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Cost-Benefit Analysis of Performance Based Budgeting Implementation

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Abstract

This is the first study which estimates costs and benefits of overall policy reform for implementation of performance based budgeting. Costs estimation is based on a phased implementation, where we consult the Regulatory Impact Assessment methodology. In order to estimate benefits, we use a microeconomic approach to assess technical efficiency (Data Envelopment Analysis-DEA and Stochastic Frontier Analysis-SFA) of the budget users. The estimated benefits are higher than the estimated costs, or for every Macedonian denar invested in this reform an additional 2,600-8,000 Macedonian denars of gross value added in the Macedonian GDP are expected.

Key words: performance based budgeting, cost–benefit analysis, budget systems, public finance, technical efficiency, Macedonia.

JEL classification: H11, H61, E62

1. Introduction and Literature Review

Some of the most frequently asked questions regarding the public sector and the fiscal policy issues primarily relate to the size of the public sector or state budget as well as the more prominent dimension concerning the efficient allocation of public resources. More recently, the issues of transparency and accountability of public consumption contributes to the discourse of enlightening the state of public finances at the governments. These issues are of utmost importance, given that the public revenue generation and the provided public goods are directly related to the life of any economic agent in the country. Therefore, in order to assess these realistically as more or less successful, it is particularly important to identify the performances for each budget activity. This process is not an easy one considering factors such as the political context, the administrative capacity, the level of transparency in determining the outputs and results or performance of each activity, an independent audit of the performance and results, or the integration of the performances in the political decisions.

With time, the evolution of budget systems closely follows specific needs that are set for fiscal policy and the budget process, starting from the monitoring and control of public expenditure, improving prioritization and efficient allocation of scarce public resources, increasing the transparency and accountability of the fiscal authorities, and improving the performance of the public sector. Considering these needs, the budgetary systems have evolved over time. First came the traditional form of budgeting as line-item budgeting with a growing interest in performance budgeting during the government's actions in the New Deal and World War II (see Tayer and Willand, 1997; Jones and McCaffery, 2010). This was followed by the next wave of change in budgetary evolution represented by Planning and Programming Budgeting systems in the 1960s (Tayer and Willand, 1997, Shick, 1971) aimed at increasing the efficiency of resource allocation and emphasizing long-range planning. Later, the Zero-Based Budgeting concept was introduced in order to improve prioritization between different programs and increase accountability during the crisis of the mid-1970s (Chan, 2002; Broadnax, 1977). Finally, taking into account the weaknesses and challenges that previous budget concepts had encountered, the budget evolution of the 1990s focused its interest on the results-oriented budgeting system, namely Performance-Based Budgeting (PBB) (Diamond, 2003; OECD, 2008, Robinson and Last, 2009).

PBB is a concept that allows access to information and data showing us when and if the budget programs, the agencies, and the other institutions providing public services, are efficiently and effectively fulfilling their obligations. It aims to improve the efficiency and effectiveness of public expenditure by linking the financing of the organizations and institutions in the public sector with the results that they deliver. PBB allows us to explain specifically where the public money was spent and to measure the degree to which the envisioned outcomes were achieved (Lorenz, 2012; Bouckaert and Peters, 2002). Very often, the PBB concept is associated with productivity and efficiency of budget units, aggregate fiscal discipline and control, allocation efficiency and prioritization of strategic goals, as well as transparency and accountability (see Shick, 2007; Robinson and Brumby, 2010; OECD, 2007).

Economic pressures during the last decade and increased citizens' demands for improved public sector performance have been among the main reasons for the emergence of the new doctrine (i.e. PBB) which supports the conversion from a budget system which is input-oriented towards a budget system that is results-oriented. While the input-oriented (traditional) budget focuses on the incremental levels of funding, the performance budget

focuses primarily on the results. The major drawback of the traditional (line-item) budget is the lack of information as a guide for a policy or decision-making tool. In addition, the traditional system may lead to misallocation and an inefficiency of resources due to the insufficient management flexibility to address the changing environment and often involves a "use it or lose it" situation at the end of the year (Aristovnik and Slejcek, 2009). Additionally, needs for implementation of PBB are closely connected to its ability to serve as a strategic planning tool, to improve clarity and consistency of project design, to allow departments to have a unified sense of purpose of direction, and to increase flexibility, accountability, and responsibility of concerned officials (Navin, 2003).

Analysis of the implementation processes and practices of a number of countries shows that numerous questions regarding the PBB concept continue to remain open. There is no single agreed standard definition on performance budgeting regarding either the type of information that needs to be part of the performance budgeting or the stage at which performance budgeting should be introduced. There are other open issues as well, especially regarding when and how the performance information should be used in the process of decision-making. There is no unique model for PBB. Even when the countries adopt similar models of this concept, the approach used for its implementation varies depending on the national capacities, culture, and priorities (Robinson and Brumby, 2010, Robinson and Last, 2009, Qi and Mensah, 2012). The analysis of relevant academic literature points out numerous deficiencies or problems that may arise during the implementation of this budget concept, which relate to factors such as the lack of political support and commitment to implementation, the motivation of civil servants, underdeveloped institutional capacity, problems with measuring the performance and quality of information, and the integration of performance information in the budget process (OECD, 2007; Aristonovik and Seljak, 2010; Broom, and McGuire, 1995; Hughes, 2008). Nevertheless, there are three generally accepted major types of performance budgeting (OECD, 2008), which are the presentational, performance informed budgeting, and direct performance budgeting. As regards the implementation process, generally the three strategic areas where choices need to be made are the top-down vs bottom-up approach; comprehensive vs partial implementation coverage; and the incremental vs "Big bang" time scale.

Furthermore, there are studies that suggest that the concept of PBB is inadequate for a number of countries, especially for low-income countries (see Robinson and Last, 2009). These studies suggest that the concept should be implemented only in countries (especially in the underdeveloped and developing countries) with sound macro-fiscal policies, where the laws and the procedures guarantee that the budgets are executed as planned, where the information systems can provide timely and reliable budget information, and when there is an opportunity to increase the capacities for further analyses to be conducted during the implementation and the functioning of the concept. On the other hand, it should be kept in mind that for countries that have serious problems in public management and with the implementation of the fiscal policies and plans, it is unlikely that there would be benefits from the implementation of PBB.

Considering the benefits and the need for reform of the budget systems on the one hand, and the mixed experience and complexity of the whole reform on the other, we define the specific research objectives of this study as being the following: to detect the need for serious reform of the budget system (on the case of Republic of Macedonia); to determine a concrete reform plan for implementation of the PBB (for institutions/resources/economic agents); to estimate the expected benefits and costs related to the implementation of the PBB; to determine

whether the estimated benefits are higher than the estimated costs and what the net present value of the benefits would be; and finally to draw concrete conclusions on whether the reform implementation of PBB should be conducted in Macedonia.

In addition to the above, there are numerous other studies aimed at defining the key lessons that should guide the designing of the basic model of PBB and its implementation. In this regard, we would like to emphasize general guidelines developed by OECD for countries as they adopt and evolve initiatives to improve the PBB process (OECD, 2007, 2008). Robinson and Last (2009) presented a basic model of PBB and preconditions for its implementation. Diamond (2003) examined in detail the process of moving from a traditionally centralized input-oriented system to more developed performance based systems giving general guidelines for stages in the process of creating major institutional change, and determining lessons learned for successfully introducing and sustaining the move from one budget model to another. Part of Navin's (2003) research involved the guide to PBB and determining a framework for implementation of PBB. Schwarz and Dorotinsky (2005) propose a general structure of six areas for introduction of PBB on a general government and ministry level. Ouda (2011) tries to define the appropriate framework for implementation of PBB in the public sector of developing countries. Aristonovik and Seljak (2009) presented in detail the implemented framework and selected lessons from PBB implementation in Slovenia. A significant part of these recommendations and proposed steps were taken into consideration and implemented in our study.

The key lessons derived from the analysis of the available empirical literature generally suggest the following (for more detail see Robinson and Brumby, 2005): Firstly, empirical literature on governance-wide PBB is extremely scarce, with modest methodology, and does not provide specific conclusions about the effectiveness of this concept; Secondly, the empirical literature that analyzes PBB systems on a sectoral level gives more concrete results for their role in increasing efficiency; Thirdly, a very small part of empirical literature uses in its analysis actual data on expenditures to assess the allocative impact of PBB and output measures for evaluating efficiency and effectiveness. Most of the empirical research in this area is based on opinion surveys as a primary research tool, mostly due to methodological problems and issues to provide the necessary data for analysis. This remains an open challenge before researchers (including us) for more data-based empirical research.

A number of studies (based on surveys) conducted by national organizations and individual researchers are to determine the perceived effectiveness of budgeting systems. After presenting a detailed overview of analyses (surveys) conducted by national organizations, Qi and Mensah (2012) conclude that, despite the differences in surveying methods, PBB is widely seen by state officials as successful in inducing consideration of outcomes and performance measures in making spending decisions. Numerous researchers have also conducted surveys to determine how PBB is being implemented, what the determinants of successful implementation of PBB are, and whether PBB was perceived to be successful. Although the results are mixed regarding the penetration of the PBB information in the actual decision-making process, most of the studies showed that performance budgeting and performance indicators are an important tool (in some studies "somewhat effective") for making budget allocation decisions, changing appropriation levels, and affecting cost savings. (Broom, 1995; Jordan and Hackbart, 1999; Joyce and Sieg, 2000; Melkers and Willoughby, 2001, 2005; Moynihan (2005), Pattison, 2011; Hou, et al., 2011). Other than the conducted surveys of the effectiveness of PBB, there are only a few empirical studies which actually use empirical data to examine PBB effectiveness. Crain and O'Roark (2004) analyse

the impact of PBB innovation on state expenditures in the U.S. by using panel data from 1970-1997. By using a fixed effect model with five PBB implementation variables, Klase and Dougherty (2008) conducted empirical analyses using the data from 50 states for the period 1986-2001. Lee and Wang (2009) conducted analyses of the effects of PBB practices on spending behavior before and after implementation of PBB in the U.S., China and Taiwan. Especially important for our research are the empirical analyses on a sector level which use DEA methodology (which also is used in our research) to determine the potential benefit to efficiency and the decreasing of expenditures (in this case in the health sector) as a result of implementation of performance budgeting and indicators (see OECD, 2010; Jourard, 2008, Nikolov, 2006).

In the context of South East Europe (SEE) and emerging economies there is a wide gap in the academic literature related to PBB. Research and literature are limited and mostly exist in the form of working papers, descriptive evaluations of budget and institutional reforms in the countries, and limited analysis of certain aspects of PBB (Olden et al., 2012; Aristonovik and Seljak, 2010, Tandberg and Pavesic-Skarlep, 2009; Džinic, 2011; Diamond, 2006; Kasek and Webber, 2009). The analysis of Maksimovska-Veljanovski and Stojkov (2014) presents the institutional capacities and readiness of individual SEE countries, including Macedonia, for implementation of PBB. The identified gap in the academic literature for the SEE countries further increases the relevance and justifies the need for this study.

The contribution of this study is in several areas: Firstly, to the best of our knowledge, this is the first analysis of its kind, which is based on a developed methodology focuses on estimation of costs and benefits of overall policy reform for implementation of the PBB; Secondly, most of the empirical research in this area is based on opinion surveys as a primary research tool, so this study fills an important gap in the academic literature regarding more data-based empirical research in this area. The identified gap in the academic literature for the SEE countries further increases the relevance and justifies the need for this study; Thirdly, this study is especially important for a number of emerging and developing countries - being based on a developed platform (which could be further upgraded and improved) enables to get answers to the following questions regarding PBB implementation: are estimated benefits higher than the estimated costs of the reform; what will the net present value of the benefits be; what will be the efficiency improvement for every euro invested in this reform; and finally whether they should or should not implement PBB. Last but not least, this study presents a road map for the Macedonian government on how to implement the PBB in Macedonia.

The next section briefly analyzes and summarizes the performance budgeting situation in Macedonia (as a country that is used as the basis for our research). This is followed by a third section that presents the detailed reform plan with proposed steps for implementation of PBB in the country. The fourth, and main section, focuses on a number of topics including: costs estimation based on Regulatory Impact Assessment methodology; and for the benefits estimation we use a microeconomic approach to assess technical efficiency (Data Envelopment Analysis-DEA and Stochastic Frontier Analysis-SFA) of the budget users with budget executions, number of employees and wages and salaries as inputs, compared with the corresponding sectorial gross value added in the GDP, which is assumed as a final output from those budget users as decision making units-DMU. The main findings are then presented in the final section.

2. Current Situation in the Republic of Macedonia – Challenges for PBB

There is a specific situation and environment in R. Macedonia with specific features that are important/crucial in the process of decision-making for the design and implementation of a PBB approach. In this regard in addition will be addressed a few studies conducted in the country concerning the area of performance budgeting and will be considered the basic challenges regards the Budget of the country and auditing practices.

One research conducted by Center for Economic Analyses (CEA) and Institute for Democracy “Societas Civilis” Skopje (IDSCS), which covers 60 out of the 91 budget users in R. Macedonia (66% of all budget institutions in the country) and which spends 91,7% of all budget expenditures in 2013¹ finds (see Trenovski, 2014): even though ½ of the institutions in Macedonia are not acquainted with the exact meaning of PBB it does not pose a great obstacle, as much as the fact that none of the institutions publishes budget that contains output indicators, nor are these used together with results indicators; only 26,7% of the monitored institutions classify the budget expenditures by program classification; the annual accounts of the institutions do not explain the differences between the original projections of the output indicators and the specific outcomes; 70% of the institutions do not publish their strategic plan; only 21,9% of institutions use a specific methodology for evaluation of the achieved program outputs; only 18,8% of the institutions conduct analyzes of the changing needs of the program users; 38,7% of the institutions do not publish any explanation for the difference in the projected and the actual expenditures; 2/3 of the institutions are facing difficulties in linking the budget plan with the goals of the strategic plan.

Another study focuses on needs and benefits of PBB for strengthening the transparency and accountability in the country conclude that (see Trenovski and Tashevska 2014) performance budgeting could have a significant impact on strengthening and continuous development of the strategic sectors within the ministries; PBB could allow moving from control over the limits of the budget users’ resources, towards control of the performance and results that could be achieved with the resources ; the data and information, in the form of indicators coming out of the performance budgeting process, could enable implementation of impact assessment analyses, risk analyses, analyses of the life cycle of public expenditure etc.; PBB could be an especially important leverage mechanism for implementation of the developmental part of the budget, which has large and numerous expected results, since it could enable comparison with the budget expenditure. Concerning fiscal transparency in R. Macedonia, PBB could enable public presentation and availability of important information (data, program elaboration, etc.) on the implementation of the budget activity, could enable access to budget activities’ results, could encourage public (or scientific) debate about the results and the effectiveness of a particular budget (programs, activities, users), and could enable the public to monitor the effects of the budget more easily and to create an image and an opinion on the fiscal position of the policy-makers.

¹ The budget users were firstly monitored and analyzed through the web sites and the published documents, and secondly through direct interviews with the budget user’s representatives responsible for the preparation of the budgets for each of the institutions, providing answers to specific questions on the implemented procedures of accountability and transparency.

The analysis of the current status of all budget users and their output indicators (listed in the Budget for 2015.) which are the most important part and the foundation for implementation of PBB indicate²:

- 50 out of 92 budget users (including the Health Insurance Fund, Pension Fund and the Employment Agency), which is 54% of all budget users, have not specified output indicators in the 2015 budget. (the situation is the same or even poorer in the budgets for previous years);
- large number of budget users which are employing the dominant part of the public administration (in the budget for 2015.) and absorb a significant part of the budget, have not set any output indicators: Ministry of Finance, Ministry of Interior Affairs, Ministry of Foreign Affairs, Ministry of Justice, Ministry of Education and Science, Agency for Foreign Investments and Export Promotion, Ministry of Environment etc.
- The output indicators that should measure the performance of the budget users (the remaining 42 budget users) are poor and inconclusive (usually only one output indicator is referred) and cannot determine the performance, achievement and fulfillment of the planned objectives/goals. The most commonly encountered indicators are the number of procedures, reports, projects, or permits to be issued/ or their issuance initiated, nevertheless the output indicators do not include a part referring to the successful accomplishment of the goals.

Another chronic deficiency, inevitable to be noted in this study, is the need for initiation of evaluation of the results of the policies implemented by the institutions in Macedonia, which are spending public funds. In that regards the legislation explicitly states that the SAO conducts audit of the regularity and performance.

The main state audit performed on the budget of the Republic Macedonia (and other budget users listed in the law) is a regularity audit. Specifically, if we elaborate section of the audit report of the central government's budget for 2013, the scope of the audit is defined³ as:

- The procedure for preparation, adoption and management of the budget to be in accordance with the legal regulations;
- The institutions that have authority for planning and collection of public revenues to have established records and controls over the implementation, to have complete and reliable documentation and to have established procedures for mutual exchange of data over calculated/expected, collected/uncollected revenue, in order to provide timeliness/accuracy and completeness in the planning and revenue collection;
- Functioning of effective and proper control procedures for prevention/detection of errors in the process of functioning of the treasury account and the records.

Thus, the audit of the budget is predominantly focused on compliance with the regulations within the budget process, focusing predominantly on the budget revenues (inputs) while the outputs/targets/performance audit is not even mentioned in the scope of the state audit.

²See Budget of the Republic of Macedonia for 2015, available at:
http://www.finance.gov.mk/files/u6/BUDZET_2015_ZA_OBJAVUVANJE_21-10-2014.pdf

³ See report of SAO of the Basic Budget of R.M for 2013 (page 4-5):
http://www.dzr.gov.mk/Uploads/1_Osnoven_budzet_Republika_Makedonija_2014.pdf

3. Process of PBB Implementation -Reform Plan

The reform plan is one of the most important segments of this study, which should elaborate objectives expected to be achieved by implementing the concept of PBB, and development of methods and steps for successful implementation of the planned reform. The proposed plan was based on analyses of literature concerning PBB and practices in number of countries which are in different stages of implementation of this concept. In this sense, the focus is firstly on the objectives to be achieved with the reform (implementation of the PBB), and then to work out a detailed implementation plan⁴.

The pursued objectives through the implementation of PBB in R. Macedonia⁵:

- ✓ Introduction of greater accuracy, precision and certainty in the budget process;
- ✓ Improved linkage between the budget process and the national initiatives for growth and development through better resource allocation;
- ✓ Increased fiscal discipline and aggregate control between all parties involved in the budget process (agencies, ministries, regulatory bodies, sectors/departments etc.);
- ✓ Improved focus of the policies and prioritization in resource allocation, program planning and management, since the resources and their allocation must be justified by national and sectorial strategies;
- ✓ Increased efficiency in the diagnosis and treatment of cases with failures in achieving the performance, as a result of systematic monitoring and results evaluation;
- ✓ Increased awareness and culture for performance measurement and the benefits, among all parties involved in the process;
- ✓ Significant assistance and support to the policy makers at all levels of decision-making based on comprehensive and precise information;
- ✓ Reduction of cases that require supplementary (adjustment) budgets and ad-hoc initiatives for budget expenditures, as well as enhancement of strategic planning;
- ✓ Promoting strong motivation among the management structure in the public sector and public administration providing public services as a result of joint consultation for setting targets, clear communication of the targets and goals to be achieved and the manners of execution, as well as the obligation for reporting of the results.

Before we start with a detailed overview of the reform plan, we will give a brief presentation of data, sources and concerned legal frameworks which later will serve to determine the costs and benefits of implementing the new budget concept.

The data used for the research/feasibility study are gathered from various sources:

- Draft Budget of R. Macedonia for 2015.
- Law on Budgets, unofficial consolidated text (Official gazette of Republic of Macedonia no. 64/05, 04/08, 103/08,156/09, 95/10, 180/11 and 171/12)
- Budget documents - Fiscal Strategy of the Republic of Macedonia 2014-2016 and the Strategic Plan of the Ministry of Finance 2014 to 2016.
- Available socio-economic statistics for R. Macedonia, data from the three institutions that produce such data - the Central Bank of R. Macedonia, Ministry of Finance and the State Statistical Office.
- Data from the State Audit Office (published audit reports and other documents)

⁴ Having in mind the limited space, we will try to present the briefly concise picture of proposed concept.

⁵ Detailed elaboration of the expected goals of the implementation of the performance based budget in a large number of developing countries and developed countries, see Schwarz and Dorotinsky (2005).

- Data and information from international research and analyses (often implemented by the international institutions OECD and the IMF, as well as academic/scientific research) for identification of conducted analyzed and confirmed schemes/ structures of variables/indicators, estimated values etc.
- Data and information from other countries' experiences that have implemented the concept of PBB, or are in the process of implementation.
- Historical data (most often used) for costs associated with organizing activities related to the implementation of the concept of PBB (organizing meetings, trainings, workgroups, engaging experts, etc.).
- Own estimates for certain positions where there is no relevant data to be referenced, as well as assessments related to indirect costs and benefits that are often expressed qualitatively thus their quantification is a specific process.

Laws, legal acts and documents (a base to be built upon for implementation of PBB):

- ✓ Law on budgets, *consolidated text* (Official Gazette of R. Macedonia no.64/05, 04/08, 103/08,156/09, 95/10, 180/11 and 171/12).
- ✓ Law on state audit – passed by the Assembly of R. Macedonia with a Decree for Promulgation of the Law on State Audit no. 07-2001/1 as of 6th of May 2010, published in the Official Gazette of R. Macedonia no.66 of 13.05.2010.
- ✓ Rulebook on the manner of conducting state audit (Official Gazette of R. Macedonia no. 66/10 and 145/10) – prescribing the manner for conducting state audit (planning, execution and reporting for the conducted audit), as well as the reports that need to be created and published by the State Audit Office.
- ✓ Rules of procedure of the Assembly of R. Macedonia (Official Gazette of R. Macedonia no.91/2008).
- ✓ Fiscal strategy of Republic of Macedonia 2014-2016 and
- ✓ Strategic Plan of the Ministry of Finance 2014-2016.

3.1. Proposed Steps for Implementation of PBB

Here we elaborate the concrete steps in implementing the new budget concept⁶. Concrete activities, phases of implementation about each of proposed steps for implementation of new concept are elaborated in details in Anex, (see Table 2 and 3).

1. Preparation of a platform for increasing institutional capacity

- Creating approach/study for implementation in line with the institutional structure of the state (the starting point is this cost-benefit study). According the literature and practices general recommendations for the implementing approach are: top-down approach, partial implementation coverage, incremental timescale changes and in the beginning presentational type of PBB;
- Ensuring support from the political leaders (as well as citizens and administration) is crucial for the implementation of this reform. In order to be implemented the political

⁶ The general structure (5 area) for introduction of performance-based budgeting in R. Macedonia generally follows the areas (although they offer 6 areas) that Schwarz and Dorotinsky propose (Schwarz and Dorotinsky, Public Expenditure Working Group Implementation - PRMPS World Bank, May 2005), while the specific steps listed here are designed by the authors considering the current fiscal -economic environment of the country.

elite needs to be convinced, and believe that the implementation of this concept is to their advantage and for the benefits of the citizens, which in itself will represent a major challenge. In order to implement this activity, firstly organization of meetings/appointments with the political parties should take place, where the new concept, the benefits and the implementation plan will be presented. It is also recommendable organization of workshops and round tables where the questions of the political elites will be answered (organizing special roundtables for citizens) and where they can express their opinions;

- Clear definition of the objectives and the expected results of the proposed reforms transparently shared with all stakeholders - policy makers, ministries, agencies, sectors, etc., in order to be acquainted with all the tasks and activities to be implemented. In this direction, continuous workgroups should be organized, trainings for interested parties, as well as design of a special portal where specific information and manuals will be shared, and where ideas and opinions regarding the implementation of the new concept will be gathered.
- Inclusion of all the interested parties in the process, to create a sense of ownership of the budget process reforms and to be actively involved in the process (especially in the definition of the indicators) - with own proposals, participation in the design and implementation bodies, decision making meetings and in the implementation. The previously designed portal can also be used, thus each opinion and idea concerning the implementation platform will be considered;
- Suggestion of one centralized organizer "leader" who could lead the whole process. In most countries that have implemented this concept the centralized organizer/leader is the Ministry of Finance which has proven as most successful solution. In this regard the Ministry of Finance will lead (will be leader) the activities related to the implementation of a new concept;
- Establishment of a special body (within the Ministry of Finance) that will be involved in the defining and detailing the most adequate PBB modality for R. Macedonia, and then of the monitoring of the implementation process and recommendations of corrective measures (alterations of the laws, procedures, pilot project implementation, providing training for the direct implementers etc.), to enable elimination of shortcomings that may arise in the concept implementation. In the first year, the special body would organize coordination meetings at least twice a month. The body would be comprised of representatives of all units involved in the implementation of the new concept, and will be coordinated by the Ministry of Finance;
- Full assessment of the available institutional capacity. The Ministry of Finance and the special body that will be established should conduct a comprehensive analysis of: manners for resource allocation/inputs and the ability of their linkage with the results/performance, monitoring tools (through the accounts and activities) of the objectives implementation, the possibility for direct and specific linkage of the strategic goals with the programs, activities and results, assessment of the possibilities and capacities of public management, assessment of the capacities and capabilities of internal and external audit, etc.;
- It is especially recommended to consider the possibilities for reform of the accounting system from cash-based to modification or conversion (partial) to accrual based accounting where the accounting records are based on the occurred transactions;
- Implementation of the reforms and organization of training for the capacity increase of all stakeholders of the concept implementation (in accordance with the conducted analysis/assessment);

- Reform and preparation of new strategic plans in the spirit of PBB, which would clearly associate the allocated inputs with the expected results. Hereby, it will require reform of the Budget Law, the Law on State Audit, Rules of Procedures of the Parliament of Republic of Macedonia, Fiscal Strategy of the Republic of Macedonia 2014-2016, the Strategic Plan of the Ministry of Finance 2014-2016, Strategic Plans of the pilot ministries (it is necessary to introduce multi-annual budget planning), etc.

2. *Planning and budget process reforms aiming at performance*

- Development of a program classification of the budget that will continue to serve as the basis for PBB. With this innovation, besides the revenue and expenditure section of the budget, it should contain a separate section of well-defined budget plans for the direct budgetary users (to be oriented towards performance). Among other things, this means that the financial plans of the direct budget users should be oriented towards performances/results, which should be reflected in the explanation of the financial plan as well. According to this, the goals and the associated anticipated results must be clearly defined together with the indicators for achievement of the goals. Since partial implementation would be more appropriate in the initial period, our proposal inline with the common practices in other countries⁷, is an implementation of the **concept within the Ministry of Education, Ministry of Health and the Ministry of Labor and Social Policy**;
- Elaboration/analysis of the existing budget system and how the parts of the budget system can most easily be linked and converted into a PBB. The existing links between the objectives, plans and the activities of the individual budget users can be used as a basis for implementation of the new concept, considering that the existing strategic plans of budget users (Ministry of Education, Ministry of Health and Ministry of Labor and Social Policy) contain parts which connect their objectives with the strategic objectives of the Government and parts where there are indicators for the expected outcomes of the programs and activities;
- Development of different types of information about performances - development of different types of indicators (qualitative, quantitative, combined). In this direction, the number of targets should be limited to avoid a complicated system of performance measurement. Nevertheless, it is desirable that multiple measures and indicators for achievement of the selected targets are used. This is one of the most complex and the most important steps in the process of designing PBB. In this process the involvement of the management structure of the initial implementing budget users, is inevitable in order to set realistic indicators for performance measurement. For implementation of this activity experts with experience in the implementation of this concept could be engaged who would facilitate the overall process.
- Setting of precise and specific objectives (this involves good knowledge of the budget programs and the work of the budget users) and continuous measurement and monitoring of the progress towards achievement of the objectives. The achievement of the indicators set should be continuously monitored by the working body and the involved budget users, in order to avoid disappointment and reduced motivation for the concept implementation in the case if shortcomings or failure to achieve the planned performance targets occur. This activity can be part of the tasks of the established work groups in each ministry;

⁷ Countries which implement the concept initially in ministries which are market oriented – citizens/businesses. See Schwarz and Dorotinsky (2005).

- Signing contracts with the departments, agencies and ministries that contain the expected performance indicators and the accompanying rights and obligations. The work groups together with the body established within the Ministry of Finance prepare the contracts for the pilot ministries and the agencies and these contracts contain the agreed performance indicators.

3. Information on performance, incentives and motivation for efficiency and effectiveness

- Improved presentation, reporting and dissemination of the information regarding the performance indicators, which is the lifeline within the concept of performance-based budgeting. The information on performance indicators should be adequately presented in order to accomplish its goal. Nevertheless, the limits of the performance information, their role of the performance measurement and their usage should be clear as well. This activity includes preparation of reports and brief analyzes (both for the policy makers, the parliament and the public) that periodically (preferably quarterly) would report on the performance and objectives achievement per budget user's program and activities. Such analyzes periodically (quarterly) initially would be prepared by the work groups of the pilot ministries and the consolidated report would be prepared by the body within the Ministry of Finance;
- Development of an incentive system to motivate the public administration and the politicians' behavior change in understanding of the budget process. They should understand the process of implementation of performance based budgeting as an opportunity to improve the efficiency of their operations, making appropriate/right decisions and policies, and the fulfillment of the established objectives;
- The establishment of an information and communication system and the cooperation (consultation) among the organizations/institutions which are involved in the implementation of the information based budgeting. This is particularly important in the process of implementation of the concept, but it is as important for the functioning of the process (sharing experiences, problems, dilemmas, joint action, changes, notifications, cooperation). It is particularly important to identify the best practices that have proven as successful and share them with the interested parties. This can be done on a continuous basis or on defined regularity - e.g. twice a month;
- Creation of a system that would motivate behavior change among the public administration and the politicians (to support the reform process), which is particularly complex and lengthy process, however particularly significant for smooth implementation and normal functioning of the new concept. In order to achieve this roundtables, workshops and public debates could be held, where the best practices and benefits of implementation of the new concept will be noted;
- Creation of a system to motivate the administration involved in the implementation process towards achievement of a greater efficiency and effectiveness while fulfillment of the objectives. Regarding this activity, the departments, agencies and the budget users which have achieved their goals, and an outstanding performance or are leaders in the reform, etc., could be promoted, or ranked;
- Setting up of a mechanism of procedures and practices that will ensure transparency and accountability of the budget users involved in the implementation of the performance based budgeting.

4. Monitoring and Evaluation

- Creation and implementation of an independent performance evaluation system/mechanism for the achievement of the budget users' objectives. It is especially important for the evaluation to pinpoint the best practices and lessons learned which could then be distributed back to the interested parties. The evaluation body will analyze the collected data, create reports/analyses for the budget users' achievement of the planned outputs and will grant access of the information to the interested parties (policymakers, budget users, public, etc.). There should be a special body established for the purpose of performance evaluation;
- Performance audit – an additional audit of the process how the budget users conducted their tasks, administered the resources for achieving the established objectives and whether the objectives have been met, needs to be conducted. For this purpose there is a need for state audit regulation alteration and the aspects taken into account by SAO in the implementation of the audit should be extended.
- Setting up a system of standards which can be used for grading and evaluation of the budget users. For example: programs with similar or identical goals should report to the Ministry of Finance similar/common performance measures; integration of budget requests with the annual performance plans to be achieved with clearly specified performance targets; providing expenditure information of individual programs per unit, to reflect the total cost of the implementation of the programs.

5. *Corrective measures and decision making for improvements*

- Integration of performance information in the budget process, nevertheless in the beginning strong correlation of performance results and allocation of resources should be avoided, i.e. decision-making based on the performance information should be avoided. This is particularly important because such relationships may initially discourage the participants to seriously consider the process or look for ways to create an image that the performance indicators are satisfactory, and actually not opt for improved performance.
- Identification of the problem areas and to suggest modifications for the processes of service or activities implementation or to make changes in the operating practices and procedures.
- Identification of the reasons for the problems that affect the achievement of the objectives/performance and development of an action plans to remove the problems.
- In the areas with clear indications of low performances and unfulfillment of the targets, decisions can be made or the Government may penalize certain activities, could reduce the support or sanction the management structure. In contrast, the Government may increase the support of specific programs, promote best practices and results, reward successful budget users and managers in the public sector.

In line with the above mentioned, the same steps, with small adjustments need to be made at a budget user's level for those budget users involved in the implementation of performance-based budgeting. Since partial implementation would be more appropriate in the initial period, our proposal based on the common practices in other countries (who initially implemented this concept in the ministries which are market-citizen oriented) is an initial implementation of the concept in the Ministry of Education, Ministry of Health and the Ministry of Labor and social Policy.

The table below presents the phased approach of introduction of performance-based budgeting. The table will be used for calculation of the direct costs used in the cost-benefit analysis for introduction of performance-based budgeting in R. Macedonia.

Insert Table 1. Phased Approach to introduction of performance based budgeting

4. Cost-Benefit Assessment of PBB Implementation

The detailed development of the phases of PBB implementation allows us to get to the more specific part of the analysis that should thoroughly define the costs and the benefits of the overall process of implementation of the new concept. Considering that it is a process of reform which on one hand, causes major changes in the entire public sector, on the other hand is an revolutionary process (as the experience of other countries show) with an implementation and modification that can last a longer period (over a decade); the cost-benefit assessment uses all available data, and assumptions to frame-in the entire analysis. The purpose of this assessment is to come out with a concrete empirical analysis (cost-benefit) that will demonstrate the net gain or net loss from the introduction of the concept. To the best of our knowledge, our cost-benefit-analysis of the possible PBB implementation in Macedonia, is first of this kind. Therefore, it will contain a number of assumptions and approximations that will allow us to closely cover a large number of complex activities.

4.1 PBB Cost Assessment

The analysis of the implementation costs of this complex process/concept is an intricate procedure which should include a number of activities associated with each of the steps in the implementation of PBB. There is no methodology or system that will allow us to determine the total cost of the concept implementation, given that the design and implementation steps are different for each individual country, and the structure of the public sector in various economies has own characteristics that is difficult to generalize.

Thus, the basis for estimation of the implementation cost of PBB in Macedonia will be the procedure/methodology used by the Government of the Republic Macedonia regarding the Regulatory Impact Assessment - RIA⁸. The methodology is fully aligned with the existing system for strategic planning in the ministries and the procedures for policy and the decision-making coordination within the Government of Republic of Macedonia. The methodology represents an upgrade of the existing practices introduced in 2009, which also comply with the positive experiences and practices in the European Union Member States as well as the OECD countries⁹.

The analysis of the documents and acts regulating this area: Methodology for regulatory impact assessment Official Gazette of RM no. 107/2013; - Guidelines for the manner of acting in the work of the ministries in the involvement in the process of conducting of Regulatory Impact Assessment, Official Gazette of RM no. 106.2013; - Code of Good Practices in the participation of civil society sector in the policy making process, Official

⁸ The Ministry of Information Society and Administration is the ministry user and the ministry which manages this process. See details of the regulation, prepared reports and the documents regulating this area on: <https://ener.gov.mk/default.aspx>

⁹ See point 1 of the Methodology for Regulatory impact assessment, Official Gazette of Republic of Macedonia, no. 107/2013

Gazette of RM no. 99/2011; as well as the Manual for regulatory impact assessment, which define the key steps in the assessment of the impact/effect of new process implementation¹⁰:

- ✓ Situation analysis, problem definition and goal setting;
- ✓ Identification of possible solutions;
- ✓ Analysis of the costs, impacts and benefits of the identified solutions;
- ✓ Planning of the manner of conducting, monitoring and evaluation.

The study thus far defined the situation in details, the problems and the objectives to be achieved with the implementation of PBB. The possible solutions and steps for implementation were also developed in detail. The benefits in each area (specifically) and their assessment will be developed in the following section after determining of the costs. Thus, the remaining part of the study is concerned with the analysis and cost determination of the implementation of the activities and the planned steps. The specific activity implementation costs under the aforementioned acts are: - the establishment of new institutions/bodies or expanding responsibilities and organization of the existing authorities, the necessary human resources and their training needs, investments (office space), supervision needs, equipment, etc.

In this section we illustrate costs for each of the previously developed activities and procedures in the implementation phase. The calculation method will also be explained. In the process of determining the costs, the following will be taken into account: the cost of organizing the planned activities (meetings, sessions, trainings etc.), costs for creating new bodies/departments/institutions, cost for the time spent and the commitment of the participants in the process of implementation of the concept, and finally the approximate cost for all employees who will be part of the reform.

Note that this plan do not necessarily mean new employees or additional costs for the existing employees, given that the new system implementation can use certain dislocations of the insufficiently used resources of the public administration (see Table 2 in Annex). This notion is confirmed with the numerous evaluations reports of introduction of new regulations and changes in R. Macedonia, which often indicate that there are no additional implementation costs (in particular for the implementation and compliance with the regulation), although there are additional engagement of public administration¹¹.

Insert Table 2: Cost assessment of introduction of PBB

Insert Table 3 – Calculation of the costs in phases, months and years

Beside calculated costs for implementation of PBB there is also possibility to appear additional costs. The additional (indirect) costs largely relate to promotion, presentation and raising of the awareness and knowledge on PBB, benefits of this concept and the results/effects of the concept on the budgeting process and the broader environment. The second type of additional costs are associated with the possible occurrence of obstructions and obstacles in the process of the new concept implementation caused by the political parties, policy makers and the other stakeholders.

¹⁰ For details see point 2.2 Conducting regulatory impact assessment, Methodology for regulatory impact assessment, Official Gazette of R. Macedonia no. 107/2013

¹¹ For details see the reports for regulatory impact assessment of numerous regulations which are already implemented or are planned to be implemented. See: https://ener.gov.mk/default.aspx?item=pub_regulation

4.2 PBB Benefit Assessment

PBB is a concept that could provide elimination or reduction of many of the inconsistencies and omissions in the planning, implementation and monitoring of the state budget. General benefits of the implementation of this concept are:

- PBB could primarily have a significant impact on strengthening and a continuous development of the strategic sectors in the ministries, which could represent a key area where the strategic objectives/indicators are set, and which could further be used in the budgeting process.
- PBB could allow for a focus change of the fiscal management, from control of the limited funds of the budget users, to control of the performance and the results that can be achieved with these funds.
- The data and the information expressed in the form of indicators arising from the process of PBB could enable continuous application of comprehensive impact assessment analyses, risk analyses, analysis of the life cycle of public expenditure, scenario preparation of the economic and fiscal variables, etc.
- PBB could be especially important leverage mechanism for the implementation of the developmental section of the budget.
- The implementation of this concept could have a significant contribution to the fiscal transparency in the state, which is of utmost importance.

It is also necessary to mention the benefits of the concept implementation for different stakeholders: the central government; regulatory bodies (SAO, inspection services, etc.); budget users (ministries, agencies, etc.); business sector and citizens. Thus, calculation of the exact benefits in all areas of interest and for all stakeholders is immense and complex task which exceeds the limits of this paper. Therefore, we use a methodology that can approximately calculate the benefits of implementation of PBB¹².

4.2.1 Methodology on Benefit Calculation

The methodology applied is a microeconomic approach for measuring technical efficiency in the production of gross value added in the GDP of Macedonia, using the inputs of the budget users' budgets and the number of employees. Thus, on the one hand there are budget users using public funds to provide socio-economic environment for the economic agents, and on the other hand, are the results measured in a sectorial gross value added of the GDP.

The main shortcoming of this approach is that all production sectors in the Macedonian GDP (ESS system of 2010) are approximated as homogeneous, at least in terms of labor intensity. It is also assumed that the system of production of the added value is with constant sectorial economy of scale because it is difficult to evaluate adequate economy of scale for all sectors. The idea is that through the state budget funds allocation and the number of employees, the budget users are providing adequate environment for the Macedonian socio-economy and the society to produce an appropriate value added i.e. the GDP. Some budget users are more efficient and effective in their work and thus produce relatively higher value added, and other budget users are less efficient and less effective thus produce relatively lower value added.

¹² Part of this methodology is used by OECD in determining effectiveness of health care systems in OECD countries (OECD, 2010)

With an assessment of the average efficiency of production of 1 denar value added of the GDP from the allocation of 1 denar to the budget user and the payment of 1 denar per employee we can get a quantified number of how much more value added would have occurred in the Macedonian GDP through an increased efficiency of the budget users to the efficiency of those budgetary users which are assessed with this methodology as the most efficient in the RM. This higher relative efficiency in the operations would make proportionally higher value added with a higher efficiency which will be a proxy for how much would the value added increase if the budget users think within the frames of PBB.

To measure the percentage of higher relative efficiency, which will be a proxy for the percentage increase in the value added in the Macedonian GDP, we will use the frontier analysis obtained with mathematical programming frontier. This is a non-parametric method of Data Envelopment Analysis-DEA¹³. We will also apply a parametric analysis method by Stochastic Frontier Analysis-SFA¹⁴ to get another quantitative estimate of the average (in) efficiency of the Macedonian budget users in their impact on the production of the gross value added in the GDP.

4.2.2 Data Envelopment Analysis -DEA frontiers

Starting from the pioneers Charnes, Cooper & Rhodes (1978), so far there have been published some 2,800 articles and dissertations using DEA (See: Cooper, Seiford & Tone, 2000; Seiford, 2005).

DEA is a useful method since it provides flexibility for efficient modeling of the Decision-Making Unit - DMU and allows modeling of the links between production functions with multi-input and multi-output and allows performance measurement. Furthermore, DEA is data oriented and does not require assumptions which are rather restrictive for regression calculation i.e. For purpose of statistical methods. The main drawback of this method is that it cannot model the noise and the statistical error, thus consequently the statistical hypotheses cannot be tested. Another disadvantage of DEA is its sensitivity to inhomogeneous DMU. In our case DMU are the budget users grouped according to the ECC system of 2010 using the total budget allocation and the number of employees to ensure adequate gross value added of the GDP.

The DEA dynamics is illustrated in the following graph. The graph provides combination of two measures, both technical and allocative efficiency arising from the total economic efficiency.

Insert Graph 1. Illustration of DEA dynamics

The graph clearly explains that the entity (in this case the budget user) uses two inputs (budget allocation and number of employees), x_1, x_2 , and produces one output (in this case value added), y . The unit isoquant S-S is an isoquant of fully efficient entity (in this case the budget user). Regarding this isoquant, there is production function which is for fully efficient budget users. The tangent of the isoquant S-S is the technical rate of substitution and

¹³ Details of DEA programming is explained in Coelli (1996a).

¹⁴ Details of SFA programming is explained in Coelli (1996b).

measures by how much does one input need to be adjusted to sustain constant output if the second input is not altered. If the budget user operated inefficiently for example in point P, the measure of technical efficiency is then the difference QP. This distance is the quantity by how much the input of the budget user needs to be reduced to accomplish the same value added with reduced input i.e. with increased efficiency. The percent of input reduction to achieve full technical efficiency is actually the ratio QP/OP.

Therefore the technical efficiency (TE) according to the graph is:

$$TE = OQ / OP = 1 - QP / OP \quad (1)$$

From the equation (1) is it clear that the TE will have a value or 0 to 1 and thus it is efficient quantitative indicator of technical efficiency of the budget user. For example, if the budget user is fully efficient and the adequate value of TE will have a value equal to 1.

What can be noted from the graphs and the equation (1) is that the point Q is technically efficient but it is allocatively inefficient. This occurs because the budget user need to reduce the production costs as well, in order to reach the fully efficient point. Hence, the allocative efficiency (AE) of the budget user which operates in the point P is:

$$AE = OR / OQ \quad (2)$$

The distance RQ represents the reduction of the production costs which will occur if the production of value added is conducted with full technical and allocative efficiency i.e. in point Q_1 instead in the technically efficient, but allocatively inefficient point Q. Henceforth, the total economic efficiency will be (EE):

$$EE = OR / OP = TE \cdot AE = OQ / OP \cdot OR / OQ \quad (3)$$

Farell (1957) calculates the isoquant on a manner that the no observed point should line left or below those appropriate frontier points that are found by the mathematical programming, as it is illustrated in the following graph.

Insert Graph 2 - Calculation of the data isoquant

4.2.3 Stochastic Frontier Analysis - SFA

Another similar method for evaluation of the frontier curve is a parametric method Stochastic Frontier Analysis-SFA. In this method despite the random statistical noise it introduces a noise for exogenous shocks for the budget users. This enables decomposed deviations of the budget users' performance into two components: inefficiency and noise.

This parametric approach for measuring the efficiency is developed by Aigner and Chu (1968), Aigner, Lovell and Schmidt (1977) and Meeusen and Van den Broeck (1977) and is illustrated with the following equation:

$$\ln(Y_i) = \beta \ln x_i + (V_i - U_i) \quad (4)$$

Where Y_i – is production of value added of the i-th budget user;

β Parameters vector;

x_i is (k x 1) vector of the input transformation of the i-th budget user;

V_i are independent identically distributed $N(0, \sigma_v^2)$ random variables independent of U_i

;

U_i are random variables (non-negative) which are assumed to represent the inefficiencies for production of value added and are assumed to be independently identically distributed.

The model of the equation 7 is a stochastic frontier because it is limited by the stochastic variable $\beta \ln x_i + V_i$ and the stochastic frontier which varies around the determined part $\beta \ln x_i$.

The new statistic γ – is defined to test whether the inefficiency is significant in the model and is calculated as:

$$\gamma = \frac{\sigma_U^2}{(\sigma_V^2 + \sigma_U^2)} \quad (5)$$

If $\gamma=0$ then this implies there are no effects of the budget users (i.e. budget users U_i (i.e. $\gamma=0$) and then the deterministic model should be used. If $\gamma=0$ then the deviations around the frontier are caused by a noise, and if $\gamma=1$ then the deviations are due to the technical inefficiency.

4.2.4 Model

The idea of this model is that the budget users with the allocation of the budget funds and the number of employees and their wages and salaries provide an adequate environment for the Macedonian socio-economy and society in order to produce appropriate value added i.e. GDP. Some budget users are more efficient and more effective in their work and thus, produce relatively higher value added than average, and some budget users are less efficient and less effective and produce relatively lower value added than average.

With an assessment of the average efficiency in the production of 1 denar value added of GDP from the allocation of 1 denar to the budget user and the payment of 1 denar per employee, we will obtain a quantified figure of how much more value added would have occurred in the Macedonian GDP in a situation of increased efficiency of the budget users to the efficiency of those budget users that are relatively most efficient in RM. This higher relative efficiency in the operations would make a proportionally higher added value, which higher efficiency will be a proxy for how much would the value added eventually increase if the budget users think within the frame of PBB.

Data

The selection of the data, inputs and outputs are based on:

- Budget of RM for 2012;
- Value Added according State Statistical Office for 2012;
- The Output is the value added for 2012 by the production method of GDP in ESS 2010 sector classification;
- The Inputs are the budget funds allocation per budget user, the costs for salaries and benefits for the budget users employees and the number of employees;
- The Inputs of the budget users are appropriately linked to the output (value added) of the sectors of the GDP production method according to the ESS 2010 classification of sectors.

According to the production method of GDP by ESS 2010 sector classification, there are 10 sectors. The first line budget users are linked to one of these 10 sectors of the GDP production method and by the ESS 2010 sector classification.

With the DEA and SFA analysis, we assess the average (in) efficiency of these budget users in the production of value added through the usage of the allocated budget and with the usage of the salaries and benefits.

4.2.5 Estimation Results

DEA-VRS estimation results

We estimate the DEA-VRS frontier¹⁵ for one period (year 2012) for 10 sectors with the GDP production method by the ESS 2010 sector classification. We use variable economies of scale and DEA, which is output oriented. The results are illustrated in the table below.

Insert Table 4 - DEA-VRS efficiency scores

The estimated average efficiency is approximately 60% (0,615), which means that budget users can reduce the inputs in an average of about 40% to achieve a maximum technical efficiency. Once again we note that we do not control for the heterogeneity of the sectors in our calculations and the calculations are based on the sector, which has shown the best results in the production of value added, while the inputs of budget users are taken into account. Thus, we are not getting into the individual scoring efficiency because we are interested in the average efficiency that is considered as an orientation value.

SFA estimation results

Cobb-Douglas SFA equation in the following algebraic form is used:

$$\ln(Y_i) = \beta \ln x_i + (V_i - U_i) \quad (6)$$

¹⁵ We use DEAP 2.1 software developed by Coelli (1996a).

The results of the SFA estimation¹⁶ of the Cobb-Douglas production function are given in the following table. The positive signs in front of the variable indicate that the variable has a positive effect on the efficiency.

Insert Table 5 – Results of the SFA estimation

From the table, we see that the γ statistics are statistically significant in showing that there is technical inefficiency and that the SFA model is better to use than OLS estimation model. The parameters are with the following mathematical sign: higher budget allocation would mean higher technical efficiency, and a higher rate for salaries would mean lower technical efficiency. The budget allocation is not statistically significant variable in our case, while the amount of the salaries and the benefits are statistically significant at the significance level of 1%.

Comparison of DEA-VRS efficiency scores with SFA efficiency scores

The comparison is illustrated in the following table

Insert Table 6. - DEA-VRS efficiency scores and SFA efficiency scores

The average technical efficiency with the SFA method is estimated at 88,7% and with the DEA-VRS method 61,5%. These results show that the efficiency can be improved in average by about 40% (DEA-VRS) or by 13% (SFA) by reduction of the inputs (lower wages or lower resource allocation for the corresponding rate) in order to achieve the same value added or with the same salaries and the same allocation of resources there could be an average increase of the value added in the range of 13% to 40%. The distribution of scores is on average around the mean, less with the SFA method than with the DEA-VRS method (difference between median and average). The standard deviation does not show large values. Once again, emphasizing the heterogeneity of sectors which are not controlled in our calculations.

4.2.7 Discussion – Estimation of Benefits

The aim of the study was to assess on average by how much could the technical efficiency in some of the budget users be improved to provide such a socio-economic and social environment for the economic agents to achieve higher value added in the Macedonian economy. We considered that the technical efficiency in Macedonia can be improved in the range between 13% and 40%. The implicit assumption is that this improvement among some of the budget users can be achieved by achieving the efficiency of those budget users that have the highest average efficiency.

The implicit assumption is that with the introduction of PBB what at least we expect to happen is for budget users to increase their technical efficiency at least to a level to be equal to the other more efficient budget users. If this happens, it is possible to expect benefits from the introduction of PBB at least in the range between 13% and 40% of the gross value added of the GDP. These are possible benefits in the range of 850 million euro to 2,5 billion euro.

¹⁶ We use Frontier software 4.1 developed by Tim Coelli (1996b).

Nevertheless, it cannot be expected that the benefits would be felt immediately. Based on the experience of a significant number of developed countries (Finland, Denmark, Sweden, which started the process in 1980s, later on the UK, Canada, Australia and Slovenia within the region Slovenia, which even after 15 years is still in the concept development phase, etc.¹⁷) That have implemented a PBB, the lesson learnt is that the introduction of this concept cannot be certainly confirmed as completed and it can last for decades. Considering the time periods of 3-4 decades of development and implementation of PBB in the developed economies (with developed public sector, political and democratic system), we establish the period when the benefits and costs can be expected from the implementation of the new budgeting concept.

Therefore, in this analysis, we assume gradual benefits of 2% per annum (in the following 50 years) out of the expected 13% to 40%, which we calculated and which are amounting to 850 million euro to 2,5 billion euro.

For the purposes of this study will continue to operate in this range of benefits, from the introduction of PBB in R.Macedonia and with a dynamics of 2% higher value added of the expected benefits from 13% to 40% annually. This is illustrated in the following chart which shows the Macedonian GDP in euros with a projection for a long term period (2% growth in the long-run) and simulation possible improvements of PBB introduction.

Insert Chart 1. - Simulation of GDP of RM from introduction of PBB with 13% and 40% increased efficiency, in million denars

Insert Table 7

5. Conclusion

To the best of our knowledge, this is the first study based on a developed methodology which focuses on estimation of costs and benefits of the overall policy reform for implementation of PBB. Thus, by developing a concrete platform for implementation of PBB this study will be especially important for a number of emerging and developing countries to estimate whether benefits are higher than the estimated costs of the reform and to have a solid base to decide whether they should or should not implement PBB. Having in mind that, this is the first analysis of its kind and significant space remains for future upgrading and improvement of the platform and methodology that were used in the research.

In order to assess the costs in our cost-benefit analysis we use the Regulatory Impact Assessment - RIA. This methodology is fully aligned with the existing system for strategic planning in the ministries and the policy coordination procedures as well as the decision-making in the Government of the Republic of Macedonia (RM). The methodology also represents an upgrade of the existing practices introduced in 2009, which also comply with the positive experiences and practices in the European Union Member States as well as the OECD countries. The Net Present Value of the estimated costs for a period of 50 years is 99 million euro (with a discount rate of 8%).

¹⁷ 40% of the counties develop the concept for over 10 years (see OECD, 2008).

To assess the benefits we used a microeconomic approach for measuring the technical production efficiency of gross value added in the Macedonian GDP, using the inputs of the budget users' budgets of the and their employee number. By using this methodology, through the valuation of the average efficiency in production of one denar value added of GDP from the allocation of one denar to the budget user and the payment of one denar per employee, we obtain a quantified rate of how much more value added would have occurred in the Macedonian GDP with an increased efficiency of the budget users to the efficiency of those budgetary users which are assessed as relatively most efficient in RM. This relatively higher efficiency would result in a proportionally higher value added, and the higher efficiency will be a proxy for the increase of the value added, if the budget users think within the frameworks of PBB. The expected benefits of the introduction of PBB by using this methodology are within the range of 13%-40% of the gross value added of the GDP. These are the potential benefits within the range of 850 million to 2.5 billion euro. Still, these benefits cannot be expected immediately. It is assumed that these will gradually take place in the following 50 years with 2 percentage points per annum. The net present value of the benefits is expected to reach 4.2 billion euro in the next 50 years (with a discount rate of 8%) with a 13% technical efficiency improvement. The net present value of the benefits is expected to reach 13 billion euro in the next 50 years (with a discount rate of 8%) with a 40% technical efficiency improvement.

The estimated benefits are higher than the estimated costs for the same period with a net present value of 99 million euro. Or, for every denar invested in this reform there are additional 2,600 denars of gross value added in the Macedonian GDP expected, if there is 13% technical efficiency improvement or for every denar/euro invested in this reform there are additional 8.000 denars of gross value added in the Macedonian GDP expected, if there is 40% technical efficiency improvement.

Taking into consideration the results of the cost-benefit analysis, without reluctance we can confirm that this reform on the case of the Macedonian budget system is more than necessary. The costs of implementation are symbolic in terms of what the policy makers can accomplish – i.e. create an efficient and effective mechanism for the allocation of public money. Thus, we hope that this attempt and pioneering analysis for assessment of the effects of the introduction of this concept will serve as an initial trigger that will provoke an impetus for reform in a number of countries facing similar challenges in the area of budgeting and public finance.

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Anex

Table 1. Phased Approach to introduction of performance based budgeting

<i>Phases*</i>	1st Phase			2nd Phase			3rd Phase			4th Phase			5th Phase	6th Phase	
<i>Month/ Activity</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
<i>Preparation of a platform for increasing institutional capacity</i>	Meeting with politicians (4 meetings with the 4 large political parties).	Meeting with politicians (2 meetings with the smaller political parties). 2 round tables with the civil sector and the academic community.		Designing of a portal of information, data and directions sharing (2 new employees for maintenance of the system).											
		Preparation of a study (2 foreign experts and 4 domestic experts).		Meetings with three pilot ministries which will be initially included in the implementation (3 meetings) and 2 meetings with the remaining budget users	Trainings and workshops of increasing the instruction's capacities – based on the conducted trainings needs assessment. Training for representatives (at least 5 sessions): Ministry of Finance, State Audit Office, Parliament, pilot ministries, Government.										
				Establishment of a special body within the Ministry of Finance (two meetings per month). Consisting of 3 representative of the Ministry, one representative of the 3 pilot ministries, 3	Working body of the Ministry of Finance together with the representatives of the institutions preparing the strategic document for reform. Reform of the Law on budgets, Law on state audit, Rules of procedure of the Assembly of R. Macedonia, Fiscal strategy of R. Macedonia										

<i>Phases*</i>	1st Phase			2nd Phase			3rd Phase			4th Phase			5th Phase	6th Phase	
<i>Month/Activity</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
<i>Preparation of a platform for increasing institutional capacity</i>				representatives of other budget users who will rotate on an annual basis and 3 new employees.			2014-2016, Strategic plan of Ministry of Finance 2014-2016, Strategic plan of pilot ministries.								
					Evaluation (study) conducted by the newly established body for institutional basis upon which the new concept will be built. Two external experts engaged.										
<i>Planning and budget process reforms aiming at performance</i>				Working body within the Ministry of finance together with 3 representatives from the 3 pilot ministries (total of 9 representatives from the pilot ministries further on are part of the work groups which should evolve in sectors), prepares program budgets for the institutions*			Development of various types of performance information—indicators (qualitative, quantitative, combined), monitoring of the implementation and contract preparation – 3 work groups comprised of maximum 7 representative members/sectors within the ministry (later on sectors) in each of the pilot ministries (5 members +2 external experts + contribution from other employees), under supervision of the regulatory body								

<i>Phases*</i>	1st Phase			2nd Phase			3rd Phase			4th Phase			5th Phase	6th Phase	
<i>Month/Activity</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
<i>Information on performance, incentives and motivation for efficiency and effectiveness</i>							<p>Regulatory body at the Ministry of Finance together with the work groups within the pilot ministries are responsible for preparation of the preparation of quarterly reports for performance achievements and good practices for creation of system and policies for incentivizing of the administration and the interested parties as well as system/mechanism for transparency and accountability. The working body within the Ministry of finance together with the work groups in the pilot ministries meet twice per month.</p>								
							<p>The reports, conclusions of the meetings as well as other information are published on the formerly created portal. The rest of the budget users can get informed, provide an opinion and request for organization of round tables or other means for their involvement and information. Preferably once quarterly a discussion/meeting to be organized with all budget users, to share experiences</p>								

<i>Phases*</i>	1st Phase			2nd Phase			3rd Phase			4th Phase			5th Phase	6th Phase
<i>Month/ Activity</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Monitoring and Evaluation</i>				Establishment of a special body for monitoring and evaluation of the implementation process and performance achievement. The body will consist of: 2 representatives of the Ministry of Finance body, 1 representative per pilot ministry, SAO and a representative (the president) of the Committee of financing and budget			Changes in the SAO operating regulations (formerly mentioned). Enabling the support to SAO for establishment of a specific sector for performance and fiscal policy audit. Initially, the sector will be comprised of three employees (two new employees and one current employees who will designate 50% of their time).							
<i>Corrective measures and decision making for improvements</i>										The reports (quarterly) of the work groups and the body within the Ministry of Finance, together with the results/reports of the monitoring and evaluation body and the SAO reports are submitted to the Committee of Financing and Budget within the Assembly and are discussed on a Parliamentary session.				

** Some of the phases/activities include establishment of bodies which will continue their operations and meet occasionally after their establishment. Due to better visual representation the table presents only the envisaged period for their establishment.*

Table 2: Cost assessment of introduction of performance-based budgeting

Phase	Step/Activity for PBB Implementation	Estimated costs for activity implementation	Value (In MKD.)
I	Meeting with politicians (4 meetings with the 4 large political parties). The meetings are envisaged with 5 representatives from the Ministry of Finance and three representatives of civil society sector.	Estimated cost calculation: 40% of the average compensation of the Ministry of Finance employees (4 out of 20 working per month = 20% + 4 more days for preparation). As a proxy for the cost of the representatives of the civil society is 20% of the average gross salary paid in the country in October 2014 which is 31.080 ¹⁸ denars + Plus as much for preparation. The average salary of the Ministry of Finance employee is 33.888 denars or 40% on a monthly basis is 13.556 denars. For the civil society the calculation is 12.432 denars on a monthly basis. Total = (5 * 13.556) + (3 * 12.432) = 67.780 + 37.296 = 105.076 denars	105.076 denars (occurring once, unless there is a need to repeat it as an additional cost)
I	Meeting with politicians (2 meetings with the smaller political parties). The meetings are envisaged with 5 representatives from the Ministry of Finance and three representatives of civil society sector. 2 round tables with the civil sector and the academic community. The round tables will be organized by the Ministry of Finance (the same number of persons)	Estimated cost calculation: 40% of the average compensation of the Ministry of Finance employees (4 out of 20 working per month = 20% + 4 more days for preparation). As a proxy for the cost of the representatives of the civil society is 20% of the average gross salary paid in the country in October 2014 which is 31.080 ¹⁹ denars + Plus as much for preparation. The average salary of the Ministry of Finance employee is 33.888 denars or 40% on a monthly basis is 13.556 denars. For the civil society the calculation is 12.432 denars on a monthly basis. Total = (5 * 13.556) + (3 * 12.432) = 67.780 + 37.296 = 105.076 denars	105.076 denars (occurring once, unless there is a need to repeat it as an additional cost)
I	Preparation of a study (2 foreign experts and 4 domestic experts). The domestic experts will be hired on a monthly basis -2 working months. The foreign experts will be engaged for 45 work days.	Estimated cost calculation: domestic experts (business specialists in business and administration) according to the SSO for 2010 gross earnings is 527.779 denars or 43.982 ²⁰ on a monthly basis (2 months = 87.964 denars). 4 local experts for total of 351.856 denars. Foreign experts will be engaged for 45 work days * 10.000 denars or 900.000 denars for two experts	1.251.856 denars (the amount is for 2 working months – occurring once)
II	Designing of a portal of information sharing and communication of interested parties, data and directions (2 new employees for maintenance of the system in the Ministry of Information Society and	Estimated cost calculation: Domestic experts (Specialized in information and communication technology) in accordance with the SSO calculations for annual gross salary for 2010 of 610.126 denars or 50.845 per month ²¹ (2 months = 101.690 denars) and total for 5 experts =	1.408.450 denars. (for experts- occurring once)

¹⁸ See more: <http://www.stat.gov.mk/PrikaziSoopstenie.aspx?rbtxt=41>

¹⁹ See more: <http://www.stat.gov.mk/PrikaziSoopstenie.aspx?rbtxt=41>

²⁰ See structure of compensation per groups: <http://www.stat.gov.mk/PrikaziSoopstenie.aspx?rbtxt=113>

²¹ See structure of compensation per groups: <http://www.stat.gov.mk/PrikaziSoopstenie.aspx?rbtxt=113>

Phase	Step/Activity for PBB Implementation	Estimated costs for activity implementation	Value (In MKD.)
	Administration). Hiring 5 domestic experts for designing of the portal. Domestic experts will be hired for period of 2 working months. Foreign experts will be hired for a period of 45 work days.	508.450 denars. Foreign experts hired for 45 work days * 10.000 denars or total for 2 experts 900.000 denars. Two newly employees, a proxy for the costs are the operating costs per employee in the Ministry of Information Society and Administration which are annually recorded at 469.000 denars. (or 39.083 per month)	+ 78.166 (per month) or 938.000 per annum for two new employees
II	Meetings with three pilot ministries which will be initially included in the implementation (3 meetings). 2 meetings with the remaining budget users previously included representatives in the meetings with the politicians are present on the meetings (3 representatives of the civil sector and 5 representatives from the Ministry of Finance).	Estimated costs calculation: 40% of the monthly compensation of the Ministry of Finance employees. A proxy for the costs for the civil society representatives is 20% of the average gross salary in the country in October 2014 which is 31.080 ²² denars + as much for preparation. The average salary for the Ministry of Finance per employee is 33.888 or 40% on a monthly basis which is 13.556 denars. For the civil society sector the calculation is 12.432 denars per month. Total = (5*13.556) + (3*12.432) = 67.780+37.296 =	105.076 denars (occurring once, unless there is a need to repeat it as an additional cost)
II	Establishment of a special body within the Ministry of Finance (two meetings per month). Consisting of 3 representative of the Ministry, one representative of the 3 pilot ministries, 3 representatives of other budget users who will rotate on an annual basis and 3 new employees.	The proxy for the engagement of the three representatives is 40% of the average compensation of the Ministry of Finance employees. The average gross salary of the Ministry of finance is 33.888 or 40% on a monthly basis 13.556 denars (for three representatives = 40.668). For the representatives of the three pilot ministries the costs are calculated at 40% of the average gross salaries = Ministry of education (535.548*40% =214.219 annually or 17.852 per month). Ministry of labor and social policy (350.372 *40%= 140.148 annually or 11.680 per month). Ministry of health (597.503*40%=239.001 annually, or 19.917 per month). The costs for three new employees are calculated based on the operating costs per employee in the Ministry of Finance which are recorded at 656.000 denars annually or 54.667 denars per month (for three employees = 164.001)	40.668+17.852+11.680+19.917+164.001 = 254.118 denars (per month)
II	Evaluation (study) conducted by the newly established body for institutional basis upon which the new concept will be built. 4 external experts: 2 domestic experts hired for 40 work days and 2 foreign experts hired for 20 work days.	The calculation of the costs is for the external experts only, since the engagement of the members of the newly established body within the Ministry of Finance are already calculated. Calculation of the estimated costs: domestic experts (Specialists for business and administration) According to the SSO for 2010 the gross annual salary is 527.779 denars, or 43.982 per month ²³ or 2.200 denars per day. (40 work days = 88.000. 2 domestic experts total 176.000 denars. Foreign experts for 20 work days * 10.000 denars or total for two experts 400.000 denars.	576.000 denars. (occurring once)

²² See for more details: <http://www.stat.gov.mk/PrikaziSoopstenie.aspx?rbtxt=41>

²³ See structure of compensation per groups: <http://www.stat.gov.mk/PrikaziSoopstenie.aspx?rbtxt=113>

Phase	Step/Activity for PBB Implementation	Estimated costs for activity implementation	Value (In MKD.)
II	Working body within the Ministry of finance together with 3 representatives from the 3 pilot ministries (total of 9 representatives from the pilot ministries further on are part of the work groups which should evolve in sectors), prepares program budgets for the institutions	The representatives of the three pilot ministries are calculated as 40% of the average gross salary (for two months) = Ministry of education (17.852 per month), Ministry of labor and social policy (11.680 per month), Ministry of health (19.917 per month). Total = (3*17.852) + (3*11.680) + (3*19.917) = 53.556 + 35.040 + 59.751 = 148.347 per month.	296.694 denars. (for two months total – occurring once)
II	Establishment of a special body for monitoring and evaluation of the implementation process and performance achievement. The body will consist of: 2 representatives of the Ministry of Finance body, 1 representative per pilot ministry, SAO and a representative (the president) of the Committee of financing and budget	The representatives of the three pilot ministries cost are calculated at 40% of the average gross salaries of Ministry of education (17.852 per month), Ministry of labor and social policy (11.680 per month), Ministry of health (19.917 per month). Total = 17.852 + 11.680 + 19.917 = 49.450 per month. The representative of the SAO 40% of the monthly gross salary compensation 25.273 (63.184*40%) per month. Costs for compensation of the Parliament committee at 40% of the average gross salary of the R. Macedonia Parliament = 21.281 (53.204*40%) per month. Total for the Monitoring and evaluation body operation = 96.004 denars	96.004 denars. (per month)
III	Changes in the SAO operating regulations (formerly mentioned). Enabling the support to SAO for establishment of a specific sector for performance and fiscal policy audit. Initially, the sector will be comprised of three employees (two new employees and one current employees who will designate 50% of their time).	The estimated costs for this activity is based on the total operating costs for three new employees as part of the initial sector. According to the 2015 Budget the operating costs per employees in SAO is 1.012.000 (or 84.333 denars per month). Costs for two new employees will be 168.667 denars. For the current third employee 50% time the costs are 31.592 (50% of the average gross salary of SAO)	200.259 denars. (per month)
II-III	Trainings and workshops of increasing the instruction's capacities – based on the conducted trainings needs assessment. Training for representatives (at least 5 sessions): Ministry of Finance, State Audit Office, Parliament, pilot ministries, Government.	Each of the sessions estimates around 30 representatives of each institution for a period of 1 week. The estimated cost per trainee for hired expert and implementation of the trainings is 15.000 denars. The cost for 30 participant trainees is 450.000 denars. The estimated value for 5 training sessions is 2.250.000 denars. The sessions can be conducted in the planned period of 5-6 months and can be repeated in the next 3-5 years.	2.250.000 denars. (occurring once, distributed in a 5-6 months period)
II-III	Working body of the Ministry of Finance together with the representatives of the institutions preparing the strategic document for reform. Reform of the Law on budgets, Law on state audit, Rules of procedure of the Assembly of R. Macedonia, Fiscal strategy of R. Macedonia 2014-2016, Strategic plan of Ministry of	The estimated costs for this activity to be implemented in a period of 6 months is calculated based on the costs for engagement of 3 representatives (legal representative at least 2) of each of the concerned institutions by the reform of the listed documents (if needed others should be included as well): Ministry of finance, the three pilot ministries, SAO, the Assembly. The costs for the representatives of the three pilot ministries are calculated at	328.863 denars (per month) Activity conducted in a period of 6 months – Total cost = 1.973.178 denars

Phase	Step/Activity for PBB Implementation	Estimated costs for activity implementation	Value (In MKD.)
	Finance 2014-2016, Strategic plan of pilot ministries	40% of the average gross salaries of Ministry of education (17.852 per month), Ministry of labor and social policy (11.680 per month), Ministry of health (19.917 per month). Total= (3*17.852) + (3*11.680) + (3*19.917) = 148.506 per month (for 6 month). SAO representative cost calculated at 40% of the monthly gross salary 25.273 (63.184*40%). For the three SAO representative = 75.819. The cost for the Assembly committee 40% of the average gross salary of the Assembly of RM = 21.281(53.204*40%) per month. For three representative = 63.843. Costs for the Ministry of Finance as average gross salary per employees at 33.888 or 40% per month 13.556 denars (three representatives = 40.668). Total for the activity = 328.836 denars per month (deadline for implementation 6 months)	
II-III	Development of various types of performance information—indicators (qualitative, quantitative, combined), monitoring of the implementation and contract preparation – 3 work groups comprised of maximum 7 representative members/sectors within the ministry (later on sectors) in each of the pilot ministries (5 members +2 external experts + contribution from other employees), under supervision of the regulatory body	Costs for representatives of the three pilot ministries calculated at 40% of the average gross salary Ministry of education (17.852 per month), Ministry of labor and social policy (11.680 per month), Ministry of health (19.917 per month). Total = (5*17.852)+(5*11.680)+(5*19.917)= 89.260+ 58.400 + 99.585=247.245 per month Other costs calculation: external experts (Specialists for business and administration) in accordance with the SAO calculations for gross salary for 2010 for this type of experts is 527.779 denars, or 43.982 per month ²⁴ . Two experts' costs per month is 87.964 denars.	335.209 denars (per month)
III-IV	Regulatory body at the Ministry of Finance together with the work groups within the pilot ministries are responsible for preparation of the preparation of quarterly reports for performance achievements and good practices for creation of system and policies for incentivizing of the administration and the interested parties as well as system/mechanism for transparency and accountability. The working body within the Ministry of finance together with the work groups in the pilot ministries meet twice per month.	None (previously defined)	
III-IV	The reports, conclusions of the meetings as well as other information are published on the formerly	None	

²⁴ See structure of compensation per groups: <http://www.stat.gov.mk/PrikaziSoopstenie.aspx?rbtxt=113>

Phase	Step/Activity for PBB Implementation	Estimated costs for activity implementation	Value (In MKD.)
	created portal. The rest of the budget users can get informed, provide an opinion and request for organization of round tables or other means for their involvement and information. Preferably once quarterly a discussion/meeting to be organized with all budget users, to share experiences.		
IV	The reports (quarterly) of the work groups and the body within the Ministry of Finance, together with the results/reports of the monitoring and evaluation body and the SAO reports are submitted to the Committee of Financing and Budget within the Assembly and are discussed on a Parliamentary session.	None	
	Approximation of the total annual costs for implementation, incentivizing and human resources for all three pilot ministries for the concept PBB is estimated at 10% of the total work time and efforts of each of the ministries.	Ministry of education and science – number of employees: 5.646, costs for gross salaries: 3.023.706.000, the cost for 10% is 302.371.000 or 1, 35% of the ministry's budget. Ministry for labor and social policy– number of employees 1.815, costs for gross salaries 635.925.000, the cost for 10% is 63.525.500 or 0, 2% of the ministry's budget. Ministry of Health– number of employees 147, costs for gross salaries 87.833.000, the cost for 10% is 302.371.000 or 0, 15% o of the ministry's budget.	374.746.400 denars. (for all three pilot ministries, annual cost) 31.228.867 (per month)
...	After three years of implementation of pilot projects, other budget users are included in the new concept of PBB. Besides the already calculated costs for the functioning of bodies / authorities for the implementation of the process that were presented	The estimate of the total annual cost for implementation of the concept of PBB for all budget users, for a period of three years during the implementation process and adaptation is 10% of the time and effort of each employee within the budget users in R. Macedonia. Specifically, this means that the average 20 working days of each employee an additional 2 days will be used for reform and motivation to implement the new concept. Number of employees according to the 2015 Budget are 50.325.	2.455.041.000 denars (annually, which is around 1% of the total budget for the budget users)

Phase	Step/Activity for PBB Implementation	Estimated costs for activity implementation	Value (In MKD.)
	above for the first year – an approximate cost of the entire system is also calculated – it is assumed that it will be necessary for at least three years, while the public sector is adjusting to the new concept.	The total costs for salaries and allowances is 24.450.405.000. Calculation of 10% of the amount for salaries is 2.455.041.000.	

Table 3 – Calculation of the costs in phases, months and years

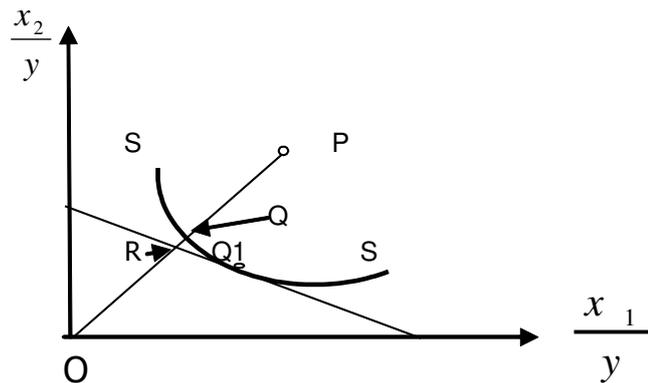
Phase	I			II			III			IV		
Month	1	2	3	4	5	6	7	8	9	10	11	12
Costs (in denar)	105.076	105.076	1.251.856	1.408.450	105.076 576.000 148.347	148.347						
I YEAR				78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166
				254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118
					96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004
						200.259	200.259	200.259	200.259	200.259	200.259	200.259
							450.000	450.000	450.000	450.000	450.000	450.000
							328.863	328.863	328.863	328.863	328.863	328.863
							335.209	335.209	335.209	335.209	335.209	335.209
TOTAL	105.076	105.076	1.251.856	32.969.601	32.486.578	32.334.624	32.971.486	32.971.486	32.971.486	32.971.486	32.971.486	32.192.623
Phase	I			II			III			IV		
Month	1	2	3	4	5	6	7	8	9	10	11	12
Costs (in denar)	105.076	105.076			148.347	148.347						
II YEAR	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166
	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118
	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004
	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259

							450.000	450.000	450.000	450.000	450.000	
	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209
	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867
TOTAL	32.297.699	32.297.699	32.192.623	32.192.623	32.340.970	32.340.970	32.642.623	32.642.623	32.642.623	32.642.623	32.642.623	32.192.623
Phase	I			II			III			IV		
Month	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>
Costs (in denar)	105.076	105.076			148.347	148.347						
III YEAR	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166
	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118
	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004
	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259
							450.000	450.000	450.000	450.000	450.000	
	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209
31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	31.228.867	
TOTAL	32.297.699	32.297.699	32.192.623	32.192.623	32.340.970	32.340.970	32.642.623	32.642.623	32.642.623	32.642.623	32.642.623	32.192.623
Phase	I			II			III			IV		
Month	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>
Costs (in denar)	105.076	105.076			148.347	148.347						
IV YEAR	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166	78.166
	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118	254.118
	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004	96.004
	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259	200.259
							450.000	450.000	450.000	450.000	450.000	
	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209	335.209
204.586.750	204.586.750	204.586.750	204.586.750	204.586.750	204.586.750	204.586.750	204.586.750	204.586.750	204.586.750	204.586.750	204.586.750	
TOTAL	205.655.582	205.655.582	205.550.506	205.550.506	205.698.853	205.698.853	206.000.506	206.000.506	206.000.506	206.000.506	206.000.506	205.550.506

The fifth and sixth year incur the same cost as the fourth year, while starting from the seventh year the approximate costs for all employees are in amount of 204.586.750 denars, the costs for meetings are in the amount of 105.076 denars, while the costs for training with the amount of 450.000 denars are eliminated and solely the cost for the functioning and development of the new concept remain.

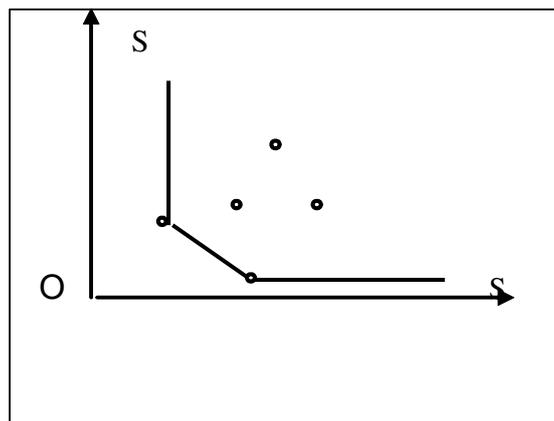
Table 3		Implementation period					Functioning period (costs related to the functioning of the new concept after the implementation – the same cost is kept in the following years)
Months	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
1	105,076.00	32,297,699.00	32,297,699.00	205,655,582.00	205,655,582.00	205,655,582.00	963,756.00
2	105,076.00	32,297,699.00	32,297,699.00	205,655,582.00	205,655,582.00	205,655,582.00	963,756.00
3	1,251,856.00	32,192,623.00	32,192,623.00	205,550,506.00	205,550,506.00	205,550,506.00	963,756.00
4	32,969,601.00	32,192,623.00	32,192,623.00	205,698,853.00	205,698,853.00	205,698,853.00	963,756.00
5	32,486,578.00	32,340,970.00	32,340,970.00	205,698,853.00	205,698,853.00	205,698,853.00	963,756.00
6	32,334,624.00	32,340,970.00	32,340,970.00	205,698,853.00	205,698,853.00	205,698,853.00	963,756.00
7	32,971,486.00	32,642,623.00	32,642,623.00	206,000,506.00	206,000,506.00	206,000,506.00	963,756.00
8	32,971,486.00	32,642,623.00	32,642,623.00	206,000,506.00	206,000,506.00	206,000,506.00	963,756.00
9	32,971,486.00	32,642,623.00	32,642,623.00	206,000,506.00	206,000,506.00	206,000,506.00	963,756.00
10	32,971,486.00	32,642,623.00	32,642,623.00	206,000,506.00	206,000,506.00	206,000,506.00	963,756.00
11	32,971,486.00	32,642,623.00	32,642,623.00	206,000,506.00	206,000,506.00	206,000,506.00	963,756.00
12	32,192,623.00	32,642,623.00	32,642,623.00	205,550,506.00	205,550,506.00	205,550,506.00	963,756.00
Total (in denars)	296,302,864.00	389,518,322.00	389,518,322.00	2,469,511,265.00	2,469,511,265.00	2,469,511,265.00	11,565,072.00
Total (in €)	4,857,424.00	6,385,546.26	6,385,546.26	40,483,791.23	40,483,791.23	40,483,791.23	189,591.34

Graph 1. Illustration of DEA dynamics



Source: T. J. Coelli, *A Guide to DEAP Version 2.1: A Data Envelopment Analysis (Computer) Program*, 1996a

Graph 2 - Calculation of the data isoquant



Source: T. J. Coelli, *A Guide to DEAP Version 2.1: A Data Envelopment Analysis (Computer) Program*, 1996a

Table 4 - DEA-VRS efficiency scores

	Sector, ESS 2010	Constant	Variable	Economy of scale
1	Agriculture, forestry and fishing	0.006	0.544	0.011
2	Mining and quarrying; Manufacturing; Electricity, gas, steam and air conditioning supply; Water supply; sewerage, waste management and remediation activities	0.141	1.000	0.141
3	Construction	1.000	1.000	1.000
4	Wholesale and retail trade; repair of motor vehicles and motorcycles; Transportation and storage; Accommodation and food service activities	0.020	1.000	0.020
5	Information and communication	0.080	0.376	0.213
6	Financial and insurance activities	0.000	0.173	0.002

7	Real estate activities	0.106	0.834	0.127
8	Professional, scientific and technical activities; Administrative and support service activities	0.002	0.190	0.011
9	Public administration and defense; compulsory social security; Education; Human health and social work activities	0.001	0.887	0.001
10	Arts, entertainment and recreation; Other service activities; Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	0.003	0.142	0.024
	Average	0.136	0.615	0.155

Table 5 – Results of the SFA assessment

	Variables $\beta \ln x_i$	SFA Cobb-Douglas model
0	Intercept - β_0	0.098 (0.066) ²⁾
1	Budget allocation in denars	0.347 (1.462)
2	Salaries in denars	-0.015*** (-6.062)
	Sigma squared	2.936*** (21.608)
	γ	0.999*** (2282617)
	LL ¹⁾	-1.565

Note:

10 observations

1) LL is log likelihood of the model.

2) t-statistics in parenthesis

* significant at a significance level of 10% (critical value of 1.860)

** significant at a significance level of 5% (critical value of 2.306)

*** significant at a significance level of 1% (critical value of 3.355)

Table 6. - DEA-VRS efficiency scores and SFA efficiency scores

	DEA scores	SFA scores
Mean	0.615	0.887
Median	0.689	0.701
Maximum	1.000	0.983
Minimum	0.142	0.007
Std. Dev.	0.369	0.353

Chart 1. - GDP and GDP with PBB introduction

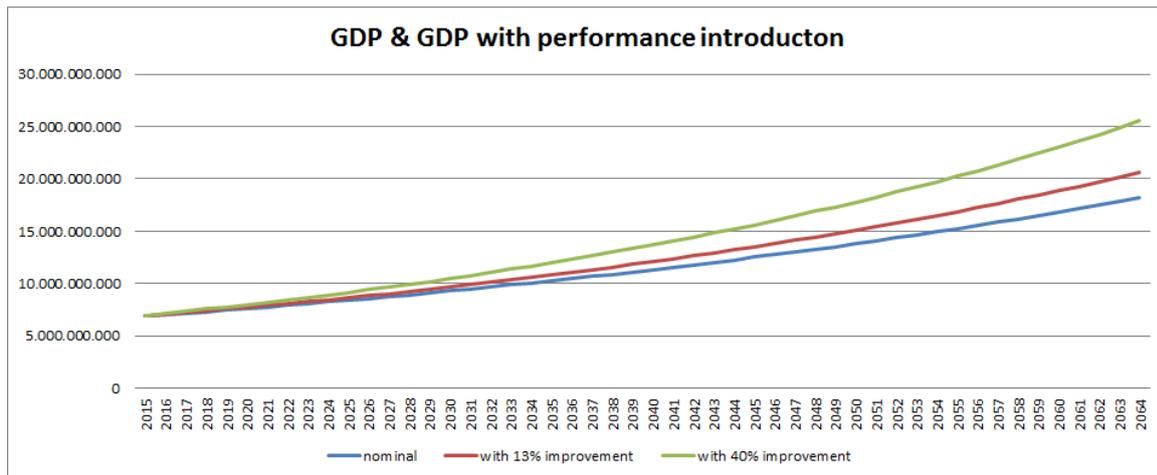


Chart: Simulation of GDP of RM from introduction of PBB with 13% and 40% increased efficiency, in million denars.

Table 7

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Functioning period (costs related to the functioning of the new concept after the implementation – the same cost is kept in the following years)
296,302,864.00	389,518,322.00	389,518,322.00	2,469,511,265.00	2,469,511,265.00	2,469,511,265.00	11,565,072.00
4,857,424.00	6,385,546.26	6,385,546.26	40,483,791.23	40,483,791.23	40,483,791.23	189,591.34