inputs and output in an economy, and the Cobb-Douglas is a function that has been used extensively. Research about the production function has a long history. The economist Paul H. Douglas and mathematician Charles W. Cobb created it in an effort to fit Douglas's empirical results for production, employment, and capital stock in U.S. manufacturing into a simple function (Cobb and Douglas, 1928).<sup>3</sup> Since that time "many studies have tended to support the hypothesis that production processes are well described by a linear homogeneous function with an elasticity of substitution of one between factors."<sup>4</sup>

In its most standard form for production of a single good with two factors, the function is

$$Y = AL^{\beta}K^{\alpha}$$

where:

$Y$  = total production

$L$  = labor input (the total number of person-hours worked in a year)

$K$  = capital input (the monetary worth of all machinery, equipment, and buildings)

$A$  = total factor productivity

---

<sup>3</sup> C. Cobb and P. Douglas, "A Theory of Production," *American Economic Review* 18, (1928), 139–165.

<sup>4</sup> P. H. Douglas, "The Cobb-Douglas Production Function Once Again: Its History, Its Testing, and Some New Empirical Values," *Journal of Political Economy* 84, no. 5 (January 01, 1976), 903.

$\alpha$  and  $\beta$  are the output elasticity of capital and labor, respectively. These values are constants determined by available technology.

Or it can be written like  $Q = K^\beta L^{(1-\beta)}$

with the solution as  $L = Q^{1/(1-\beta)} K^{-\beta/(1-\beta)}$

Since  $Q^{1/(1-\beta)}$  is a constant along the projection, this is a hyperbola, and it has a graph that resembles the middle one in Figure 1.

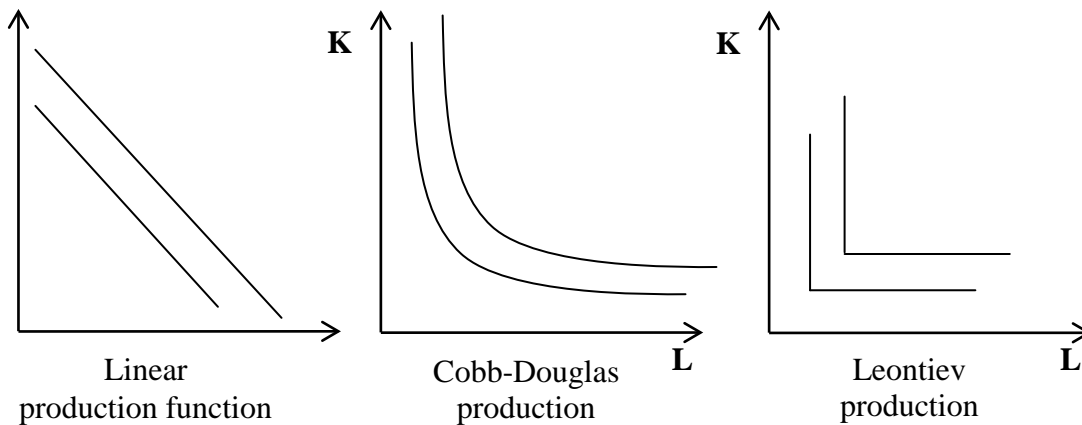


Figure 1. Different Possibilities of Production Functions.

The production functions were originally designed with an individual firm in mind but macroeconomists, such as Miller, came to realize that this methodology provides a useful tool for estimating certain parameters that cannot be directly measured from national accounts data.<sup>5</sup> The most important of these is the elasticity of substitution between capital and labor. So, the Cobb-Douglas production function lay between two extremes.

<sup>5</sup> E. Miller, (2008). *An Assessment of CES and Cobb-Douglas Production Functions*. (Washington, D.C: Congressional Budget Office, 2008), 3.

Taking that into account, Miller concludes that the elasticity of substitution provides a powerful tool for answering analytical questions about the funds distribution between capital and labor. If the markets are competitive, then factors will be paid their marginal product. He summarizes that “the wage rate will equal the marginal contribution from an additional worker and the return on capital will match the contribution in output that a marginal increment of capital provides.”<sup>6</sup> In other words, if  $\sigma = 1$ , constant shares of output are allocated to capital and labor, even though the capital-labor ratio may change over time. If  $\sigma > 1$ , then a given percentage change in  $K/L$  will exceed the associated percentage change in  $w/r$  (where  $w$  is the wage rate and  $r$  is the rental rate of capital), and vice versa. The opposite result occurs when  $\sigma < 1$ ; an increase in the ratio  $K/L$  would tend to lower capital’s share because the relative price of labor would rise in response to the increase in the amount of capital per worker.

In my case it is interesting to explore flexibility and the relationship between the “personnel” and the “equipment and infrastructure” because the budget of the MoD has been “eating away budget” since it had no resources available for combat readiness renewal or development of the Armed Forces. The average annual percentage of the defense sector financing during the period of 2006–2011 was 1.0% of GDP; the majority of the funds (about 80%) was used for the maintenance of troops. The question is whether it is only because of underfunding of the State Program or something else?<sup>7</sup> One way to determine whether we can find an answer is to compare the structure of NATO countries’ expenditures. It is possible to discover the interdependence between the production of “labor” and return of the “capital.”

In this instance, to determine the current situation and to identify any applicable constraints such as budget, policies, and technological progress, it is important to understand where we are. On the road to the perfect budget we have some constraints. First of all, it should take a macro-level view.

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<sup>6</sup> Miller, *An Assessment of CES and Cobb-Douglas Production Functions*, 5.

<sup>7</sup> V. Mozharovskyi et al. *The White Book 2011: Armed Forces of Ukraine*. (Kyiv: Ministry of Defense of Ukraine, 2012), 10.



The Ukrainian government has forecast that country's gross domestic product will grow by up to 3.4%.<sup>8</sup> At the same time leading international economic organizations have a different opinion on this matter. "The Ukrainian economy is running a substantial external deficit, which may require devaluation," according to the European Bank for Reconstruction and Development. It also adopted a much gloomier view on Ukraine, "now seeing an economic contraction of 0.5%, having in January expected growth of 1.0%."<sup>9</sup> "Ukraine's economic performance has weakened since we last lowered our ratings," as Standard & Poor's has said. "The ratings on Ukraine are constrained by our view of political uncertainty, financial sector stress, and weak external liquidity."<sup>10</sup> As a result, Standard & Poor's trimmed its forecast for average 2013–2015 GDP growth to 2.5% from 4.1%. The International Monetary Fund has downgraded the forecast for GDP in Ukraine in 2013 to zero from 3.5% in October 2012. "After almost a zero growth in 2012 due to trade conditions decline, GDP growth will remain pressured in 2013, if the economic policies would not change."<sup>11</sup>

This unfavorable current position of Ukraine is a reason why the next article attracted my close attention. It is quite possible that for a different country with a different level of development the same input from "labor" and "capital" would bring different results in effectiveness, efficiency, and output. Such a situation is examined in "Productivity Growth in Latin America," written by Dr. Henry J. Bruton in 1967. Dr. Bruton has a Ph.D. from Harvard University with main fields of specialization in technological change, development economics, and productivity growth in less developed countries. He has country experience in Egypt, Iran, India, Pakistan, Malaysia, Indonesia, and Chile. Unfortunately, I cannot classify Ukraine as a well-developed country either.

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<sup>8</sup> Interfax International Information Group, Interfax-Ukraine. *Bulletin*, Kyiv, November 28, 2012. <http://www.interfax.co.uk/ukraine-news/cabinet-approves-2013-macro-forecast-with-3-4-gdp-growth-4-8-inflation-3/>

<sup>9</sup> P. Hannon, "EBRD Cuts Forecasts For Russia, East Europe," *Wall Street Journal*, May 10, 2013. <http://online.wsj.com/article/SB10001424127887323744604578474450778425048.html> .

<sup>10</sup> D. Krasnolutska, "Ukraine Rating Affirmed by S&P as Negative Outlook Kept," *Bloomberg*, May 16, 2013. <http://www.bloomberg.com/news/2013-05-16/ukraine-rating-affirmed-by-s-p-as-negative-outlook-kept.html>.

<sup>11</sup> International Monetary Fund, *World Economic Outlook: Hopes, Realities, Risks*, (April 2013), 65. <http://www.imf.org/external/pubs/ft/weo/2013/01/pdf/c2.pdf>.

The purpose of his paper, according to Bruton (1967), is to examine the growth of GDP in five Latin American countries (Argentina, Brazil, Chile, Colombia, and Mexico – henceforth referred to as LAC) in the period of 1940–1964 in terms of hypotheses about possible explanations of the “residual” source of growth in these countries.<sup>12</sup>

The author does not make it a goal to describe the Cobb-Douglas production function. (Actually, the value of this research is in the applied aspect rather than the theory). The author refers readers to a recently provided review about all aspects of the model in Richard Nelson’s (1964) paper and only defines symbols and notes points of special relevance for later discussion.<sup>13</sup> Nelson, in his paper “Aggregate Production Functions and Medium-Range Growth Projections,” includes several models that were quite similar in basic concept but focuses on different variables in a general framework. In this case different assumptions and implications can be compared and evaluated.

So Bruton’s paper will be interesting because of its scope and analytical approach, as well as its examination of drivers of growth and the interdependence that the aggregate production function can help clarify. The author in his paper has chosen countries from the same region (Latin America) and analyzed the mean values (regression coefficients) from 1940 to 1964. At the same time he compared this data with another group of countries named the advanced group (AG) from 1949 to 1960. The only reason the author provided for doing so is, “The logic of the time periods chosen for the Latin American group is indicated as we proceed.”<sup>14</sup> Countries in the AG represent the whole world (such as North America, Europe, Far and Middle East) and serve as a control indicator. But is it correct to compare the LAC during the war time of 1940–1945 with no data from the AG at all? He wrote, “While these percentages for LAC are based on incomplete data, they are consistent with a substantial body of evidence, and can be taken as a close approximation to what complete data would indicate.”<sup>15</sup>

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<sup>12</sup> H. J. Bruton, “Productivity Growth in Latin America,” *The American Economic Review* 57, no. 5 (1967), 1099–1116. 1109.

<sup>13</sup> R. R. Nelson, “Aggregate Production Functions and Medium-Range Growth Projections,” *The American Economic Review* 54, no.5 (September 1, 1964), 575.

<sup>14</sup> Bruton, “Productivity Growth in Latin America,” 1101.

<sup>15</sup> *Ibid.*, 1102.

The data used for analysis are very important for further investigation. On the one hand, it should be a sufficient period of time for regression analysis (at least 20 years when talking about countries). On the other hand, it should be consistent for comparison with a standard sample. For the Ukrainian Armed Forces the discussion should focus on the whole period of independence since 1991, paying close attention to the huge reduction of personnel strength.

Alexander Gerschenkron succeeded as an economic historian in explaining dependence of the development of the countries. His key assumption is that the industrialization process of backward countries is significantly different from that of developed ones not only in industrial growth, but also in the productive and organizational structures of the industry that it accompanied. Gerschenkron argued that possibilities of industrialization in some countries are directly dependent on the degree of backwardness.<sup>16</sup> The more innovation the countries can implement, the greater the potential for industrialization they have.

Comparing mean values of growth rates in the two samples, Bruton found contrary results to the frequently encountered notion that less developed countries with a somewhat primitive technological base may reap large windfalls by exploiting recently developed knowledge. Further in the text he explained this situation by exploring the role of capital in production function, “This equation shows, contrary to expectations, that inputs are not carriers of the sources of productivity growth.”<sup>17</sup> This sort of logic is appealing; it means that the author would not like to prove some facts with data but rather to explain data that he collected. That is more important because, for example, talking about Ukraine and its failure to implement the State Program of the Armed Forces’ Development 2006–2011, it is too obvious to say it is “just because of money.” Definitely, Ukraine had to cancel the program earlier when the deviation exceeded 20% and develop the new one; yet it had not previously examined all drivers that influenced the program.

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<sup>16</sup> A. Gerschenkron, “Economic Backwardness in Historical Perspective,” in *The Political Economy Reader: Markets as Institutions*, ed. N. Barma and S. Vogel (New York: Routledge, 2008), 222–227.

<sup>17</sup> Bruton, “Productivity Growth in Latin America,” 1107.

Bruton's principal results consist of two tables, many equations, and lots of explanations that explore the role of capital and the role of productivity growth. What is not well-developed is the contribution of education. While he mentioned at the beginning of his research that contributions to productivity growth of embodied technology improved education, and that better allocation must then be made directly to education, later on we read the following:

It is also probably correct to assume that the rate of growth and of improvement in the educational establishments was greater in the former group than in the latter. In terms then of the customarily identified sources of  $r_A$ , technical advance and education, the Latin American countries lagged. This argument is intuitively appealing, but its validity depends very much on the assumption as to the sources of productivity growth.

—Bruton

Unfortunately, we do not have a clear explanation of how it works in the LAC sample. According to the author, increases in productivity result from improvements embodied in capital equipment and from better-educated, better-trained workers, which suggests that rates of growth and productivity should move together. Thus, for the AG sample a positive and significant relationship is expected. Yet the equation he has shown us is contrary to any expectations, that inputs are not carriers of productivity growth sources, so for the AG this rate was simply added to whatever growth was produced by increased inputs. Bruton proposed the same interpretation for the LAC sample in the first case for AG  $r^2 = 0.02$  and approximately the same for LAC  $r^2 = 0$ . He concluded that the rate of productivity growth is dependent on changes in the degree of utilization and little or no independent growth of “pure” productivity. According to the data this conclusion is true, but the relationship is still questionable, especially for developed countries. And again, education (or in our case, military training) is a very important driver that, aside from “labor” and “capital,” can add synergy for overall growth.

The summary for this article is somewhat vague. For example, Bruton wrote that his findings are “...probably not adequate to explain inflation in Latin America,” and “the rate of capital formation ... has generally been quite high, and this fact is difficult to reconcile,” and “a detailed investigation would require a country-by-country survey.”<sup>18</sup>

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<sup>18</sup> Ibid., 1109, 1110, 1112.

Such a survey is not possible here,” except in “In a very general sense.” Perhaps his reservations are due to the different time frames for the LAC and the AG studies, as well as the fact that data during war time was greatly distorted.

Yet, when the author explained the behavior of growth by examining these periods separately, he found relevant characteristics “that [were] consistent with the hypothesis that in neither LAC nor AG are inputs (capital and labor) the carrier of productivity growth.”<sup>19</sup> Again, using the same timeframe for both groups of countries Bruton concludes “that ‘pure’ productivity growth has been virtually zero in LAC in the past decade or so” and gave a brief explanation of this result.

What is especially interesting is that at the very end of his paper he mentions that if productivity growth is an important element in development, then appropriate resource allocation is crucial for development policy. In my case, I have to pay close attention to a reduction of personnel (labor) while simultaneously increasing productivity via training. In other words, it is a strong argument for ending conscription and establishing a professional army.

Another factor that can (and probably should) significantly influence the future defense spending policy is Ukraine’s declared neutral status. Talking about Ukrainian Armed Forces, Ukraine proclaimed a Non-Bloc status.<sup>20</sup> Such a status requires a new Armed Forces model since the threats remain the same, but the forces aimed at resisting those threats should be increased (not necessarily in the number of people), as Ukraine can no longer count on help from another bloc member. That means a new strategy and concept have to be developed. At the same time in relatively new documents it was stated that the reform of Security Sector and Defense should be an integrated system: the stabilization of the situation in the Armed Forces of Ukraine, the end of reducing their combat capability and combat readiness, the maintenance of officer and NCO corps, the optimization of their structure and strength, the improvement of technical readiness of

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<sup>19</sup> Ibid., 1115.

<sup>20</sup> Verkhovna Rada of Ukraine, the Law of 01.07.2010 № 2411-ВІІ *On domestic and foreign policy*, <http://zakon4.rada.gov.ua/laws/show/2411-17>.

weapons and upgrade of its structure, the improvements in combat training, the reorganization of operational (combat) and material maintenance and formation on this basis. Although small in number, the effective professional Armed Forces of Ukraine are able to perform the task of defending the state in terms of a non-aligned policy.<sup>21</sup>

An increase in funding for training and acquisition is possible only in the case of reallocation of money from the “personnel” category. To reduce the number of Armed Forces personnel, we need even more resources. Substantially and simultaneously reducing the number of people (Labor) does not seem possible because the process requires more money than is used for their maintenance. If we fire an officer, he must be paid compensation. If a military family is in line for housing, it must be provided an apartment. If we close a military base, we need to recultivate the land, and so on.

On the other side, increased training is impossible without a sufficient amount of available and ready ships, aircraft, tanks, etc. (Capital). In this case it should be noted that we do not have the technological capacity to repair all units that we need immediately (e.g., we do not have a sufficient number of dry docks for ships). Again, the main purpose is to provide the needs of security and defense on the principle of defense sufficiency, balanced with resources, using resource capabilities of the State to protect Ukraine’s national interests from existing and potential threats.

In any case, it is of interest to compare Ukrainian defense expenditures (shown in Table 1) with defense expenditures of NATO countries (see Table 2).<sup>22</sup> Another useful source for analysis is the recent study, “European Defense Trends 2012: Budgets, Regulatory Frameworks, and the Industrial Base.”<sup>23</sup> This report analyzes national

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<sup>21</sup> President of Ukraine, Decree of 08.06.2012 № 389/2012, On Decision of the National Security and Defense Council of Ukraine on June 8, 2012 On the New Version of the National Security Strategy of Ukraine, <http://zakon2.rada.gov.ua/laws/show/389/2012>.

<sup>22</sup> NATO. “Financial and Economic Data Relating to NATO Defense. Defense Expenditures of NATO Countries (1990–2011),” Communiqué, PR/CP(2012)047-REV1, April 13, 2012, [http://www.nato.int/nato\\_static/assets/pdf/pdf\\_2012\\_04/20120413\\_PR\\_CP\\_2012\\_047\\_rev1.pdf](http://www.nato.int/nato_static/assets/pdf/pdf_2012_04/20120413_PR_CP_2012_047_rev1.pdf).

<sup>23</sup> J. Hofbauer, R. Levy, G. Sanders, G. Ben-Ari, D. Berteau, *European Defense Trends 2012: Budgets, Regulatory Frameworks, and the Industrial Base* (Washington, D.C: Center for Strategic and International Studies, December 18, 2012). [https://csis.org/files/attachments/121218\\_EuropeReport%202012\\_EventSlides.pdf](https://csis.org/files/attachments/121218_EuropeReport%202012_EventSlides.pdf).

defense budgets of 37 European countries. Moreover, it assesses European defense trends in policies and capabilities.

Country	GDP, %	Personnel, %	Equipment, %	Infrastructure, %	Other, %
Albania	1.5	77.1	13.4	0.8	8.8
Belgium	1.1	75.4	6.4	1.7	16.5
Bulgaria	1.4	67.4	6.3	1.5	24.8
Canada	1.4	42.5	17.5	4.5	35.5
Croatia	1.5	69	12.2	0.8	18
Czech Republic	1.1	56	13.2	2.9	27.8
Denmark	1.4	52.2	9.7	1.5	36.7
Estonia	1.7	32.3	10.1	13.6	44
France	1.9	49.4	28.2	2.7	19.8
Germany	1.4	52.3	16.4	4.1	27.2
Greece	2.1	73.9	6.9	0.9	18.3
Hungary	1	55.2	13.1	1.1	30.6
Italy	1.4	74.8	11.7	1.3	12.2
Latvia	1	51.3	10.8	9.3	28.6
Lithuania	0.8	68.3	10.1	1.7	19.9
Luxembourg	0.5	44.3	28.4	11.2	16.1
Netherlands	1.3	53.8	13.6	3.8	28.8
Norway	1.5	43.4	17	4.2	35.3
Poland	1.7	58.2	16.1	4.8	20.9
Portugal	1.5	78.5	8.8	1.4	11.2
Romania	1.3	80	7.5	1.4	11.1
Slovak Republic	1.1	69.5	7.1	1	22.4
Slovenia	1.3	74.6	5.7	2.6	17.1
Spain	0.9	64.8	6.7	1.9	26.6
Turkey	1.9	50.2	28.6	2.7	18.5
United Kingdom	2.6	35.7	24.5	1.6	38.3
United States	4.8	41.4	26.5	1.1	31
<b>NATO - Total</b>	<b>1.52</b>	<b>58.94</b>	<b>13.94</b>	<b>3.19</b>	<b>23.93</b>

Table 2. Defense Expenditures as a Percentage of GDP and Distribution of Total Defense Expenditures by Category, 2011<sup>24</sup>

<sup>24</sup> NATO. "Financial and Economic Data Relating to NATO Defense."

The most valuable aspect of this report is the wealth of data relating to European defense between 2001 and 2011. In his book, *The Impact of Human Capital on Economic Growth: A Case Study in Post-Soviet Ukraine, 1989–2009*, Osipian covers approximately the same period of time but from a slightly different approach.<sup>25</sup> It is all about Ukraine, but more focused on economic growth, paying special attention to the impact of human capital.

It is also interesting to understand how Planning Programming and Budgeting Systems (PPBS) developed in different countries. Nhemachena, Chiabrishvili, and Sewell represent Zimbabwe, Georgia, and Jamaica, respectively. These countries represent different regions, but face approximately the same problem. In this example we can see the genesis of each country's PPBS up to its implementation via transition and adjustment at different stages depending on diverse circumstances that may be interesting for the Ukrainian Armed Forces.

For example, the Zimbabwe Defense Force faces a resource crisis that threatens its capability to fulfill its mission. At the same time the ability of the country's economy to sustain the modernization program is questionable through the same period. In his paper, Nhemachena examines the budgetary process of his country, giving us a detailed description of budgeting systems, and in particular the PPBS. He mentions that his country recently implemented a multi-year plan and program as well as a three-year rolling budget system.<sup>26</sup> This information will be especially useful for the Ukrainian Armed Forces in the context of similar processes that are taking place now.

The Georgian experience deserves further study because it is a former republic of the Soviet Union. Georgia implemented many successful reforms on its way into NATO. Overcoming the economic decline that happens to most countries in transition, Georgia faced the negative effects of instability in the defense reform process, especially in the implementation of the PPBS. Particularly in 2004, "Georgia [was] about halfway from

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<sup>25</sup> A. L. Osipian, *The Impact of Human Capital on Economic Growth: A Case Study in Post-Soviet Ukraine, 1989–2009* (New York: Palgrave Macmillan, 2009).

<sup>26</sup> C. R. Nhemachena, "Defense Budgeting in a Constrained Economy: Reengineering the Budget Process to Meet the Challenge of a Modernizing Zimbabwe Defense Force" (published thesis, Naval Postgraduate School) (Springfield, VA.: National Technical Information Service, 1998), 53, 54.



Defense Budgeting in the narrow sense to a broader understanding.”<sup>27</sup> The solution proposed by Chiabrishvili looks at the MoD as a public sector agency, and it is the reason that the MoD has to focus on its outputs, outcomes, and metrics.<sup>28</sup>

In his paper, Sewell also examines the resource allocation process for the national security in his country. The purpose of his study is to establish whether the current process is adequate to the country’s expenditure; he gives us an explanation of how much to allocate to defense with the consideration of all other viable alternatives. It is worth studying lessons from the theoretical approach to resource allocation for defense.<sup>29</sup>

Studies showing that performance can be improved with additional personnel and/or higher education levels will be particularly useful for better resource allocation in the Ukrainian Armed Forces. Assuming that we reduce the number of staff but increase its professionalism (with more intense training), we can achieve even better overall results. This study attempts to relate inputs to outputs by using the Cobb-Douglas production function.<sup>30</sup> Feuring used regression analysis, and the results show positive effects of human capital on performance. In another case that used the Cobb-Douglas production function extensively, Jayachandran shows the analytical procedures for a sensitivity analysis of a cost estimate.<sup>31</sup> “This approach is accurate for linear cost models and can be upgraded for non-linear models by adding higher order terms to the differential.”<sup>32</sup> In this example the parameters of the Cobb-Douglas model are taken from historical data. Further the model can be used to assess the effects of small changes in parameter values on the total cost.

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<sup>27</sup> M. Chiabrishvili, “Economic Security Environment and Implementation of Planning Programming, Budgeting, Execution (PPBE) System in Georgia” (Master’s thesis, Naval Postgraduate School, 2004), 48.

<sup>28</sup> Ibid., 81.

<sup>29</sup> A. F. Sewell, *Prospects for Improving the Resource Allocation Process for National Security in Jamaica: A Comparative Study* (Ft. Belvoir, Virginia: Defense Technical Information Center, 2004), 53–57.

<sup>30</sup> J. C. Feuring, *The Impact of Human Capital on the Cost of Air Force Acquisition Programs* (Fort Belvoir, Virginia: Defense Technical Information Center, 2007).

<sup>31</sup> T. Jayachandran, *An Analytical Cost Estimation Procedure* (Ft. Belvoir, Virginia: Defense Technical Information Center, 1999).

<sup>32</sup> Ibid., IV.

## E. METHODS AND SOURCES

In order to apply the Cobb-Douglas production function to economic analysis of the Ukrainian Armed Forces and for recommendations in regards to improving the defense planning process, we need to choose a timeframe. For qualitative country or branch of economy regression analysis it is necessary to consider at least 15 to 20 years. This timeframe is equal to the whole existence of the Ukrainian Armed Forces since my country gained independence in 1991.

The next step is to identify what exactly we can include in “labor” and what in “capital.” It will not be easy because the Ukrainian Armed Forces change their program structure from year to year. Actually, the PPBS was established in 2005. When we determine at a high level what portion will be assigned to “capital” and how much to “labor” ( $\alpha$  and  $\beta$  respectively) we will go to the next phase of defense planning.

The MoD of Ukraine, like other ministries, has to compete for resources while the possibility of substantially increasing funding is extremely low. Hence, the challenge is to maximize the efficiency of funds allocated annually. It can be done in several stages: first, find the optimal division of funds by functional appropriations; second, maximize the measures of effectiveness (MOE) using a fixed budget approach; and, finally, apply the best solution in case of changes in the budget. In other words, during the process of defense planning it is important to apply what Hitch and McKean proposed in 1967. They advocate determining the maximum effectiveness for a given budget and then examining how each alternative fares under several different budget scenarios.<sup>33</sup>

A quick look at the data shown in Table 1 and Figure 1 gives us an idea that something is wrong in our budget distribution.<sup>34</sup>

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<sup>33</sup> C. Hitch & R. McKean, *The Economics of Defense in the Nuclear Age* (Cambridge, MA: Harvard University Press, 1967), 167, 176.

<sup>34</sup> J. Hofbauer et al., *European Defense Trends 2012*, 5.

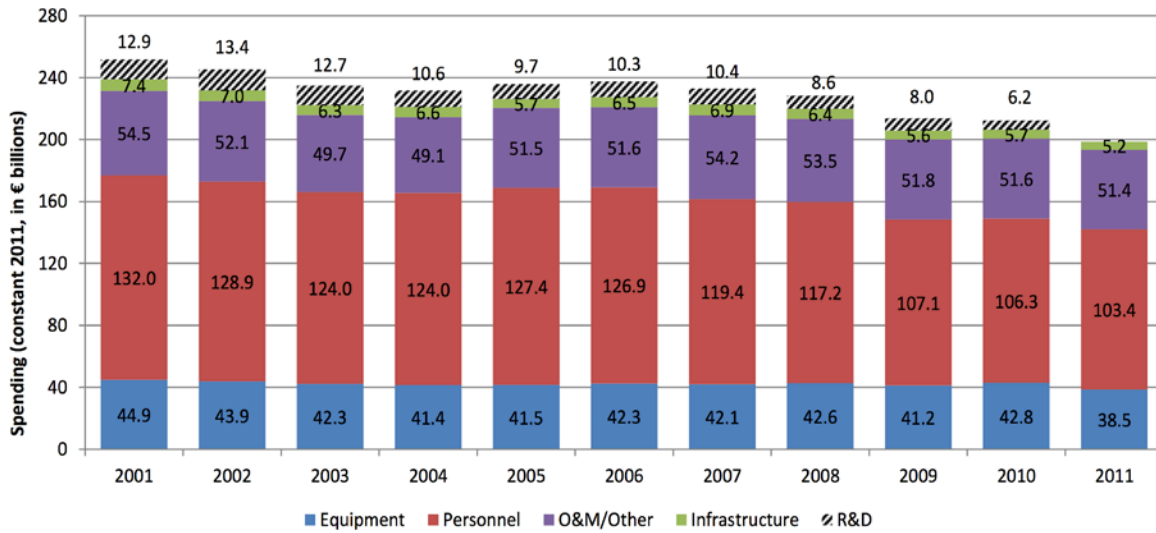


Figure 2. Total European Spending by Defense Spending Categories

The best solution would be to increase defense spending at least 100%, but we know that this is practically impossible. It is not merely an issue that too low of a percentage of GDP is spent on defense. It is also an issue of determining how to increase expenditure for equipment and infrastructure more effectively and to make training more intense.

In short, the Ukrainian Armed Forces should reallocate resources as shown in Figure 3 in the direction of Figure 4 or Figure 5 to meet the NATO or European example. This recommendation does not contradict the Non-Bloc status of Ukraine; rather it suggests how to improve the defense planning process and make it more scientific. It is proposed as a transitional plan to optimize the Armed Forces and to make it affordable for the State.

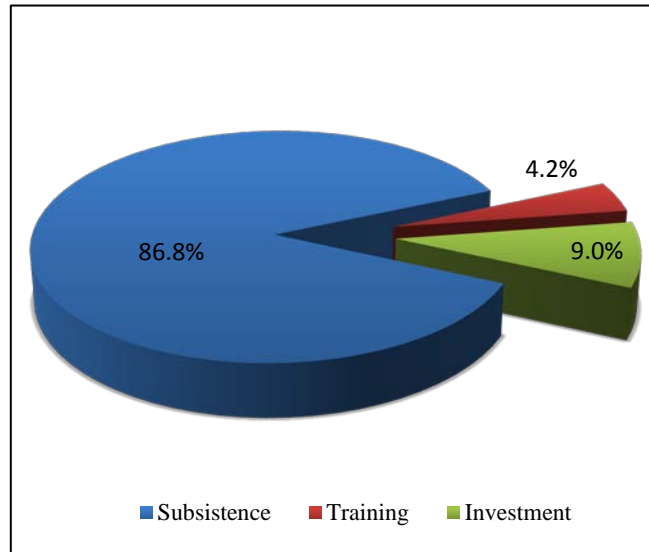


Figure 3. Defense Spending Categories, Ukraine, 2011.

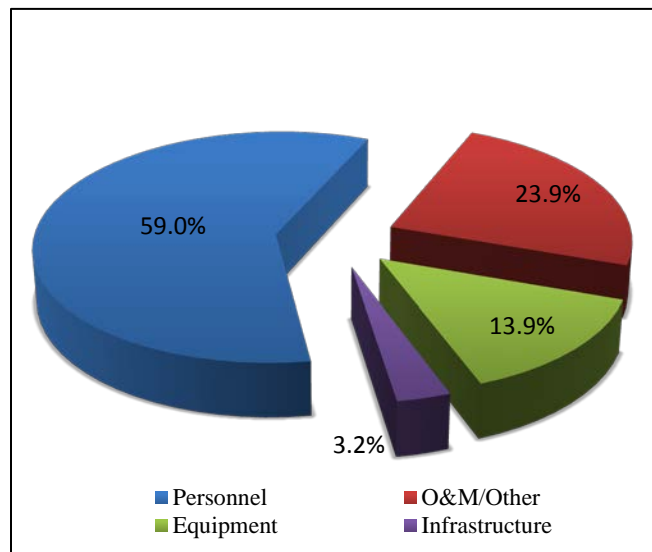


Figure 4. Defense Spending Categories, NATO, 2011.

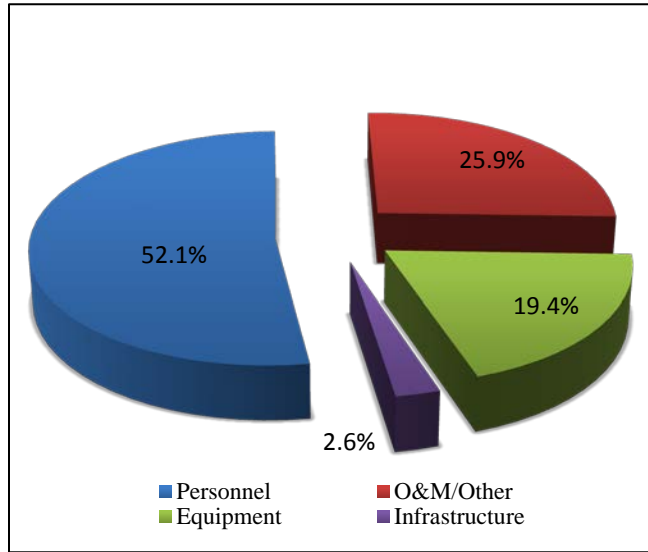


Figure 5. Defense Spending Categories, Europe, 2011.

## F. ORGANIZATION OF THE STUDY

The thesis is organized as a qualitative study. This approach was selected due to the lack of data for the entire period of observation that we currently have access to at NPS. In addition, before we make any calculations, we need to put forward clear requirements for the regression model and, theoretically, to justify what we need to include as “labor” and “capital” in the concept.

In addition to the introduction and conclusion, this thesis includes three separate chapters. Chapter II describes how the Ukrainian Armed Forces organize the short-term defense planning and budget planning procedure. Chapter III examines long-term planning. It discusses state-level planning, instruments and approaches, and as a consequence, the need to shift from conscription to professional armed forces. Chapter IV contains recommendations on how to improve working with defense budgets and resource allocation; it also gives suggestions and imposes requirements for analysis of the conditions and factors that affect the planning of defense expenditures using the Cobb-Douglas production function.

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## II. SHORT-TERM DEFENSE PLANNING AND BUDGET PLANNING AT THE MOD TODAY

One of the main objectives of the MoD is to provide rational distribution and efficient use of scarce public resources to the Armed Forces. These objectives are defined in the laws and conceptual guidelines that regulate the activity of the MoD on defense and budget planning.

As of today, the integration of defense and budget planning into a single effective system in the MoD has not been completed. The evolution of the defense budget process in Ukraine between 1991 and 2006 was in the spotlight of Milesenko's research.<sup>35</sup> Since 2006 we have felt significant changes in this area of MoD activity. A large number of laws, regulations, and guidelines was adopted, including the "Law On Domestic and Foreign Policy," the National Security Strategy, and the Military Doctrine.<sup>36,37,38</sup>

The result of the short-term defense planning is the budget request, the consolidated budget of the MoD, and the Plan of Maintenance and Development of Armed Forces (PMD). These processes cannot take place in isolation from the procedures adopted in the state as a whole.

In Ukraine, organization of the budget process started almost from the first years of independence. At the same time, the adoption of the Ukrainian Defense Planning law in 2004 can be considered the start of defense planning.<sup>39</sup> The law is the reason why defense planning was required to adapt to the current system of budget planning.

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<sup>35</sup> R. Milesenko, "The Evolution of the Defense Budget Process in Ukraine, 1991–2006" (2006), <http://hdl.handle.net/10945/2818>.

<sup>36</sup> Verkhovna Rada of Ukraine, the Law of July 1, 2010, № 2411-VI *On Domestic and Foreign Policy*, <http://zakon4.rada.gov.ua/laws/show/2411-17>.

<sup>37</sup> President of Ukraine, Decree of June 8, 2012, № 389/2012, <http://zakon4.rada.gov.ua/laws/show/771/2012>.

<sup>38</sup> President of Ukraine, Decree of June 8, 2012, № 390/2012, <http://zakon4.rada.gov.ua/laws/show/390/2012>.

<sup>39</sup> Verkhovna Rada of Ukraine, the Law of November 18, 2004, № 2198-IV, *On Defense Planning*, <http://zakon4.rada.gov.ua/laws/show/2198-15>.

In addition, during the implementation of the defense planning system in the MoD and GS, the programming stage of the defense and budget planning process was improved; it is adopted and widely used in the armed forces of many developed countries. The main advantage of this method of planning is that the organizational framework and resources for implementation of targeted programs fully meet the requirements of a market economy. In essence, defense planning and program-based budgeting method are complementary and designed to improve the efficiency of planning and the use of budgetary funds.

Through repeated adjustments, iterations, and different calculations of data on the current state and the future outline of the Armed Forces we were able to determine the critical limit of expenditures necessary to meet the Armed Forces requirements on every defense program. At first, working groups performed this task; then, since 2007, it was the responsibility of the Budget Committee of the MoD. The implementation of the short-term defense planning mechanism has allowed for getting the support of authorities at all stages of the budget process.

In the next section the short-term defense planning procedure employed at the MoD is discussed. The budgetary planning of the MoD will be covered in the remainder of this chapter.

#### **A. THE MOD SHORT-TERM DEFENSE PLANNING PROCESS**

Defense planning at the MoD and within the Armed Forces is carried out according to the Ukrainian Defense Planning law.<sup>40</sup> To enforce the provisions of the law, mechanism and methodology of funding for strategic and defense planning were developed according to the relevant Resolution of the Cabinet of Ministers (CMU).<sup>41</sup> At the ministerial level an order of the Defense Minister of Ukraine was issued, which approved the regulations on the organization and implementation of intermediate and

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<sup>40</sup> Verkhovna Rada of Ukraine, the Law of November 18, 2004, № 2198-IV, *On Defense Planning*, <http://zakon4.rada.gov.ua/laws/show/2198-15>.

<sup>41</sup> Cabinet of Ministers of Ukraine, Decree of April 5, 2006, № 447b, *On Approval of the Organization and Financing of Strategic Planning in the Defense and Military Development*, <http://zakon4.rada.gov.ua/laws/show/447-2006-%D0%BF>.



short-term defense planning by the Ministry of Defense and the Armed Forces of Ukraine.<sup>42</sup>

The procedure for the short-term planning is cyclical and is tied to the budget process in Ukraine. The cycle of the short-term planning can be divided into four stages (Appendix):

- Phase I (November–March) consists of determining the next year’s preliminary expenditures on the MoD from the State Budget of Ukraine, making expenditure forecasts for the following years, and making changes to the list of budget programs.
- Phase II (April–July) consists of developing Tentative Plan of Maintenance and Development of Armed Forces (TPMD).
- PMD of Armed Forces, drafting the MoD budget request, and submitting that request to the Ministry of Finance of Ukraine (MF).
- Phase III (August–November) consists of supporting the Ukraine’s State Budget bill and drafting the PMD of the Armed Forces for the next year.
- Phase IV (December–February) consists of obtaining approval of the consolidated budget of the MoD and the PMD of Armed Forces.

### **1. Objectives and Outcomes of Phase I**

In the first phase the measures to be carried out during the planning period are set out; they are divided based on priority and the need for financial resources for their implementation as determined. Thus, a necessary database is prepared that will allow the management of the Armed Forces to decide on the amount of capital needs and priorities.

At this stage, the Command of the Armed Forces and other military bodies responsible for the development and implementation of PMD provide general proposals to MDDMP on priorities and needs for financial resources. These proposals are made on the basis of the intermediate-term defense planning documents.

The proposals received are analyzed and refined in MDDMP, according to the senior authority solutions of the MoD, the GS and according to possible limitations during that period. Referrals are submitted for consideration to the Budget Commission

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<sup>42</sup> Minister of Defense of Ukraine, January 19, 2010, Order № 15, *On Approval of the Regulation on the Organization and Implementation of Medium-and Short-Term Defense Planning in the Ministry of Defense of Ukraine and the Armed Forces of Ukraine* (as amended on 28.12.2011 № 838), <http://www.mil.gov.ua/>.

of the MoD. The Budget Commission determines the preliminary draft budget for the MoD for the next year and makes expenditures forecasts for the following years in the fields of PMD and MoD budget programs.

At this stage in budget planning, the preceding parameters of the draft budget and forecast spending for the next few years are being developed using the aforementioned indicators. The Minister of Defense signs this document and submits it to the MF. (The MF determines the terms and presentation annually.)

## **2. Objectives and Outcomes of Phase II**

In the second phase the Tentative PMD is developed. Based on the TPMD, the MoD budget request is created and sent to the MF. At this stage the military authorities clarify what funds will be needed in the next year for the implementation of prioritized activities. They submit their resulting proposal to those responsible for shaping and implementing the development directions for the Tentative PMD draft.

The proposals are analyzed and the feasibility of their implementation during the planned period is determined. By the middle of March aggregate proposals are submitted to the MDDMP to shape the Tentative PMD draft. Based on these proposals, MDDMP develops the Tentative PMD, and by the end of May it is submitted for approval to the Chief of the General Staff – the Commander-in-Chief of the Armed Forces of Ukraine.

The approved Tentative PMD is sent to the MoD Department of Finance (DF) and to the Chief of Financial and Economic Management of the GS in full. Other organs of military administration receive specific excerpts from the document, such as those related to the formation of the MoD budget request. The procedure of forming the MoD budget request is contained in the next section.

## **3. Objectives and Outcomes of Phase III**

The purpose of the third phase is to provide the MoD and the Armed Forces leadership with necessary materials (such as calculations, justifications, and other reference data) to justify the proposals to include expenditure needs of the Armed Forces

in accordance with the current law and to clarify the measures according to the specified expenditures by the CMU.

At this stage the conciliation meeting takes place at the MF. Unresolved questions about the Armed Forces spending are submitted for consideration during the meeting of the National Security Council of Ukraine. If necessary, the proposals of the Minister of Defense and the Chief of the GS – Commander-in-Chief of the Armed Forces of Ukraine on the increase in funding or decrease of the tasks assigned to the Armed Forces are made to the CMU, National Security Council, and the President.

The DF promptly informs MoD management and the GS on the status of the MoD budget request that had been sent to the MF and the CMU.

After the State Budget is approved by the CMU, the MoD Budget Commission examines materials on MoD cost sharing for budget subprograms (at the beginning of October). The Budget Committee's decision, approved by the Minister of Defense, is then forwarded to the appropriate military command and serves as the basis for further refinement of the Tentative PMD measures and the formation of the PMD.

By the end of October, those responsible for the formulation and implementation of the development strategy submit aggregate proposals for the PMD draft to the MDDMP.

By mid-November the PMD draft is processed according to the established procedures. The agreed upon PMD draft is then sent to the DF of the MoD and to the Main Financial-Economical Directorate of the GS in full. The other organs of military administration receive only the portions of the draft related to the preparation of project proposals for the consolidated MoD budget.

At this stage, defense planning and financial authorities work together to prepare reference and analytical materials, as well as the MoD speeches regarding the next year's expenditures in the CMU and committees of the Verkhovna Rada of Ukraine.

#### **4. Objectives and Outcomes of Phase IV**

During the fourth phase of the short-term defense planning procedure the PMD combined estimate is adopted.

The purpose of this phase is to bring a list of measures to be carried out in the plan period in line with the level of funding approved by the State Budget law. In other words, this phase prepares the ground for successful implementation of these measures. At this point the budget planning is ahead of the defense planning, which essentially contradicts the efficiency of planning activities. At this stage of budget planning the consolidated budget and passports of MoD budget programs are approved and serve as the basis for the final adjustment of the PMD draft.

The final adjustment of the PMD draft begins at this stage. Planned activities in the PMD project are brought in line with the overall performance of the consolidated MoD budget. In the event that the total PMD cost exceeds these figures (in the process of refinement), as it usually happens, there are two possible solutions: first, searching for possible ways to increase the MoD budget; second, adjusting the PMD to reduce the number of measures or their value to meet the established boundaries of existing budget. The latter solution requires analysis of events and finding alternatives to save money.

Bringing PMD project activities in line with the consolidated MoD budget is conducted on the following schedule:

- within two weeks after the approval of the consolidated MoD budget, those responsible for the development and implementation of the revised PMD submit their revised PMD proposals to the MDDMP;
- within one month after the approval of the consolidated MoD budget, the PMD which has been finally adjusted and based on the passports of budget programs is submitted for approval by the Minister of Defense.

PMD funding begins with the start of the budget period. In case of late adoption of Ukraine's state budget law funding for short-term planning is carried out in accordance with the Budget Code of Ukraine and other normative acts.

Changes to the PMD, as well as review and approval of plans and other documents concerning defense planning, are based on orders and directives of the MoD.

Thus, the annual PMD contains a detailed list of measures within the allocated financial resources for the fiscal year.

Implementation of the defense planning system in the Armed Forces of Ukraine was a transitional stage of planning from the “funds - measures - result of the use of funds” system to the “measures - money - the result of the activities and use of funds” system. However, this system needs to be supplemented with elements such as “goals” (at the beginning of the planning process) and “degree of the goals achievement” (at the end of the process).

In addition, the defense planning system allows for possible costs related to the needs of the Armed Forces to be divided into three categories: personnel, training, and equipment and infrastructure. However, to make such a classification using the budget classification is very difficult. While budget planning is moving toward consolidation programs, defense planning reflects a trend to further specification. For example, in 2012 we had seven budgetary programs (including the one that consists of 20 subprograms from all three areas: maintenance, training, and weapons and equipment), while the defense planning was operating in eight directions or 46 tasks.

Deeper specification of defense planning allows us to more accurately classify expenditures for maintenance, training, and weapons and equipment. Furthermore, it allows us to transform these expenditure areas into budget programs (subprograms) according to generally accepted approaches in the state. This trend also allows us to provide necessary specifications for the preparation of reference materials and reports.

## **B. THE MOD BUDGET PLANNING PROCESS**

As in the short-term defense planning process, there are four stages in the budget planning process of the MoD:

- Phase I (January – middle of April) consists of the formation of the prior indicators of the State Budget of Ukraine;
- Phase II (June–July) consists of the formation of the MoD budget request;
- Phase III (August–November) consists of support of the bill “On the State Budget of Ukraine”;

- Phase IV (December–January) consists of the formation of a consolidated budget of the MoD and the passports of budgetary programs.

### **1. Objectives and Outcomes of Phase I**

Based on prior indicators determined by the Budget Commission in terms of MoD budget expenditures, those responsible for the development and implementation of state programs (and subprograms) send justification for changes in the structure of next year's expenditures to the DF in agreement with the MDDMP. If necessary, during this phase they also provide suggestions for changes to the list of names and quantity of budget programs.

Proposals of the prior indicators of draft budget for the next year and for the forecast of expenditures for the following years in terms of spending MoD are approved by the Minister of Defense and are submitted to the MF. (MF determines the terms and form of presentation annually.)

### **2. Objectives and Outcomes of Phase II**

During the second phase, the MoD budget request is formed (on the basis of the Tentative PMD) and is sent to the MF.

After the MF approves the limits of the State Budget general fund for the next year, the MoD Budget Committee examines the distribution of these costs across budget programs (including their related subprograms). Those responsible for the development and implementation of state programs defend these indicators before the budget committee. As a result of the budget committee hearing proposals to clarify the distribution of threshold expenditures across budget programs for general and special funds of the MoD budget request and of additional budget requests (over the limits) are prepared. These proposals can be submitted for consideration and approval by the Minister of Defense.

Based on the approved distribution thresholds spending, those responsible for the development and implementation of the state programs work on proposals for the MoD budget request and provide them to the DF. The DF summarizes received proposals,

prepares an MoD budget request, and submits it to the Minister of Defense to be signed and sent to the MF within a stipulated period.

### **3. Objectives and Outcomes of Phase III**

During the third phase (August–November) the state budget law is supported. This phase coincides in full (including all content and activities) with the third stage of the short-term defense planning, as outlined in earlier in this chapter.

### **4. Objectives and Outcomes of Phase IV**

During the fourth phase the consolidated budget and passports of budget programs of the MoD are approved. These documents, as described in the previous section, are based on the PMD draft. However, the approved combined MoD estimate is a basis for the final adjustment of the PMD.

After the CMU approves the draft budget for the next year, DF, in cooperation with those responsible for the development and implementation of budget programs (including their related subprograms), start drafting the budgets of lower level administrators. They allocate expenditures and send (in October) their estimates to these managers for compiling; they consider spending performance estimates of lower level units and send proposals for the MoD consolidated budget draft (in November).

Based on MF approval of the limits on budgetary allocations, the DF refines and submits the combined estimate of the MoD and the proposals to the annual and monthly allocations of the Ukrainian State Budget for approval by the Minister of Defense.

In the two weeks after the publication of the Ukrainian State Budget Law, the DF, in the prescribed manner, submits the refined Defense proposals to the basic indicators of the state defense order to the Ministry of Economy of Ukraine.

One month from the date the state budget law is signed, on the basis of the approved consolidated MoD budget, the passports of budget programs are approved by the joint order of the Minister of Defense and the Minister of Finance.

The combined MoD estimate, as well as extracts from the annual and monthly schedules of appropriations of the State Budget of Ukraine, are approved by the Minister of Defense and then sent by the DF to the GS in its entirety. Relevant parts of the combined MoD estimate are also distributed to those responsible for the formation and implementation of budget programs.

Thus, during the budget planning at the MoD, defense planning documents are widely used at all stages. This transparency allows those responsible for the formation and implementation of budget programs to better determine what the spending needs of the Armed Forces are, to allocate financial resources more efficiently, and to carry out directions for use, and so on.

Although there are many benefits to planning the MoD budget request, practical experience has shown that there are certain problems in the mechanisms of the short-term defense planning process:

- Annual projected defense spending figures were significantly lower than envisioned in the Strategic Defense Bulletin and the State Programme of the Development of the Armed Forces of Ukraine for 2006–2011;<sup>43</sup>
- No mechanism exists for separating expenditure needs indicators of the Armed Forces from the total expenditure on defense. Analysis of predictive indicators for spending on defense shows the trend of its annual reduction, while GDP grows every year;
- The limit of MoD expenditures for the fiscal year is identified by the MF at the beginning of the budget process and is usually equal to the current year expenditures multiplied by the inflation index. Sometimes these expenditures do not include even the minimum requirements of the Armed Forces;
- Due to the fact that the expenditures limit for the needs of the Armed Forces is not known before the fiscal year, the GS is forced to develop the PMD draft several times.

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<sup>43</sup> President of Ukraine, Decree of December 22, 2004, № 670/2004, *On the Decision of the National Security and Defense Council of Ukraine of 17.06.2004 “On the Strategic Defense Bulletin of Ukraine for 2015,”* <http://zakon4.rada.gov.ua/laws/show/670/2004>.



### **C. CHANGES NEEDED IN THE DEFENSE PLANNING SYSTEM AND BUDGETING**

The analysis of the organization and implementation of the short-term defense planning in the MoD and the Armed Forces showed that during the period of 2005 to 2011 a substantial improvement took place. It was demonstrated from the development to the practical implementation of the legal framework in the process of defense planning. However, there are unresolved problems in the defense and budget planning process at almost every phase. These problems do not allow us to qualitatively determine the need for funds and to ensure their effective use. In particular, at this time there is an urgent need to increase the effectiveness, efficiency, and transparency of the planning system. The implementation of the target-oriented method of defense planning shifts the focus from the management of budget resources to the management of processes to achieve specified goals or at least to meet specified performance indicators.

The conceptual apparatus defined in the legal framework has the same requirements. Thus, the Budget Code of Ukraine stipulates the following terms:

- a budget program is a set of measures aimed at achieving the common goal, objectives and expected results; each spending unit is responsible for defining and implementing those goals and objectives according to their functions;
- a passport of the budget program is a document that defines the purpose, objectives, areas of budget funds responsible for planning, performance indicators, and other characteristics of the budget program, according to the budget appropriation established by the State Budget of Ukraine;
- budget management is a set of actions of the budget process participants in accordance with its powers relating to the formation and use of budgetary funds; it enforces budget legislation aimed at achieving the goals, objectives, and concrete results of their activities and ensures efficient, effective, and targeted use of budgetary funds.<sup>44</sup>

As we can see, the law stipulates that all measures of the budget process should be aimed at defining and “achieving goals, objectives, and concrete results.” The same definitions regarding budget management are given in the Law of Ukraine “On Defense Planning:”

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<sup>44</sup> Verkhovna Rada of Ukraine, *Budget Code of Ukraine of July 8, 2010, № 2456-VI*, <http://zakon2.rada.gov.ua/laws/show/2456-17/print1366176374220905>.

Defense planning is an integral part of the strategic planning and management of state resources in the field of defense, which is carried out in the statutory deadlines in order to ensure the required level of defense capabilities through grounding prospects of the Armed Forces and other military formations with regard to the nature of real and potential threats in the sphere of military and economic capabilities of the state, with specific activities, agents, and deadlines.<sup>45</sup>

The Budget Code of Ukraine in this case is a legislative act of general application. The use of the terminology of the Law “On Defense Planning” is consistent with the provisions of the Budget Code of Ukraine; moreover, it specifies regulation concerning the Budget Code. As a general rule, then, it should apply the provisions of the Law. In addition, the Constitution of Ukraine defines the Armed Forces tasks as the “[d]efense of Ukraine, protection of its sovereignty, territorial integrity, and inviolability.”<sup>46</sup>

Thus, the main objective of the Armed Forces can be considered to be the ability to perform tasks defined by the Constitution of Ukraine. This goal is extensive and comprehensive. Therefore, to ensure a smooth planning process it is necessary to define intermediate objectives through the achievement of which the main goal can be achieved. To achieve these goals, we must identify specific tasks and activities. Thus, we have employ a three-fold approach to achieve the main goal: (1) identify the goal, (2) specify the intermediate objectives, and (3) determine the tasks and activities required to achieve these objectives. According to the defense planning process, the effectiveness of these measures is impacted by the timing of their implementation.

At this time, the defense and budget planning in the MoD and Armed Forces is carried out only at the third level, which includes the measures to be carried out by those responsible for the development strategy and budget programs. (There are detailed criteria of these measures in the PMD and grouped indexes in the passports of the budget programs.)

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<sup>45</sup> Verkhovna Rada of Ukraine, the Law of November 18, 2004, № 2198-IV, *On Defense Planning*, <http://zakon4.rada.gov.ua/laws/show/2198-15>.

<sup>46</sup> Verkhovna Rada of Ukraine, *Constitution Act of June 28, 1996*, № 254k/96-VR, <http://zakon2.rada.gov.ua/laws/show/254%D0%BA/96-%D0%B2%D1%80>.

The goals in the documents on defense and budget planning are not clearly defined. If we define a goal as a task in defense planning documents (as stated in the order of the Minister of Defense) and budget planning (as described in the passport of the MoD budget program), the goals are only described declaratively (“as a provision...,” “carrying out...,” “restoration...,” etc.), without defining specific indicators.

The quantitative and cost indicators of the PMD and performance indicators of MoD budget programs also cannot be called objective, since such factors may be considered only measures to achieve goals. According to the results of their implementation, it will be impossible to determine to what extent the Armed Forces increased/decreased its ability to carry out constitutional tasks. These indicators would provide a way to measure its effectiveness in case of the full provision of the Armed Forces’ needs.

In addition, existing documents do not currently define the timing of planned activities. In other words, these activities are deemed to be performed within a year. This lack of specificity makes monitoring the timeliness of the planned activities, assessing the use of budget funds, and adjusting the performance of individual commanders on these issues impossible.

Also, despite the fact that initial planning is done based on well-known practices (that is, the activities are the primary source in determining the expenditure items), the MoD budget request is formed based on the Tentative PMD. The draft of the consolidated MoD budget is formed on the basis of the PMD draft. The completion of the process, however, is the opposite: approved expenditure items determine the ability to perform activities. Practice has shown that during the final adjustment of the PMD draft certain measures have been changed or canceled at the last moment due to the discrepancy of the expenditure items and the content of these measures.

There are drawbacks in the stage of implementation of programs and plans in the MoD and the armed forces. In addition to objective factors, the quality of planning is adversely affected by a number of subjective factors:

- inconsistency of management decisions with regard to the planning documents;

- dispersion of efforts of military management on current problems with disregard for the impact of those decisions on the future;
- attempts to preserve the old system of resource allocations;
- tendency to identify planning activities without defining specific outcomes, etc.

All this leads to the dispersion of limited budget funds to the activities that are not covered by the plans and are contrary to the fundamental principle of defense planning, which determines the specific priorities of the Armed Forces according to specific needs.

At the implementation stage of short-term planning significant efforts are primarily focused on the execution of the budget. Thus, bodies of military management at all levels are dealing with the control of the financial flow mechanism and forgetting that the main goal is achieving specific outcomes. The military budget documents (including passports of budget programs, estimates, monthly apportionment plans, monthly distributions of allocations, etc.) are formed solely on the basis of budget categories and do not provide accessibility and transparency in the allocation of resources. This situation does not allow the respective heads of military management bodies to respond to the failure of short-term plans and to influence this process.

Along with other factors during budget execution, it leads to problems associated with unsustainable use of resources. On the one hand, all possible resources are sought to solve ongoing problems; on the other hand, the funds are not used in time because of delays in agreements, bureaucratic obstacles, and problems with tender procedures. While the presence of unused funds is considered only a financial bodies problem, the reason for that is often a late execution of work or services, the implementation of which should be controlled by those commanders.

Lack of transparency of financial resource allocation and a permanent requirement to use the resources immediately encourages officials to use them inefficiently. In addition, some executives underestimate the importance of the PMD and try to implement measures that are not scheduled, which further erodes the whole system of defense planning and does not allow for the achievement of specified performance plans of the armed forces.

Some problems exist at the reporting stage. A system of ongoing monitoring (such as measurement of effectiveness) of budget programs performance, as well as defense programs must be established. This system will allow management to make appropriate decisions promptly.

Currently, taking into consideration the reporting of the budgetary programs, it is possible to perform the cash flow analysis, as well as to examine the dynamics and structure of MoD expenditures. PMD performance reporting only allows us to see the trends and to do a superficial analysis of program implementation and usage of resources. However, at this time it is difficult to determine the effectiveness of measures and usage of resources from defense and budget reporting, since, as noted earlier, the terms of their implementation and their ultimate goals are not clearly defined at the beginning of the planning process.

All these aspects confirm that the planning process requires improvement. The defense planning system should be united by a common concept to achieve defined goals in accordance with certain financial resources.

#### **D. CONCLUSION**

One of the main tasks of defense planning is rational distribution and efficient use of scarce public resources for the Armed Forces' needs. The system of short-term defense planning established in the Armed Forces of Ukraine is performed cyclically, and it is consistent with the national budget process. Defense planning documents have been widely used at all stages of budget planning in the MoD, which allows for the determination of the military's expenditure needs more reasonably and to make the process of financial resources allocation more efficient.

However, at this time there are unresolved problems at almost all stages of the short-term defense planning process. The quality of the planning process and efficiency of budget funds usage need to be improved. Modern approaches suggest shifting focus from budget resource management to controlling the process of achieving a goal, i.e., specific performance objectives. These approaches should be implemented in the Armed Forces of Ukraine along with clearly defined goals and an action plan to achieve them.

The main points of improving the expenditure planning process should be: (1) the use of budget management, including balancing expenditures according to available financial resources and the challenges posed to the Armed Forces of Ukraine; (2) developing mechanisms of long-term strategic planning and taking into account indicators of strategic planning in the intermediate and short term; (3) combining the defense and budget planning in the MoD by integrating the defense and budget programs and synchronizing processes.

### **III. STATE-LEVEL PLANNING AND THE PROFESSIONAL SOLDIER: IMPERATIVE OF OUR TIME**

As mentioned in the previous chapter, the short-term defense planning was generally well organized in the Armed Forces of Ukraine. The approaches to the planning process that are used in the Ukraine in general take into account the experience of the leading countries in the defense planning organization and mechanisms of its implementation. However, development of basic military and political documents is part of strategic and long-term defense planning.

In this chapter I will discuss the key documents that affected, or could affect, both the funding of the armed forces and their development. I am also going to justify the need for further professionalization of personnel as the most rational option from the points of view of resource allocation and monitoring of the entire military organization.

#### **A. LONG-TERM PLANNING: DOCUMENTS AND APPROACHES**

The main documents of long-term planning are the *Strategic Defense Bulletins (SDB) of Ukraine 2004 and 2012*.<sup>47-48</sup> According to Ukrainian legislation, “financing of the Armed Forces of Ukraine is carried out by State Budget of Ukraine.”<sup>49</sup> The financial indicators of the first SDB formed the basis of the State Programme for the Development of the Armed Forces of Ukraine during the period of 2006–2011. On the basis of the decree approved by the president last year, a program is currently being developed that will continue until 2017.

It should be noted that the first projected indicators of defense expenditures for 2015 from the general fund of the state budget were made during defense planning and

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<sup>47</sup> President of Ukraine, Decree of June 22, 2004, № 670/2004, *On the Decision of the National Security and Defense Council of Ukraine on June 17, 2004 “On the Strategic Defense Bulletin of Ukraine for 2015,”* <http://zakon4.rada.gov.ua/laws/show/670/2004>.

<sup>48</sup> President of Ukraine, Decree of December 29, .2012, № 771/2012, *On the decision of the National Security and Defense Council of Ukraine of 29 December 2012 “On the Strategic Defense Bulletin of Ukraine,”* <http://zakon4.rada.gov.ua/laws/show/771/2012>

<sup>49</sup> Verkhovna Rada of Ukraine, the Law of December 6, 1991, № 1932-XII, *On Defense of Ukraine*, article 2, <http://zakon4.rada.gov.ua/laws/show/1932-12>.

were accepted by the Government of Ukraine in February 2004. The financing of the MoD is expected to be on average at 2% of the GDP and defense needs identified at the level of 2.09% of the GDP. These indicators of expenditures were taken as a basis for the development of the Strategic Defense Bulletin of Ukraine for 2015, which is a conceptual long-term policy document on the reform and development of the Armed Forces of Ukraine. Due to an understated inflation rate over the planning of defense spending (from 6.2 to 9.7 %, while in reality it was 13% and higher) we faced chronic underfunding of the MoD.<sup>50</sup> As a result, prices have increased 2.5 times, but according to unofficial expert estimates, that figure was much higher. Moreover, with the change of government in 2007, indicators of expenditures were reversed and funding of the MoD was shifted to the “manual” mode.

The previous program failed primarily because of underfunding. The president tried to remedy the situation by issuing the decrees of 2008 and 2009, but the documents did not find support from the CMU.<sup>51-52</sup> One of the consequences of this policy was the fall of the financing needs of defense under 1 % of the GDP (in 2009–2011), while at the time of the SDR adoption the Article 2 of the National defense law included the norm that defense spending must be at least 3% of the GDP. Later, in 2007 the law of Ukraine, “On State Budget of Ukraine for 2008” removed the norm “3% of GDP” for defense spending.<sup>53</sup> However, despite the fact that the constitutional court declared the amendment unconstitutional, it has not returned to the applicable law.<sup>54</sup>

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<sup>50</sup> State Statistics Service of Ukraine, *Consumer Prices for Goods and Services in 2002–2012*, [http://www.ukrstat.gov.ua/operativ/operativ2008/ct/cn\\_rik/icsR/iscR\\_u/isc\\_tp\\_rik\\_u.htm](http://www.ukrstat.gov.ua/operativ/operativ2008/ct/cn_rik/icsR/iscR_u/isc_tp_rik_u.htm).

<sup>51</sup> President of Ukraine, Decree of January 10, 2009, № of 2/2009, *On the Decision of the National Security and Defense Council of Ukraine of 26 September 2008 “On Urgent Measures to Raise the Defense of Ukraine,”* <http://zakon4.rada.gov.ua/laws/show/2/2009>.

<sup>52</sup> President of Ukraine, Decree of March 3, 2008, № 196/2008 *On Immediate Measures to Ensure the Development of the Armed Forces of Ukraine,* <http://zakon4.rada.gov.ua/laws/show/196/2008>.

<sup>53</sup> Verkhovna Rada of Ukraine, The Law of Ukraine, *On State Budget of Ukraine for 2008 and Amendments to Certain Legislative Acts of Ukraine*, article 74, <http://zakon4.rada.gov.ua/laws/show/107-17/print1364237936225598>.

<sup>54</sup> Constitutional Court, Decision of May 22, 2008, № 10-rp/2008, “The decision of the Constitutional Court of Ukraine in the case of the constitutional petition the Supreme Court of Ukraine on...,” <http://zakon4.rada.gov.ua/laws/show/v010p710-08>



Moreover, even the money that was allocated for the defense budget did not reach the MoD because of the division of this amount for the general and special fund. During the execution of the State Programme for the Development of the Armed Forces of Ukraine during the period of 2006–2011, the share of the special fund that the MoD did not get ranged between 30–60%. In addition, in 2006, Article 88 of the law “On the State Budget of Ukraine for 2006” applied a mechanism that was allowed to restrict funding even for a general fund.<sup>55</sup> Financing practices of the armed forces from any other funds different than a general fund lead to the fact that the MoD will not be funded in full, even though funding is included in the state budget.

The approaches to financing mentioned above are important because in the recent past Ukraine has completed the development of the Concept of Reform and Development of the Armed Forces of Ukraine for the period up to 2017.<sup>56</sup> Currently, an intermediate-term program is being developed by the MoD on the basis of the concept. Financial resources for its implementation are determined by the decree of CMU.<sup>57</sup>

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<sup>55</sup> Verkhovna Rada of Ukraine, the Law of December 20, 2005, № 3235-IV *On the State Budget of Ukraine for 2006*, article 88, <http://zakon4.rada.gov.ua/laws/show/3235-15/print1364237936225598>.

<sup>56</sup> President of Ukraine, Decree of December 29, 2012, № 772/2012, *On Decision of the National Security and Defense Council of Ukraine of 29 December 2012 “On the Concept of Reform and Development of the Armed Forces of Ukraine for the period till 2017,”* <http://zakon4.rada.gov.ua/laws/show/772/2012>.

<sup>57</sup> Cabinet of Ministers of Ukraine, Decree of July 7, 2010, № 568, *On Approval of Forecast Expenditures Figures from the General Fund Budget for Defense until 2023*, <http://zakon4.rada.gov.ua/laws/show/568-2010-%D0%BF>.

Year	The amount of expenditures, million UAH	
	Total	Includes the needs of the defense
2011	11239	10475.8
2012	13299.5	12396.4
2013	15360	14317
2014	17358	16179.4
2015	19418.5	18100
2016	21416.5	19962.4
2017	23477	21883
2018	25475	23745.4
2019	27535.5	25666
2020	29533.5	27528.4
2021	31594	29449
2022	33592	31311.4
2023	35652.5	33232

Table 3. Prognostic Indicators of Expenditures from the General Fund Budget for Defense Until 2023.

Unfortunately, the term “% of GDP” is excluded from this decree entirely, making it difficult to trace the development of the national economy and the level of financing of one of its most important institutions. On the other hand, the level of funding claimed in the decree even at first glance does not meet those ambitious goals that have been stated in the *Strategic Defense Bulletin of Ukraine*. Thus, the results of a defense review without adequate financial support are more declarative than economically justified or legally binding. It is even more important that any changes made to the previous medium-term program on financial indicators of the MoD failed.

It should also be noted that from the beginning of the defense review in July 2008 to its completion in December 2012, it took almost 3.5 years, and the financial indicators for its implementation were approved in July 2010.<sup>58</sup> Such long-term planning shows the complexity rather than quality of setting priorities. During the same period Ukraine

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<sup>58</sup> President of Ukraine, Decree of June 27, 2008, № 598/2008, *On the Decision of the National Security and Defense Council of Ukraine of 30 May 2008 “On a defense review,”* <http://zakon4.rada.gov.ua/laws/show/598/2008>.

refused to join NATO, declaring non-aligned status, which, however, did not lead to increased funding.

Reform is not a set of organizational and staff measures to reduce the armed forces but the construction of a new system of relations in different directions: between the army and society and between the army and the state economy. It is also about development of relations within the army. The logic is hard to find. According to the SDR, the full switch to the contract service is planned to happen by 2025. According to the president it will be by 2017, while according to the minister of defense “military service drafting will end in 2013, and at the same time the transition to manning of the army exclusively under contract will start.”<sup>59</sup> “The transition to a contract will happen during this and next years, after which Ukraine will have a professional, adequately staffed army.”<sup>60</sup> It is not only a different time frame (under the state program the transition would take until 2015) but also a different dimension and understanding of the depth of the professionalization process.<sup>61</sup> In this case, given the amount of funding defense needs for the period up to 2023, there was an urgent need to review the date of completion of the transition of the Armed Forces of Ukraine to a professional army. As a result, the MoD thought it was reasonable to conclude the transition to all-voluntary service by 2025, to be carried out in three phases: 2011–2015 (80% of the manning level), 2016–2020 (90% of the manning level), and 2021–2025 (100% of the manning level).<sup>62</sup>

The *2012 Strategic Defense Bulletin* claims it is systematic and serves as a basis for the preparation of policy documents (reform and development programs). The main provisions of the bulletin are the strategy of transforming the military organization of the

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<sup>59</sup> Interfax, “Yanukovych: Ukraine Soon to Have Professional Army,” February 15, 2013, <http://www.interfax.co.uk/ukraine-news/yanukovych-ukraine-soon-to-have-professional-army/>.

<sup>60</sup> Bondarchuk Mykola, “Minister of Defence: ‘We do not want to fight anyone, but we will stand up for ourselves if need be,’” *UNIAN*, February 11, 2013, <http://www.unian.ua/news/552627-ministr-oboroni-mi-ne-zbiraemosya-ni-z-kim-voyuvati-ale-skrivditi-sebe-ne-damo.html>.

<sup>61</sup> President of Ukraine, Decree of April 17, 2002, № 348/2002, *On the State Programme of Armed Forces of Ukraine Transition to Manning, Performing Military Service Under the Contract*, <http://zakon2.rada.gov.ua/laws/show/348/2002>.

<sup>62</sup> Ministry of Defense of Ukraine, *The Main Provisions of the Military Reform in Ukraine*, <http://www.mil.gov.ua/index.php?part=reforms&lang=ru&sub=oprvu>

state, the rational allocation of tasks of defense, a prospective structure, development priorities, and the initial data for the medium-term planning. However, the CMU has failed to demonstrate an overall view of the security sector reform by not answering these questions: (1) what are the goals of the reform? (2) what is the future of the security sector and each of its components? (3) what are the relationships between various programs? Worth mentioning is the institutional dimension of this issue. For example, disaster management by the armed forces was not mentioned in the SDB at all while the State Emergency Service of Ukraine became a part of the MoD just two weeks after the SDB was published.<sup>63</sup>

Another example of this is in 2012 the new Highly Mobile Assault Troops were created based on airborne and airmobile units.<sup>64</sup> At the same time we cannot find any references about it in the SDB in that year. Finally, the long-term plans involve improvement of the troops' (forces') organizational structure, reorganization of establishments, and optimizations of its strength. This means the automation of processes management, which in fact cannot take into account the specifics yet. Thus, millions of UAH will be used ineffectively; this is not an isolated case. This proves that the priorities of development must be chosen more thoroughly.

Meanwhile, the transformation of military structures of governance to further strengthen civilian control over the armed forces, the withdrawal of their non-core functions of policy formulation and implementation outsourcing are seen as a secondary or long-term tasks. So, we should find a way to create an effective system to protect national interests and use it to build an efficient and adequate model of the Ukrainian security sector and its components. The key momentum here has to be further professionalization of the armed forces.

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<sup>63</sup> President of Ukraine, Decree of January 16, 2013, № 20/2013, *Some Aspects of the State Emergencies Service of Ukraine*, <http://zakon4.rada.gov.ua/laws/show/20/2013>.

<sup>64</sup> Ministry of Defense of Ukraine, "The Armed Forces of Ukraine" (White Paper, 2012), 17, [http://www.mil.gov.ua/files/white\\_book/WB\\_2012\\_ua.pdf](http://www.mil.gov.ua/files/white_book/WB_2012_ua.pdf).

## **B. THE PROFESSIONAL SOLDIER**

The last few decades have been characterized by the fall of authoritarian regimes and the formation of democratic institutions in many countries of the world. Samuel Huntington describes this process as the third wave of democratization that swept a large group of countries. He said that “democracy is the only legitimate and viable alternative to an authoritarian regime of any kind.”<sup>65</sup> Naturally, changes have occurred in the army as well because it is a mandatory institution of the state.

There is no unity among political scientists on the definition of the term “democratization” or “professionalism.” However, practice is the criterion of truth, and the best way to understand theoretical postulates. Ukraine gained its independence in 1991. As part of the Soviet Union we had forced conscription, while in independent Ukraine we have had more democracy and are moving toward professionalization of various law enforcement agencies, security forces, and armed forces.

Eliot Cohen said the United States failed to establish a reliable system of military service. He reviewed numerous approaches including selective service, an all-volunteer force, lottery draft, universal military service and universal military training.<sup>66</sup> Below are the achievements and contemporary problems in Ukraine, and an analysis of different approaches to the issue of such prominent theorists like Huntington and Morris Janowitz in more depth.

### **1. Ukrainian Vision of a Professional Soldier**

In the Soviet Union it was an honor to serve in the conscription army. At the same time, the threat of a military coup was neutralized by a number of measures. There were periodic executions of army commanders, especially in the period between the First and Second World War; a strong institution of commissars, which was a shadow of the commanders; and powerful and pervasive ideological work. Independence provided an

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<sup>65</sup> Samuel Huntington, *The Third Wave: Democratization in the Late Twentieth Century* (Norman: University of Oklahoma Press, 1993).

<sup>66</sup> Eliot A. Cohen, *Citizens and Soldiers: The Dilemmas of Military Service* (Ithaca: Cornell University Press, 1985), 117–133, 166–189.

opportunity for a new look but more importantly, allowed us to put the forms and methods suitable for the beginning of the twenty-first century into practice. Due to a number of objective and subjective reasons, the speed of the transition was different, and so was the result.

Ukrainian border guards are national successors of the Soviet Border Troops. The personnel of the State Border Service of Ukraine consist of military personnel and employees of the State Border Service of Ukraine. It is the most proactive agency in comparison with other defense and law enforcement structures, and it evolved from a military structure to a law enforcement (police-type) body. The Border Troops of Ukraine have completely switched to a contract service.

Such steps towards professionalization and, even more, demilitarization are being taken by the Security Service of Ukraine. “SBU considers that it is normal practice when the state body functions within the civil structure. We are also ready to consider a prospect of transition to the civil structure,” the deputy head of the Security Service of the Ukraine Porodko said.<sup>67</sup> At the same time, he stressed that it will not occur fast but will be gradual due to the dismissal of a large number of people from the military service and a significant fiscal burden associated with it.

It is likely that the issue of funding was crucial in the case of armed forces, too. First of all, this is determined by the number of personnel, and, therefore, money allowances for its maintenance, as well as by reasons of political expediency. The first full-fledged attempt to go to professional armed forces was made after the defense review in 2004.<sup>68</sup> This program has not been implemented, although it was subsequently stated at all levels that there is no alternative to professionalization. Another attempt was made this year, and the minister of defense proclaimed 2013 as the last year in which young

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<sup>67</sup> “SBU Fast Demilitarization Is Impossible,” *ForUm News*, April 24, 2013, <http://en.for-ua.com/news/2013/04/24/142522.html>.

<sup>68</sup> President of Ukraine, Decree of June 22, 2004, № 670/2004, *The Decision of the National Security and Defense Council of Ukraine on June 17, 2004 “On the Strategic Defense Bulletin of Ukraine for 2015,”* <http://zakon4.rada.gov.ua/laws/show/670/2004>.

people would be called for service.<sup>69</sup> Starting next year, the armed forces will be formed only on a contract basis. “Ukraine needs [an] efficient army, despite the fact that there are no contentious issues with the neighboring states,” said Deputy Defense Minister Oliynyk, in a press-conference.<sup>70</sup> On the other hand, Rahmanin proves that under the circumstances a military coup in the Ukraine is impossible.<sup>71</sup> So, what do the classics tell us? What do they think is the criterion of professionalism and what are their views on the control of the military organization?

## 2. What is a Professional?

Huntington and Janowitz both create connections between the civil and military worlds based on professional affiliation; however, their approaches differ significantly. Despite the fact that Huntington was not quite satisfied later with his first work in 1957, his opponents cited this paper as a classic work on the relationship between military and civilian institutions. Before delving into the details, it makes sense to briefly touch on the term “professionalism.”

In Ukrainian interpretation a “professional” is a person who is well educated, whose relationship with an organization is defined by a contract, and who brings his experience and knowledge to the position. Perhaps in this lies the duration of the transition process to the all-voluntary and professional force. The reason for that is not only underfunding (which of course makes it difficult to implement defense programs), but also the lack of understanding of the essence of professionalism. At the same time, according to Max Weber, to be a professional means a “vocation” or dedication of life wholly and exclusively to politics. He wrote, “He who strives to make politics a

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<sup>69</sup> “Last Military Conscription to be Held This Fall, Defense Ministry Says,” *ForUm News*, March 4, 2013, <http://en.for-ua.com/news/2013/03/04/164805.html> .

<sup>70</sup> “Defense Ministry Tells Why Ukraine Needs Efficient Army,” *ForUm News*, March 4, 2013, <http://en.for-ua.com/news/2013/03/04/170034.html>.

<sup>71</sup> Sergey Rakhmanin, “Спаситель на белом танке (The Savior on a White Tank),” *Gazeta*, March 1, 2013, <http://gazeta.zn.ua/internal/spasitel-na-belom-tanke-.html?page=6&items=52>.

permanent source of income lives ‘off’ politics as a vocation, whereas he who does not do this lives ‘for’ politics.”<sup>72</sup>

By pursuing quantity of contract servicemen, we are missing the qualitative aspect of their training. As a result, we are seeing a large turnover when only a few of them sign a second contract. In this case, the old Soviet system, with an officer being career military makes more sense in the Weberian understanding of the word “professional” than the one that exists now in Ukraine. What is obvious to Western analysts is not fully comprehended in my country yet. In other words, it is impossible to form a professional military corps by parliamentary bill or presidential decree.

### **3. Even More Control is Required of Professionals**

Based on an appropriate understanding of the “professionalism,” Huntington proposed a system making it possible to establish a balance between the competence of the military and political supremacy of civilians. He defined this system as the concept of “objective control.”<sup>73</sup> Huntington recommended that civilian leaders provide considerable autonomy to professional military in the tactical and operational area in exchange for their full and unconditional subordination to civilian control in matters of policy and strategy of nation building. Although this system is not always confirmed by practice, the American idea on how civil authorities have to oversee the military was being formed for more than fifty years. If it is not infringed, it leads to the overall balance of relations between civilians and the military, and as a result to reasonable policy decisions.

Objective control can be considered as a reliable tool against the politicization of the armed forces. Professional soldiers are moving up the hierarchical ladder due to the improvement of their professional skills. Because of this, they want to maximize the isolation of professional activities from outside influences, especially from politics. In the

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<sup>72</sup> Max Weber, “Politics as a Vocation,” in *From Max Weber: Essays in Sociology*, ed. Gerth and Mills (Oxford: Oxford University Press, 1946), 77–83.

<sup>73</sup> Samuel Huntington, *The Soldier and the State: The Theory and Politics of Civil-Military Relations* (Cambridge, Massachusetts: Belknap/Harvard, 1957), 83.



case of army politicization, instead of focusing on the improvement of military skills it will drown in the political debate.

According to Huntington, military intervention into politics is the antithesis of the objective control: civilian control is reduced to the extent that it increases the participation of the army in the institutional, class, and constitutional politics. The subjective control, by contrast, involves intervention. The essence of objective civilian control presupposes recognition of the autonomy of military professionalism. The essence of subjective civilian control is to deny the independence of the military sphere. Subjective civilian control achieves its objectives by imposing civic values to a military, turning the army into a reflection of the state. Objective civilian control achieves its objectives through the militarization of the army, turning it into an instrument of the state.<sup>74</sup> Objective civilian control is achieved by reducing the influence of the army in society. The army becomes neutral to all participants in the political struggle.

However, objective control provides for recognition in the military sphere entirely left for military professionals (e.g., combat training, mastering the skills to use different types of weapons, etc.). Thus, the political activities of civil society groups in the armed forces are minimized and they take control, while the definition of the size of the armed forces, the level of funding, including the taking of risks on the definition of external threats are taken on by the politicians. Provided there is objective control over the armed forces, Huntington brings a civilian element of control to the border, which does not allow the military to determine the order of their use in the framework of the constitutional purpose.

Yet, the question of who is fully responsible for financing the armed forces remains. Is it those politicians in the Ministry of Finance who are focused on money or the National Security Council? Politicians who are focused on money, or the ones who are attentive to security issues? In my opinion, it should be the last one because, according to Tilly, "...war-making depends on three closely-related factors: the character of its major rivals, the external threat interests of its domain classes, and the logic of the

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<sup>74</sup> Ibid., 80–83.

protective activity...”<sup>75</sup> In *the Informal Agency Theory*, Feaver said, “the civilian principal contracts with the military agent to develop the ability to use force in defense of the civilian’s interests” and “only the principal knows exactly how he judges various risks and how these judgments translate into preferences over outcomes.”<sup>76</sup> Definitely, money is important, but understanding the challenges and threats, and taking an integrated approach and systematic evaluation is inherent only in National Security Council, whose decisions must be binding on the Ministry of Finance.

#### 4. Scholars’ Discussion on Army Professionalization Issue

Nevertheless, the military must do their job well, and that means to possess the “distinguishing characteristics of a profession as a special type of vocation:” expertise, responsibility, and corporatism.<sup>77</sup> Huntington not only raised the issues of military coups in principle, but he pointed out the solutions, offering an appropriate theoretical apparatus. Almost everyone, including his students, would criticize him later, but Huntington gave a reference point and suggested a method. He said, “Method should be used to solve real world problems, not just serve as instruments for cloistered debates in academia.”<sup>78</sup> It is even more important in post-nuclear age.

Talking about professionalism, Cohen analyzes and provides historical examples of a wide range of possibilities, including professional force, a cadre/conscript system, and a militia arrangement. He proposes a combination, involving relatively small but high-quality professional army for local wars with support of mass army if needed. He argues that the resultant force would be the best compromise between a military necessity and a political outlook. So, one of his possible solutions at that period of time was: “First,

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<sup>75</sup> Charles Tilly, *Coercion, Capital, and European States, AD 990–1992* (Cambridge, Massachusetts: Wiley-Blackwell, 1990), 67–95.

<sup>76</sup> Peter D. Feaver, *Armed Servants: Agency, Oversight, and Civil-Military Relations* (Cambridge, Massachusetts: Harvard University Press, 2003), 57, 69.

<sup>77</sup> Samuel Huntington, *The Soldier and the State*, 8.

<sup>78</sup> Peter D. Feaver and Erika Seeler, “Before and After Huntington: The Methodological Maturing of Civil-Military Studies,” in *American Civil-Military Relations: The Soldier and the State in a New Era*, ed. Suzanne C. Nielsen and Don M. Snider (Baltimore, Maryland: Johns Hopkins University Press, 2009), 90.

service should be brief and limited; second, forces should be ready for both total and small wars (assumed volunteers); third, the system must not be excessively costly.”<sup>79</sup>

Yet much is changing currently. When the fighting becomes more technologically complex, military operations are transferred to the computer networks, and as a result, require a high level of training of the personnel. In practice, it is difficult to prepare such a specialist in a matter of a few months and it is even more costly and not wise at all to send this individual to the reserve soon. An all-volunteer and professional force is the call of the times and the objective reality. For example, compare the time it took to catch Osama bin Laden and the time it took to catch Boston terrorists Tsarnaevs by Special Forces. New complex technology, social networks, news media, and people who can manage all these resources resulted in having the job done in a matter of days.

Discussion about professionalism will not be complete if we do not study the sociological approach by Janowitz. Using interdisciplinary methodology, Janowitz (as well as Huntington) foresaw the future of the armed forces in the hereinafter professionalism but used an opposite approach. Whereas Huntington prescribed a division of labor that would respect both military professionalism and objective civilian control, Janowitz rejected objective control. He advocated a theory, which encouraged active interconnectedness between civil society and the military in order to foster civic participation. It narrows the gap between the civilian and military spheres, makes the structure of the armed forces more bureaucratic and requires deep specialization.<sup>80</sup> At the same time, there is no institutional autonomy (Huntington), but there is pervasive integration (Janowitz).

For example, the outsourcing of military supplies, catering, and the convergence of military and civilian education systems (similar to the ROTC), is now implemented in Ukraine, but these processes are not of a systemic nature. If there is government funding, then purchased services are meant for the protection of bases and depots; the military is not fully satisfied with the civilian logistics of food services; the leadership over military

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<sup>79</sup> Eliot A. Cohen, *Citizens and Soldiers: The Dilemmas of Military Service* (Ithaca: Cornell University Press, 1985), 18.

<sup>80</sup> Morris Janowitz, *The Professional Soldier* (New York: Free Press, 1971), 417–442.

education passed from Army, Navy and Air Force to the MoD and back many times, and the system of education 4+1 (4 years as a student + 1 year as a cadet) is still questionable.

### C. CONCLUSION

As opposed to short-term planning, long-term planning requires more attention, even though a number of concepts and programs have been adopted recently. It is necessary to develop a clear structure of the contemporary security and defense sector, to define the role and place of the armed forces in it, and to identify the national procedures of the defense and budget planning and their relationship to the economy of the state. Unfortunately, the SDR has not answered any of these questions.

The procedure and method of forming forecasting indicators of expenditures on defense are situational in nature. Revision and modernization of resourcing and legislative and regulatory support of the planned reforms will require a balanced approach and political will not only from the Ministry of Defense of Ukraine, but also from the Cabinet of Ministers of Ukraine, the Verkhovna Rada of Ukraine, and the President. Professionalization should be state business.

Laws should govern the determination of the total number of the Armed Forces personnel and their optimization through their financial and economic support. Professionalization of the Armed Forces of Ukraine is still understood narrowly in the SDR; it is reduced to a mechanical increase in the number of contract servicemen and some financial motivation; no attention is paid to the depth, meaning, and the systematic nature of this issue. Often it comes down to a volunteer force, which is not always equivalent to a professional one.

“Civil military *problematique*” is still a hot topic.<sup>81</sup> Furthermore, professionalism is imperative of our time; it is our future. Today it is impossible to be successful in any field without doing a top quality job. This is fully applicable to the Ukraine as well. A professional is, first of all, a well-trained soldier. Observing the trend of gradual reduction in defense spending by the state, it makes no sense to hope for a miracle, but to

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<sup>81</sup> Peter D. Feaver, “Civil-Military Relations,” *Annual Review of Political Science* 2, no. 1 (1999), 212.

look for internal resources within the Armed Forces. One of the solutions to the problem could be reducing the number of troops while redistributing resources to the training of personnel and the purchase of new and upgraded weapons. Moreover, merely stating “there is no alternative” is not acceptable. A comprehensive analysis should be conducted and informed choices need to be made. This method can serve as a regression analysis and an application of the Cobb-Douglas production function.

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#### **IV. RECOMMENDATIONS FOR IMPROVED DEFENSE PLANNING AND RESOURCE ALLOCATION**

Profound qualitative changes are rapidly taking place in theory and practice of the art of war. This, in turn, means there is a need for a radical improvement of resource and especially financial provision of the Armed Forces of the Ukraine. Unfortunately, financial forecast indicators leave us with low expectations regarding the availability of those provisions in the near future.

Moreover, the correlation between a military organization's needs and the state's capabilities has been a problem that has not been solved either methodically or mathematically in a form of algorithm aggregate. For example, every year the first phase of defense planning starts with the usual question, "What indicators should be applied in the short-term planning process?" In practice, the problem can only have an empirical solution and will depend mainly on the economic conditions in the country as well as the political situation and not on a thorough analysis.

The resources' provisioning system is due for revision as well. The system should be based on modern methods of production, distribution, and use of resources for the effective and economical use of taxpayers' money and for better control over the resources' use on the part of the armed forces and civil society.

##### **A. IMPROVING DEFENSE PLANNING**

Many authors of published works all over the world try to justify the amount of military spending based on its impact on the economy. Usually they do this by using complex mathematical and statistical models; however, a consensus on the general direction of the influence of military spending on economic growth has not been reached. Some view military spending as an alternative investment to the civil sector and argue that military expenditures negatively impact economic growth. Others do not see a stable relationship between military spending and economic growth rates. In general, everyone agrees that there is a certain optimum value in military spending, and those values are

different in different countries. Therefore, Ukraine cannot remain on the sidelines of the global processes and must contribute to the rational use of resources.

At the same time, computational models and methodologies for assessing the impact of military spending on the armed forces themselves simply do not exist. Year after year, we state (especially during the period of 2006–2011), that the MoD failed to fully meet the resource requirements of the armed forces; “expenditure was mainly focused on supporting personnel and making urgent steps to restore the technical readiness of military materiel and armaments.”<sup>82</sup> Patching the holes or prioritizing everything is not a development plan; and it is not even planning.

It seemed that the situation would change significantly with the adoption of the 2006–2011 medium-term program and the transition to program- and goal-oriented planning, but it never happened. Underfunding is only part of the problem, although the former minister sees that as the entire problem.<sup>83</sup> Equally important are issues of forecasting the cost indicators of planned activities, as they are the source data for the determination of costs. Inventory objectives themselves have been long overdue for revision (some have not been changed since Ukraine was part of the Soviet Union). Despite progress in matters of pricing, the regulatory and methodological framework needs significant improvement.

The effectiveness of PPBS in many ways depends on the indicators and criteria that are established during the development of plans and programs, and which are used to evaluate their subsequent implementation. Unfortunately, in many cases they do not objectively reflect reality; often they are of a specific nature and may be difficult to determine. Even now, at the stage of the development of reforms that should take place by 2017 it is becoming clear that their implementation is virtually impossible due to the discrepancy between the goals and the financial resources needed for meeting them. This

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<sup>82</sup> Ministry of Defense of Ukraine, “The Armed Forces of Ukraine” (White Paper, 2011), 10, [http://www.mil.gov.ua/files/white\\_book/WB\\_Eng\\_final\\_2011.pdf](http://www.mil.gov.ua/files/white_book/WB_Eng_final_2011.pdf).

<sup>83</sup> Tymchuk Dmitry, “Defense Minister Mikhail Ezhel: ‘Ukrainian military should become representative of the middle class,’” *Флот – 2017*, April 21, 2010, <http://flot2017.com/item/opinions/22677>.



necessitates development of the order and methods of determining the defense expenditure indicators and creating a mechanism to make amendments.

Although we have categorized the long-, medium-, and short-term planning processes, there is still no continuity between them. They do not constitute a hierarchical system and do not give an adequate idea of the effectiveness of the performed activities. It might be possible to track the activities, but making adjustments to the medium-term program is impossible as was mentioned in the second and third chapters. Without proper provision, the long-term program of action outlined in the SDR remains a mere intent and words instead of becoming an achievable goal.

### **1. Develop a Unified Approach**

In order to create a unified development planning system for the armed forces that would have achieving specific goals as its objective, there needs to be a unified approach to the defense and budget planning at the MoD and the GS to ensure the effective use of budget funds. Thus, MoD budget planning must focus on achieving the objectives set in the defense plans. Budget programs need to aim at supporting the plans developed in the course of defense planning with the utmost efficiency, precision, and transparency.

For the last few years, the MoD has been working on reducing the number of budget programs. To some extent, this process has provided a great deal of flexibility in terms of transferring funds from one budget program to another; however, improvements are still needed. So, there needs to be a correspondence between budget programs and defense programs in terms of the expenditures on personnel and their training and the purchase of weapons. This approach will ensure greater transparency of the planning process, and its clarity will ease the process of program monitoring and control.

Unfortunately, the fact that MoD financing is below 1% of GDP shows that it is necessary to determine the minimum needs level of the armed forces. The needs should be based on the “protected budget expenditures.”<sup>84</sup> Other criteria should be subject to the requirements of combat readiness. Politicians can reduce the level of funding for the

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<sup>84</sup> Verkhovna Rada of Ukraine, *Budget Code of Ukraine* of July 8, 2010, № 2456-VI, Article 55, <http://zakon2.rada.gov.ua/laws/show/2456-17/print1366176374220905>.

armed forces within the framework of civilian control over the military organization, but they must be aware of the risks involved and take on full responsibility in this case.

In case of a more favorable level of MoD funding it makes sense to prepare several versions of the budget request. This is necessary both for internal use (within the MoD, for a better evaluation of the use of budget money alternatives), and to defend the budget request before the CMU, NSDC and VR. Additional influx is possible from the revision of the general fund budget for the first and second quarters, as well as from a special fund. It is advisable to secure the multi-variant approach in the documents governing the short-term planning. The Budget Committee should be entrusted with choosing the best alternative in the course of the hearing on the budget request.

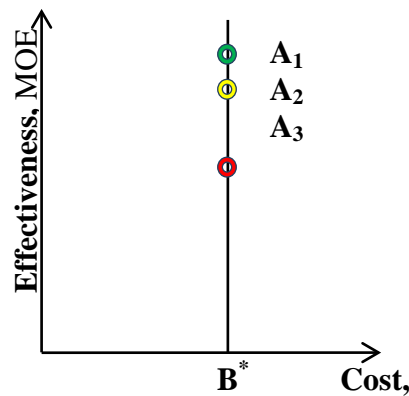


Figure 6. Fixed-Budget Approach.

Methodologically the following approach is proposed.<sup>85</sup> Within every year's specific budget  $B^*$  (in our case, it is a constant for taking inflation into account) we should analyze different alternatives  $A_1, A_2, A_3$  (Figure 6). Every alternative  $A_1$  includes expenditures for personnel, training, equipment, and infrastructure. It will be ideal if we have different sets of alternatives (and find the best  $A_1$ ) for different (more difficult) and same (a simple case) level of financing of the  $B$ . It means that everyone who is responsible for a budget proposal (subprogram) should give information to the Resource

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<sup>85</sup> F. Melese, "The Economic Evaluation of Alternatives" (Report, Naval Postgraduate School, 2010), 33.

Planning Directorate on a different level: pessimistic, optimal and optimistic. Finally, on the General Staff and MoD levels we have to use the economic evaluation of alternatives to find the best solution based on the submitted budget proposal for the whole MoD to the MF. In short, we have to maximize the overall effectiveness of the MoD.

In his research paper, “The Economic Evaluation of Alternatives,” Dr. Melese recommends achieving a significant defense acquisition reform in the following ways: by integrating Requirements Generation and Defense Acquisition with the PPBS, reducing future costs, and improving performance and schedules.<sup>86</sup> The key concept of his study is that alternatives are cost-effectiveness relations, not points.<sup>87</sup> For example, in the case of the optimistic budget  $B^*$  the best alternative is  $A_1$ , and in case of reduction or sequester of budget (pessimistic  $B^{**}$ ), the best alternative will be  $A_2$ . So, we can see in Figure 7 how this approach provides a unique opportunity for senior leadership to achieve significant success and get maximum effectiveness with a slightly different budget.

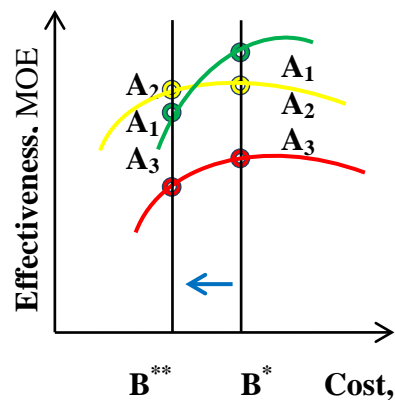


Figure 7. Expansion Path Approach.

Intuitively we have used this approach with different levels of budget at the MoD (eligible/affordable or optimistic/pessimistic), represented in Figure 7, but we did not develop enough elements of the cost-effectiveness system. To solve this problem, we

<sup>86</sup> Ibid., 11.

<sup>87</sup> Ibid., 37.

should first answer several questions: what is important, how much is enough, how important is it, and finally, how much does it cost?

It is very important to link economic (particularly financial) indicators with the efficiency of their use. This implies, first of all, the formation of the whole system of measurable indicators, when we can conclude whether the goal is achieved and by what percentage upon completion of the planning cycle. To do this, there should be at least five to 10 criteria in each MoD program.

## 2. Develop an Objectives Hierarchy: “Top-Down” Approach

Our goal is to maximize the overall effectiveness of the MoD, and determining an objectives hierarchy would be the first step on this path. We already know what the top level is: personnel, training, equipment, and infrastructure. Now a more difficult task: using the “top-down” approach in which we proceed downward to lower levels of increasing detail. We have to develop every category (build the “tree”) until it can be measured and stop when we know how to quantify things. It can be accomplished in different ways: numerical (weight), cognitive load (low/medium/high), or categorical (yes/no) measures.

Then we have to establish a value function and stop when we can measure every category (answering the question: how much is enough?). After that we develop a set of weights, comparing different attributes over their respective range to answer to the question: how important is it?

And finally we will find the MOE:

$$V(A) = w_1v_1(A) + w_2v_2(A) + \dots \Rightarrow \max_i V(A_i) = \sum_{j=1}^m w_j v_j(a_j) \quad (1)$$

At the end we can find the best one using solution techniques (“superior,” “efficient,” “marginal” or “optimal” solution). With Dr. Francois Melese’s approach we will end up with possibly a couple of them (for different levels of budget).<sup>88</sup>

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<sup>88</sup> Ibid., 31–45.

Of course, the MoD has previously used characteristics, features, attributes, and other criteria in the defense planning process, but it is time to do it more systematically. After that we need feedback on at least a quarterly basis to know how things go. When accomplished, it will be a powerful tool for proving the need to assess the effectiveness at both stages: when we develop proposals for submission and when the final decision will be made. It is very important to provide a powerful tool for senior management to make decisions quickly and wisely, in order to minimize the risks of future uncertainty.

Improving defense planning will allow stakeholders to clearly define objectives and the activities needed to achieve them. This would increase the validity of resource requirements at all stages of the budget planning and efficient use of funds.

## **B. USING THE COBB-DOUGLAS PRODUCTION FUNCTION**

The armed forces must be prepared not for yesterday's wars, but for the current ones or possible future ones. With radical changes in the nature of armed conflict, military reform must be radical too. Science is the only place to find answers to all questions concerning the evolving nature of armed conflicts and to provide sound recommendations on specific areas of development of the armed forces. First of all scientific analysis considers the types, forms, and methods of their application, the structure and the size of the military, the development prospects and quality indicators of arms and military equipment, and the direction and training of troops (forces) intensity.

A solution to this complex problem is only possible within the comprehensive framework of professional armed forces. To construct this framework, as we know from experience with the previous medium-term program, it is necessary not only to develop and document the program of transition to the contract form of service, but also to link it to training programs as well as to a long-term program of arms acquisition and modernization of the armed forces. These and other documents should clearly define the roles and tasks of the armed forces, taking into account their operational use.

Effective planning is impossible without the development of new approaches and methods. It is evident from the experience of implementing PPBS in Ukraine since 2004, from the implementation of the medium-term program and from the annual planning

cycles, that it is necessary to consider all possible risk factors, transition to stochastic models, and to develop methods of situational, indicative and strategic management. There is a considerable body of literature that examines the impact of the amount of the budget expenditure allocated for defense on the economic growth of the state as a whole. In this analysis, I would like to narrow the field of research, namely to consider the efficient allocation of resources within the MoD. One such option is the Cobb-Douglas production function offered as an approach for better resource allocation in the Ukrainian Armed Forces. The resulting work can be referred to as: “Modeling and optimizing resource allocation of the Armed Forces to stimulate the economic efficiency under fixed budgets.”

## **1. Research Questions**

To develop the resource allocation model using the Cobb-Douglas production function, the following questions were considered:

- Does the structure of defense expenditure matter? If so, what are the signs and direction of the correlation between “labor” and “capital” and the efficiency of defense spending?
- How can the transition to staffing the Armed Forces of Ukraine exclusively with contract service personnel be improved?

## **2. Assumptions and Theoretical Background**

As a rule, except the obviously impracticable special fund, the amount of spending on the defense of Ukraine within the same fiscal year is constant and determined by the state budget. It is assumed that by varying the structure of costs of this magnitude, one can achieve maximum return for each hryvnia invested. The common MoD financing tool is the budget programs, but from the point of view of this study it will be more convenient for us to use aggregates.

**Labor:** By increasing personnel expenses we can improve the quality of the personnel through additional education, field training, and coaching. More intensive training enhances professionalism, promotes stability, creates human capital, and provides infrastructure. On the whole it may contribute to improving the educational level of the labor force in the country and may act as a stabilizing influence in society.

Higher pay reduces turnover and increases the competitiveness of military service in the labor market.

**Capital:** While personnel costs in recent years were about 80%, the rearmament and modernization expenditures were based on a residual principle. At the same time, investment in the defense sector generates innovative development. In this case, you can do with fewer troops, to prevent loss of life in the event of a conflict, to form positive externalities for the civilian sector through the revival of the domestic military-industrial complex.

Rapid growth of the share of “Subsistence of the Armed Forces of Ukraine” (from 68.7% to 86.8%), and reduced funding of “Investment in infrastructure, weapons and equipment” (from 21.5% to 9%) observed in the period from 2006–2011, indicates the lack of a deliberate government policy and a crowding out effect. These actions were motivated by the need to keep the number of members of the Ukrainian Armed Forces, which, in our opinion, has nothing to do with the efficient use of state resources. Thus, over the years, investments in innovations, high-end technology, and procurement of new weapons became unavailable.

Consequently, there is every reason to believe that the failure of the previous medium-term program is due not only to its underfunding, but also its ineffective implementation. Military spending is not regulated by market processes; therefore, it tends to distort optimal allocation of resources. A policy implemented to support a military program was probably detrimental to efficient resource allocation. In order to prevent a recurrence of the above-mentioned practices for the medium-term program up to 2017 it is necessary to thoroughly examine the issue.

### **3. Methodology**

The study presented in the following sections is an empirical analysis of the relationship between appropriations for “labor” and “capital” within the MoD budget and its impact on the efficiency of defense spending. The intent is to determine how to achieve a relationship between “labor” and “capital” to get the most efficient use of the budget under one budget cycle. The method is to study the effect of these ratios on a set

of predefined indicators of their effectiveness (both qualitative and quantitative). Such a model for the analysis of the armed forces funding has never been applied before. It allows for simulation of the macro-processes at the level of a single ministry.

#### **4. Data**

The initial data is the amount of money from the state budget spent on the categories of “labor” and “capital.” Here it should be noted that the current MoD breakdown does not fully comply with this requirement. So, at the moment, the budget is broken into the following categories: “Subsistence of the Armed Forces of Ukraine,” “Training of the Armed Forces of Ukraine,” and “Investment in infrastructure, weapons and equipment.” However, some time ago, “the Reform of the Armed Forces of Ukraine” was a separate category. Moreover, even the allocation of a particular subprogram to a category can vary within the budget or defense planning process (e.g., modernization of materiel).

The best solution in this situation is linking defense and budget program expenditures based on the “transformer” and bringing the resulting data in its final form to meet the standard in NATO countries (see Table 4). In addition, the methodology developed in the course of this study must be used within the framework of the “Partnership for Peace Planning and Review Process” and, in particular, for the development and implementation of the “Annual National Program of Ukraine-NATO Cooperation.” Such an approach is not contrary to the non-aligned status of the state and at the same time assists in developing capabilities for both NATO-led and EU-led operations.

The indicator system proposed in the previous section will allow for assessing the effectiveness of each program separately. At the same time, even on the basis of a set of criteria that is now available, it is possible to draw conclusions about the success of the MoD in general. These include, for example, indicators of preparation (the number of graduates, average flight time per crew, tactical exercises, parachute jumps, combat firing), technical equipment (a number of new and modernized military equipment were



brought into service), and social standards (salaries for service personnel and wages for civilian personnel, cost of food, clothing, etc.).

Code	Category	1991	(...)	2017
1	OPERATING COSTS			
1.1	<i>Military personnel</i>			
1.1.1	Pay and allowances			
1.1.2	Employer's contributions to retirement funds			
1.1.3	Other			
1.2	<i>Civilian personnel</i>			
1.2.1	Pay and allowances			
1.2.2	Employer's contributions to retirement funds			
1.3	<i>Pensions</i>			
1.3.1	Paid to military retirees			
1.3.2	Paid to civilian retirees			
1.4	<i>Operations and maintenance</i>			
1.4.1	Ammunition and explosives (excluding nuclear)			
1.4.2	Petroleum products			
1.4.3	Spare parts			
1.4.4	Other equipment and supplies			
1.4.5	Rents			
1.4.6	Other operations and maintenance			
2	PROCUREMENT AND CONSTRUCTION			
2.1	<i>Major equipment</i>			
2.1.1	Missile systems (a)			
2.1.2	Missiles (conventional weapons)			
2.1.3	Nuclear weapons			
2.1.4	Aircraft			
2.1.5	Artillery			
2.1.6	Combat vehicles			
2.1.7	Engineering equipment			
2.1.8	Weapons and small arms			
2.1.9	Transport vehicles			
2.1.10	Ships and harbor craft			
2.1.11	Electronic and communications equipment			
2.2	<i>National military construction</i>			
3	RESEARCH AND DEVELOPMENT			
3.1	<i>Devoted to major equipment</i>			
3.2	<i>Other</i>			
4	OTHER EXPENDITURES			
5	TOTAL (1 + 2 + 3 + 4)			
6	STATISTICAL DISCREPANCY			
7	ADJUSTED TOTAL (5 + 6)			

Table 4. Actual and Planned Defense Expenditures by Service and Category.

To conduct a quality regression analysis it is advisable to take the data for the entire period of Ukraine's independence. Data for this model should be a time frame for the 22 year period from 1991–2013.

## **5. Variables**

The analysis includes the aggregate variables “labor” (which roughly translates to Operating Costs in the NATO classification) and “capital” (Procurement and Construction + Research and Development, respectively). This neutral approach will help avoid ambiguous interpretation of the terms within the country. In addition, it will help compare Ukrainian statistical samples with the control samples, namely those of the NATO states. We can draw a line at the old Member States, with the greatest period of observation, as well as those that are most similar to Ukraine in territory and the number of troops (Poland, Romania, Turkey).

Such efficacy studies have not been conducted in Ukraine, especially since the current categories “Subsistence of the Armed Forces of Ukraine,” “Training of the Armed Forces of Ukraine,” and “Investment in infrastructure, weapons and equipment” are not clearly defined. On the other hand, developing the system of performance indicators of each defense budget program will significantly improve the quality of planning with a focus on the end result.

## **6. Model Specifications**

For our model, we used the following specifications:

- a. Define performance indicators for each of the defense programs.
- b. Group financing indicators into two categories “labor” and “capital.” To do this, a clear correspondence must be established between the financial performance of defense programs and budget programs by forming a “transformer” matrix. Next, adjustments should be made in attributing expenditures to the appropriate category according to the national guidelines. In general, they reflect the defense expenditure (also called defense burden).

c. Study the correlation of structural shifts in the distribution of resources using performance indicators (as defined in Step a.), and aggregate indicators of “labor” and “capital” (defined in Step b.).

d. Establish the correlation and functional relationship between the growth rate of aggregate indicators for “labor” and “capital” and selected factors in accordance with the requirements of econometric analysis.

e. Determine, as a result of the selection of statistically significant interactions, an econometric model that includes the isolated effect of each factor. The regression coefficients will show the change of the “labor” and “capital” percentage rate in the event of a change of selected factors by 1%, *ceteris paribus*.

f. Evaluate the functional relationship between the growth in defense spending and the corresponding “labor” and “capital” changes based on the neoclassical theoretical approach and using the Cobb-Douglas production function.. If each of them is changed by 1%, the elasticity of these factors will show how it will impact the volume of military spending as a whole.

g. Analyze the obtained isoquants (the ratio between K and L) within the fiscal year Q (Figure 8). Next, the cost-benefit analysis must be used to move from point  $C_1$  or  $C_2$  to the optimal point  $C^*$ . Similarly, having made calculations for each year, we get a comprehensive view of the effectiveness of defense resource allocation during the observation period.

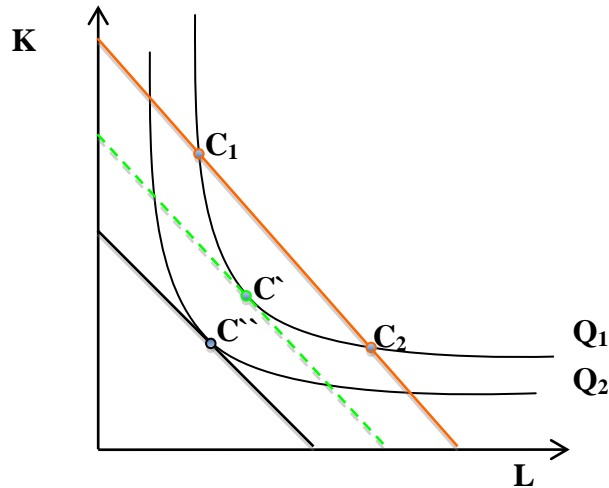


Figure 8. Adjustment from Inefficient to an Efficient Input Mix.

h. Analyze the results of the implemented econometric model to determine the most efficient use of resources and to make an informed prioritization of what processes need to be given attention on the government level.

## 7. Expected Results

The results of the study should be taken with caution, considering that many controversial events took place within the history of Ukraine and its Armed Forces since the declaration of independence. First, after the collapse of the Soviet Union, Ukraine inherited a huge part of the Armed Forces: about 780 thousand members of personnel, 6.5 thousand tanks, about 7 thousand armored combat vehicles, up to 1.5 thousand military aircraft, ships and more than 350 support ships, 176 intercontinental ballistic missiles and 1,272 strategic nuclear warheads and 2.5 thousand tactical nuclear weapons.<sup>89</sup> Second, defense financing was not applied evenly. For example, in 1992 the defense of Ukraine was allocated 34% of the necessary funds, in 1993–1994 only 28%, in 1995 only 16.9%, and all this against the background of a significant reduction in numbers.<sup>90</sup> Thirdly, it is necessary to take into account the macroeconomic situation in the country as a whole. For

<sup>89</sup> O. Kuzmuk, “The Military Organization of Ukraine: Laying the Foundation,” *Science and Defense*, (February 2012), 9, <http://www.nio.mil.gov.ua/pdf/2012-1.pdf>.

<sup>90</sup> A. Bodruk, *Structures of Military Security: National and International Aspects* (Kiev: NIPMB, 2001), 300.

example, as a result of the 2008 economic crisis the armed forces' needs were satisfied at the level of 1% of GDP or less during 2008–2011.

At the same time, as a result of the study, it is expected to reach correspondence between “labor” and “capital” as well as output indicators. The correlation between these categories can be interpreted in the context of sources of funding, namely the expenditure structure. The prevalence of this or that category should be linked to historical context; it should be broken into periods if necessary and grouped according to the implementation of the medium-term program. It is advisable to eliminate the influence of factors such as periods of recession in the country and make the system exogenous.

The resulting patterns should form the basis of medium-term program adjustments within annual defense planning. The results should serve as a theoretical basis for the professionalization of the Ukrainian Armed Forces. Proven methodology should be one of the components for the next defense review.

### **C. SUGGESTIONS FOR FUTURE RESEARCH**

Going forward, the first step is to use the model provided in this thesis to conduct a study using a database from 2006 to 2011 as the most comprehensive medium-term program and relevant to the previous one. Next, it makes sense to cover the entire period of Ukraine's independence from 1991 to present. In the future, this model could be updated with more recent data as it becomes available. In addition, the accumulated statistics will allow for the determination of the trend lines as well as prediction of future optimal allocation of resources between “labor” and “capital.”

Another suggestion for future research would be to apply this analysis to specific levels of the military to determine whether similar effects occur on a smaller scale. In this regard, the experience of the Naval Forces as a leader in terms of transition to contract service is of particular interest.

In the future using the Cobb-Douglas production function for resource allocation in the Armed Forces has to be a powerful analytical tool for determining the annual number of servicemen and their transition to the professional service as a whole.

Moreover, it will provide a basis for the transfer of areas not normally controlled by the military (security, logistics, housing) to the management of civil structures. It also seems promising to study the effect of personnel training quality on the overall efficiency of resource use.

#### **D. CONCLUSION**

Budget planning in the MoD should be carried out on the basis of defense planning documents at all stages. At the same time, the existing system of defense and budget planning at the MoD and the armed forces requires improvement. This will help clearly define the objectives and actions necessary to achieve them as well as improve the validity of resource requirements and efficient use of funds at all stages of the budget planning process.

Without a well-developed system of performance indicators for each program (and related subprogram) it is impossible to evaluate the achievement of goals objectively. Such a system would not only establish an effective control of the defense and financial planning process, but also allow fortimely adjustments to the program. The presence of several well-reasoned alternative options, whether it is a standalone program or the MoD budget request as a whole, will improve the quality of planning and, as a consequence, will lead to a more efficient use of resources.

The end result of defense planning in the Ukrainian Armed Forces should be rational management decisions for implementing the state policy in the military sphere of national security. The purpose of the proposed regression analysis is to identify the rational correlation between the expenditure on “labor” and “capital” and its impact on the efficient use of defense expenditure from the state budget. The proposed new approach of the Armed Forces resource analysis in terms of components such as “labor” and “capital” will bring a new perspective on their distribution, help optimize the number of personnel, find internal resources, and clarify development priorities.

## V. CONCLUSION

In this thesis all stages of the defense planning and budgeting processes were studied, weaknesses in the allocation of defense resources revealed, and the mechanism for their effective use proposed.

### A. SUMMARY OF WORK

The aim was to analyze the defense and budget planning processes and to develop methodological approaches to the analysis and forecasting of defense resource allocation using the Cobb-Douglas econometric model.

These goals were achieved by:

- systematizing the factors that determine the functioning of the defense and budget planning within a short cycle;
- estimating the effect of military spending on the implementation of the State Program of the Armed Forces' Development from 2006–2011 and identification of the need for more thorough planning of the next medium-term program;
- analyzing the system of defense expenditure planning at the state level and concluding that a move to fully professional armed forces is necessary;
- defining the requirements for evaluating the structure of defense expenditures using the Cobb-Douglas production function.

The focus of research is the defense planning process in the Armed Forces of Ukraine. The subject of the study is the macroeconomic factors affecting the efficient allocation of defense resources.

The theory and methodology of the study were based on the principles of modern economic science, particularly classical, neoclassical, and Keynesian theory, research in the military and economic science field, as well as laws and regulations, and state government instructional and methodological documents. The work comprises the methods of the system, comparative, factor, and economic analysis.

The scientific value of the work is in a critical analysis of the defense and budget planning state in the MoD and the armed forces and researching effective methods for their improvement. The most significant areas of difficulty in the medium-and long-term

planning are identified as well as the technique for the macroeconomic analysis and forecasting of resource support for the armed forces based on the Cobb-Douglas function is proposed.

The practical significance of the work lies in the MoD leaders being able to use the findings and recommendations in the decision-making process on resource allocation in the short term as well as in the strategy formation of the Armed Forces development. Proposals will improve the process and defense budgeting in the MoD.

## **B. STRUCTURE AND THE MOST SIGNIFICANT FINDINGS**

The relevancy of the thesis topic, stating the purpose and main tasks, defining the subject and the object of research and providing scientific novelty and practical significance of the work as well as analyzing the literature on the topic is presented in the first chapter.

The second chapter contains an analysis of the legal framework for defense and budget planning, focusing attention on the need to improve the quality of the justification for the need in resources at all stages of the budget planning and effective resource use in the Armed Forces of the Ukraine.

Unlike short-term planning, medium and long-term planning are more declarative, as detailed in Chapter III. This stems from the lack of consistent government policy in the area of defense or unified views on its implementation (in particular on the number of personnel and the quality of its preparation), as well as the inadequate resource support of decisions and omissions in the calculation methodology. It is concluded that further professionalization of the military is necessary.

The fourth chapter includes findings on the need to improve not only the list of defense and budget programs but also their quality and relationships. In particular, emphasis is placed on the need to develop a system of indicators for each program (subprogram) to make timely adjustments, as well as to obtain clear judgment about the extent of its implementation. Based on these findings, we propose the use of the Cobb-



Douglas production function for rational decision-making in the management of defense resources.

The conclusion contains the main findings and results of the study.

### **C. THEORETICAL RESULTS**

Existing regulatory frameworks of the defense and budget planning processes at the MoD and the Armed Forces of Ukraine are coordinated in terms and activities and are aligned with the statewide requirements. At the same time, there are procedural gaps, causing a problem in determining the effectiveness of planning and the use of budget funds.

It is necessary to improve the program-target method of budget planning while monitoring the results and achievement of the set goals. The goals should be realistic, achievable, and directly linked to the resources available. A well-established system of priorities and challenges that affect the combat capability of the Armed Forces of Ukraine needs to be in place.

Defense planning should precede and be a basis for budget planning in the Armed Forces of Ukraine. There is a need to shift emphasis from the management of budgetary resources to the management of the goal achievement processes or in the direction of obtaining specific indicators.

There is a need at hand to develop new approaches to evaluating the effectiveness of budget expenditures by calculating the ratio between performance results and the cost of achieving them as well as the degree of achievement of planned operation results.

The organizational structure of the Armed Forces of Ukraine and the development of weapons systems and military equipment at the present stage require the professionalization of the armed forces. What's important is the quality of the personnel, and not the number of personnel. The shift in priorities will invariably cause changes in the size and structure of defense spending. Making an informed decision and having a number of alternatives will require a comprehensive feasibility study in addition to the analysis of threats and challenges.

Creating a unified methodology of planning a military organization development is not possible without quality modeling, including resource provision. One option in the toolbox of financial forecasting can be analysis of the defense spending structure using the Cobb-Douglas production function.

The study certainly does not cover all issues of defense and budget planning at the MoD and the Ukrainian Armed Forces; however, it defines the key points on which it is advisable to focus further research and development. It is proposed to replace the extrapolation methods that are still occurring with a more flexible system of factor and economic analysis. In our opinion, an implemented statistical analysis of the defense spending structure will increase the efficiency and quality of defense resource management.

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