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UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

MEd RESEARCH REPORT

"ADAPTATION OF THE MARGINAL BUDGETING FOR BOTTLENECKS MODEL FOR PLANNING, COSTING AND BUDGETING IN THE EDUCATION SECTOR"

Momo E. Duehring

- In cooperation with the United Nations Children's Fund -

A research report submitted to the Wits School of Education, Faculty of Humanities, University of the Witwatersrand in partial fulfillment of the requirements for the degree of Master of Education by combination of coursework and research

Johannesburg, 2013

Abstract

Already in its Education Strategy, adopted by the Executive Board in 2007, UNICEF fully obligates to the international commitment to universal education and defines its contribution to national efforts to fulfil children's right to education. In September 2010, UNICEF further published a special report on a study showing that an equity-focused approach to child survival and development is the most practical and cost-effective way of meeting the health MDGs for children. For the modelling process of the research a simulation was run employing the Marginal Budgeting for Bottlenecks (MBB) model, jointly developed by the World Bank and UNICEF. This model has been widely used in international public health research to design and test development strategies.

In its consistency with the human-right based approach, the MBB model addresses bottlenecks in the capacity of duty-bearers to fulfil human-rights as well as barriers of the capacity of right-holders to claim their rights. Using the MBB model, policymakers and researchers can simulate varying configurations of service delivery modes to expand access of coverage and measures to encourage usage. For each strategy, the model generates the predicted impact on intervention coverage and outcomes, overall cost and cost-effectiveness.

UNICEF's global refocus on equity and the most disadvantaged children makes it necessary to introduce improved planning and monitoring instruments. In this context, the MBB model is used as a budgeting and simulation tool for UNICEF interventions in health and nutrition. UNICEF aims to use harmonized tools across different sectors to reduce transaction costs and to improve comparison and sharing of lessons learned between the different sectors. However, it is also important to adapt and develop instruments based on the diverse needs of different sectors to ensure best results.

Therefore, the main purpose of this research is to find an answer to following question:

Can, and if so, how can the Marginal Budgeting for Bottlenecks model, developed for the health sector, be adapted for planning, costing and budgeting allocations in the education sector?

An adapted Marginal Budgeting for Bottleneck model for education could be applied for a comprehensive sector analysis, comparing intervention alternatives and setting policy goals and strategies. It could further be used to monitor the implementation of major sector reforms with regard to the comparison of potential versus actual impact of interventions on learning achievements.

Applying two production functions, the MBB model applies the basic principle of Cost-Effectiveness Analysis, comparing the costs of education interventions with the corresponding expected impact on increased service coverage. However, detailed inputs, outputs, outcomes and impacts and the corresponding correlations would need to be defined for an Service Production Function (input-output) and an Education Production Function (output-outcome/impact).

Further, a selection of globally proved remedial actions to overcome sector bottlenecks need to be specified. Education interventions largely depend on the country context and different countries and regions apply different remedial actions. Since the relationship of input and impact is not as linear as the illness-treatment relationship in health, international research and comparison of effective interventions would need to be conducted.

The MBB model is applying service coverage determinants of both, supply and demand side. Therefore the approach could be a helpful instrument in the context of the Human Rights-based Approach as used within programming of the United Nations and UNICEF. However, applying further analysis on humanitarian aspects of programming always depends on the availability of disaggregated information.

Based on the outline of the Service Coverage Concept and the Marginal Budgeting for Bottlenecks model and the conceptual adaptation of the MBB model for its use in education, following suggestions can be made for the Service Delivery Modes and Service Coverage Determinants:

Five Service Delivery Modes	Ten Sub-Packages
1. Pre-School Education	1.1 Public Early Childhood Education
	1.2 Private Early Childhood Education
2. Formal Basic Education	2.1 Public Formal Basic Education
	2.2 Private Basic Education
3. Non-Formal Basic Education	3.1 Public Non-Formal Basic Education
	3.2 Private Non-Formal Basic Education
4. (Lower) Secondary Education	4.1 Public Secondary Education
	4.2 Private Secondary Education
5. Adult Literacy, Continuing Education	5.1 Youth and Adult Literacy Interventions
	5.2 Continuing Education

	Six Service Coverage Determinants	Indicator
Supply side	**1. Availability of essential commodities**	Pupil-Classroom Ratio by grade
		Pupil-Textbook Ratio
	2. Availability of human resources	Pupil-Teacher Ratio (or Pupil-qualified Teacher Ratio) by grade
	3. Geographic and financial accessibility	School-Distance
		School-Costs by grade
Demand side	**4. Initial Utilization**	Net-Enrolment Ratio (or Gross-Enrolment Ratio) by grade
	5. Continuous Utilization	Survival Rate by grade
	6. Effective Utilization	Graduation Ratio
		Graduation Test Scores

Overall, an MBB model in education could have added value for education planning, budgeting and impact simulation. However, it has to be considered that applying the model requires extensive data input for all six Service Coverage Determinants for each of the five Service Deliver Modes. Although, the MBB model could be adjusted to only cover a certain sub-sector within Quality Education for All.

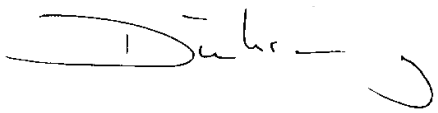
Keywords

Education Planning, Education Planning Models and Tools, Bottleneck Analysis in Education, Costing and Budgeting in Education, Impact Assessment in Education, Equity in Education, Marginal Budgeting for Bottlenecks (MBB), Analysis and Projection Model (AnPro)

Declaration

I declare that this research report is my own unaided work. It is being submitted for the degree of Master of Education at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

14th day of August in the year 2013



Momo E. Duehring

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I. Introduction and Background

1. Introduction

Over sixty years ago in 1948, the nations of the world, speaking through the Universal Declaration of Human Rights, asserted that everyone has a human right to education (UN, 1948/12). Specific targets to achieve Education-for-All were set in 1990 during the World Conference on Education-for-All and renewed in 2000 on the World Education Forum (UNESCO, 1990/03; UNESCO, 2000/04).

Furthermore, in 2000 the General Assembly of the United Nations (UN) adapted the Millennium Declaration, including Millennium Development Goals (MDG) to be achieved by 2015. Of the eight MDG targets, target 2 declares universal primary education to assure that children everywhere will be able to complete a full course of primary schooling, and target 3 promotes gender equality at all levels of education (UN, 2000/09; UN, 2001/09).

The 2006 World Development Report of the World Bank focused on 'Equity and Development', arguing that poverty reduction comes about through individuals, families and communities taking advantage of the opportunities available to them to better their lives, and that a focus on equity should be a central concern in the design and implementation of a policy for development and growth.

In the paper, equity is defined in terms of two basic principles: (1) equal opportunities, meaning a person's life should be determined primarily by his or her talents and efforts rather than by pre-determined circumstances such as race, gender, social and family background; and (2) avoidance of deprivation in outcomes, particularly in health, education and consumption (The World Bank, 2006).

The 2010 Education for All – Global Monitoring Report published by UNESCO[1], titled 'Reaching the Marginalized' distinguishes between (1) education poverty - young adults aged 17 to 22 who have fewer than four years of education; (2) extreme education poverty - young adults who have fewer than two years of education; as well as (3) the bottom 20%, those with the fewest years of education in a given society.

The report further identified three broad sets of policies that can combat marginalization, the inclusive education triangle: (1) expanding access and affordability, (2) providing a suitable learning environment, and (3) establishing equal entitlements and opportunities (UNESCO, 2010).

The human right to education and the contribution of education to economic growth and development, both support a focus on equity and the most marginalized. Almost all governments endorse the principle of equal opportunity in education and recognize that restricting access to education violates human rights. The globally agreed goals to achieve Education for All pledge to explicitly identify target and respond flexibly to the needs of the most marginalized (UNESCO, 2010).

Furthermore, studies confirm that socioeconomic background is the overwhelming determinant of learning outcomes, with schools accounting for no more than 20% of the variation in test performance (The World Bank, 2006; Pritchett L., 2004/06).

[1] UNESCO – United Nations Educational, Scientific and Cultural Organization

2. Problem Statement and Outline of Research

Already in its Education Strategy, adopted by the Executive Board in 2007, UNICEF2 fully obligates to the international commitment to universal education and defines its contribution to national efforts to fulfil children's right to education. The broad objectives are: (1) achieve universal primary education by making education systems inclusive and focused on quality, (2) achieve elimination of gender disparity and address other disparities, and (3) restore normalcy for children in emergency situations. It further states that UNICEF will be a champion for addressing disparities in education and will put special emphasis on the most disadvantaged population groups (UNICEF, 2007/05).

In September 2010, UNICEF also published a special report on a study showing that an equity-focused approach to child survival and development is the most practical and cost-effective way of meeting the health MDGs for children. For the modelling process of the research, a simulation was run employing the Marginal Budgeting for Bottlenecks (MBB) model, jointly developed by the World Bank and UNICEF. This model has been widely used in international public health research to design and test development strategies.

In its consistency with the human-right based approach, the MBB model addresses bottlenecks in the capacity of duty-bearers to fulfil human rights as well as barriers of the capacity of right-holders to claim their rights. Using the MBB model, policymakers and researchers can simulate varying configurations of service delivery modes to expand access of coverage and measures to encourage usage. For each strategy, the model generates the predicted impact on intervention coverage and outcomes, overall cost and cost-effectiveness (UNICEF, 2010/09).

UNICEF's study states that a refocus of efforts on an equity-based approach, is right in principle and right in practice, and accelerates progress towards the MDGs faster than the current path, and is even more cost-effective and sustainable. However, the aim of this research is not to prove or disprove this statement, but to analyse education planning tools and try to provide a comprehensive model to assess bottlenecks in education services, plan and budget overcoming said bottlenecks and simulate corresponding impacts, with a focus on equity and within the human rights based approach.

UNICEF's global refocus on equity and the most disadvantaged children makes it necessary to introduce improved planning and monitoring instruments. In this context, the MBB model is used as a budgeting and simulation tool for UNICEF interventions in health and nutrition. UNICEF aims to use harmonized tools across different sectors to reduce transaction costs and to improve comparison and sharing of lessons learned between the different sectors. However, it is also important to adapt and develop instruments based on the diverse needs of different sectors to ensure best results.

Therefore, the main purpose of this research is to find an answer to following question:

Can, and if so, how can the Marginal Budgeting for Bottlenecks model, developed for the health sector, be adapted for planning, costing and budgeting allocations in the education sector?

[2] UNICEF – United Nations Children's Fund

In the first step, the education planning process will be introduced with its different planning level and stages. Following this planning process and suggested steps within the context of the international commitment 'Education for All' (EFA) of corresponding planning guides and handbooks, the commonly used education planning approach will be presented. This includes the Results-based Approach within education for analysing the education sector and identifying bottlenecks (Chapter II. Section 3). For planning remedial action to overcome those bottlenecks, further models for comparing alternative strategies and formulating policies for improved education service delivery are discussed (Chapter II. Section 4). This includes the analytical approaches of comparing alternative strategies through their cost-effectiveness, weighing the costs of an educational intervention against its outcomes. In the next step, common analysis and planning aspects and its corresponding indicators will be outlined, highlighting required data to be analysed and corresponding costs to be projected for implementing remedial actions (Chapter II. Section 5).

The Human Rights-based Approach to Programming will be discussed in the context of the Universal Declaration of Human Rights - the foundation of programming within the United Nations, With regard to programming in education, the corresponding Human Rights-based Approach to Education-for-All will be presented. This includes the different application steps and elements, as well as a sector specific dimension of access to education, the right to quality in education and the respect in the learning environment (Chapter III. Section 2). In a further step, the Equity-based Approach, with the basic principles of equal opportunities and avoidance of deprivation in outcomes, and different approaches of measuring equity, are presented (Chapter III. Section 3).

The outline of the Marginal Budgeting for Bottlenecks (MBB) model as it has been developed for and used within the health sector will build the foundation for the further adaptation of the MBB model for education. This includes the conceptual framework of the Service Coverage Concept (Chapter IV. Section 2) as well as the basic elements and application modules the Marginal Budgeting for Bottlenecks model (Chapter IV. Section 3).

To provide a comprehensive analysis of the applicability of the Marginal Budgeting for Bottlenecks model, the application of the conceptual framework and theoretical assumptions to education will be discussed first. This builds upon the coverage concept and the five coverage measurements defined through the Service Coverage Concept (Chapter V. Section 2), as well as the three service delivery modes and six coverage determinants later defined by the Marginal Budgeting for Bottleneck model (Chapter V. Section 3). This will also include a brief discussion on the different Modules and Application Steps within the MBB model and some suggestions for the practical adaptation of the excel-based MBB tool for its application in education.

Finally, opportunities as well as limitations of applying the Marginal Budgeting for Bottlenecks model in education will be discussed, summarizing the findings of the research (Chapter VI). This will include the application of the Human-Rights-based Approach as well as the Equity-based Approach within the MBB model. Furthermore, the utilization of the adapted MBB tool will be discussed in terms of the planning stages and levels applicable, required data input, as well as the added value of output data for education planning.

II. Education Planning and Economic Approaches

1. Introduction

Recalling education as a fundamental right for all people, specific targets were set in 1990, during the World Conference on Education for All in Jomtien and renewed in 2000 at the World Education Forum in Dakar (UNESCO, 1990/03; UNESCO, 2000/04).

This resulted in six goals to achieve Education for All (UNESCO, 2000/04, page 43):

> *"(1) Expanding and improving comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children;*
>
> *(2) Ensuring that by 2015 all children, particularly girls, children in difficult circumstances and those belonging to ethnic minorities, have access to and complete, free and compulsory primary education of good quality;*
>
> *(3) Ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life-skills programmes;*
>
> *(4) Achieving a 50 per cent improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults;*
>
> *(5) Eliminating gender disparities in primary and secondary education by 2005, and achieving gender equality in education by 2015, with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality;*
>
> *(6) Improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially."*

The Dakar Framework for Action, adapted during the World Education Forum 2000, calls upon government to ensure that the EFA goals and targets are achieved by 2015. It further contains two fundamental conditions, which must be fulfilled at the national level before the international community will contribute resources required for the implementation of the national plans (UNESCO 2000/04):

(1) National EFA Forums to develop National EFA Plans under government leadership and in direct consultations with national civil society, specifying reforms to address the EFA goals and establishing a sustainable financial framework, including mid-term performance indicators.

(2) National EFA Plans credible for contributions of partner members of the international community[3] working in a consistent, coordinated and coherent manner to ensure that resource gaps are filled, according to its comparative advantage in supporting the EFA goals.

Achieving those international commitments require a holistic approach to translate the above illustrated goals into realistic and feasible country strategies. In the following, guidance and commonly used approaches and techniques on (1) how to structure the education planning process, (2) how to analyse bottlenecks in the education sector, (3) how to compare alternative policies, and (4)

[3] Including the first-ever global compact on education, the Education-for-All Fast-Track-Initiative established 2002, and renamed the Global Partnership for Education in 2011. This global initiative is comprised of 46 developing countries and more than 30 bilateral, regional and international agencies, development banks, the private sector as well as local and global civil society groups, in order to achieve global goals on education set in 2000 through EFA and MDG. Further information: www.globalpartnership.org

how to analyse and project corresponding data and cost, are further discussed. Based on these international standards, guidelines and practical advice, the most relevant criteria for the adaptation and comparison of education planning models are drawn for its later use in this research.

2. The Education Planning Process

Engaging in planning and managing the development of education systems becomes more and more strategic due to various reasons: (1) One may wish to plan all activities deemed essential, but might not necessarily achieve the expected results and goals; (2) More resources do not inevitably stand for better results and the way the resources are used matters and can lead to a different level of benefit; and (3) It is difficult to plan everything one would wish to do and it is necessary to make choices through a balanced decision-making process (Chang G., 2008; UNESCO, 2006).

As a follow up to the World Education Forum and in order to support National EFA Forums to develop National EFA Plans, UNESCO published an 'EFA Planning Guide' in 2001. The purpose of the guide is to provide a working tool for educational planners to translate the EFA goals into realistic and feasible national plans and action programmes. The planning guide provides practical advice on how to prepare long term education plans, with the focus on the methodology of planning resource requirements applicable to basic education delivered both by formal and non-formal means (UNESCO, 2001).

Complementary to the planning guide, UNESCO further published a 'Implementing National EFA Plans – Handbook for Decentralized Education Planning' in 2005, capturing on-going modernization efforts in public sector management and changing approaches in planning and programming, such as decentralized planning and programme-based approach to planning (UNESCO, 2005).

The EFA planning guide distinguishes between three levels of education planning based on the most common structure of national education systems (UNESCO, 2001):

(1) Level I: Schools - cluster schools or communities concerned with matters such as organizing the teaching and learning process as well as parent and community participation;
(2) Level II: Townships - districts or provinces supporting school functions through provision and management of human and financial resources;
(3) Level III: Central - national government setting guidance and standards regarding the teaching and learning process as well as management of human and financial resources.

Ideally, the education planning proceeds in three stages, whereas each stage corresponds to a particular type of plan (UNESCO, 2001):

(1) Stage 1: Long-term planning / Strategic Plan (usually for 10 or more years) – Setting the strategic policy goals, basic concepts and principles in the context of the overall social and economic development of the country;
(2) Stage 2: Medium-term planning / Operational Plan (usually for 3 to 5 years) – Defining specific objectives and targets including implementation programmes and modalities, containing a financial plan (what needs to be done, when, how, with what resources to attain the long-term policy goals);
(3) Stage 3: Short-term planning / Implementation Plan (usually 3 years or less) – Breaking down implementation programmes and modalities into activities and budgets, including milestones and

progress indicators (what will be done, when, by whom, with what amount/source of funding to achieve medium-term targets).

The functions and tasks of the three levels of education planning can differ based on the specific country context as well as governance and management approach and may change over time. As all three levels are involved in short-term planning, level II and III (districts/provinces, central/national) are mainly involved in the medium-term planning, and primarily level III (central/national) is usually concerned with long-term planning.

Education planning, the process through which an education plan is prepared, aimed at identifying the most appropriate course of action to address issues, set priority objectives and targets, and provides the basis for cost effective resource allocation. The planning process consists of a sequence of four phases, including (UNESCO, 2001):

(1) Phase 1: Finding the facts about how the sector functions today and identifying issues that need to be addressed in the future, as well as strengths that need to be maintained or reinforced (i.e. analysing the situation);

(2) Phase 2: Charting the future by setting policy goals and strategic objectives, formulating implementation programmes, assessing resource requirements, setting priorities and designing implementation strategies and modalities (i.e. preparing the plan);

(3) Phase 3: Designing the action by drawing up outline implementation plans;

(4) Phase 4: Adopting the plan as an official government document.

Since the planning process is continuous, it also includes monitoring of the plan implementation, regular updating of the sector analysis, assessing the results and impact, and feeding back this information into adjustments of policies and implementation strategies.

(5) Phase 5: Implementing, monitoring and reviewing the plan regularly to adapt to changing needs and conditions within the overall planning framework;

(6) Phase 6: Evaluating the plan and its achievements in terms of reaching stated qualitative and quantitative objectives and targets, in order to improve future planning.

Global initiatives[4] in development cooperation and corresponding international commitments of governments increasingly influence this national education sector strategy's decisions and planning. Commitments to goals and targets formulated by consensus at the international level, such as PRSP/PRGS[5], EFA, MDGs, etc., are of high importance in the co-operation with external partners and have introduced a so called programme-based approach to planning (UNESCO, 2005):

- Mid-Term Expenditure Framework (MTEF) refers to a programme and a programme budget that, contrary to traditional single year budget practice, covers a period of several years (usually three years). It comprises features such as a detailed sector development programme, a detailed estimate of required resources, and an assessment of progress and achievement of targets at the end of each year as input to the next annual budget allocation. The MTEF is the link between the

[4] Besides target related global initiatives, a mind-shift has taken place in terms of improving the effectiveness of aid. Through the Paris Declaration (2005), Accra Agenda for Action (2008) and the Busan Partnership (2011) a series of specific implementation measures (1) Ownership, (2) Alignment, (3) Harmonization, (4) Focus on Results and (5) Mutual Accountability have been put in place and globally monitored. Further information: http://www.oecd.org/dac/aideffectiveness/

[5] PRSP – Poverty Reduction Strategy Papers; PRGS – Poverty Reduction and Growth Strategy

long-term education plan and its implementation through annual budgets, with the education plan informing the MTEF, which in turn informs the annual budget allocation

- Targeted Budget Support (TBS)[6] is a means of focusing the use of resources to achieve specific objectives of the education plan and a shift away from the line budgeting or sub-sector budgeting towards outcome-based budgeting. As budget allocations are made for an entire programme, including all related activities and inputs, in a distinct budget line or section, corresponding funds allocated are specifically earmarked for the implementation of only this programme.
- Sector-Wide Approach (SWAp) provides a framework for government and donor co-operation aimed at increasing the cost effectiveness of the joint use of financial resources and enhancing the result and impact. Principal features are a joint sector or sub-sector development programme with corresponding budget, and a common funding basket to pool the financial contribution of both government and donors. As there are different mechanisms of who is managing the joint funding basket (donor, donor and government or government), in the long run the responsibility for managing the resources and implementing the programme is shifting towards the government.

International goals and commitments, and the introduction of new programming approaches to improve the effectiveness of aid require a further alignment and harmonization of education management. This includes a holistic and comprehensive approach to education planning and financing as well as implementation management and implementation monitoring arrangements.

3. Analysing the Sector and Identifying Bottlenecks

In 2006 UNESCO published the 'National Education Sector Development Plan – A Result-Based Planning Handbook' to promote result-based planning and management and related planning methods and techniques. It is the first attempt at applying the logical framework approach to education in a sector-wide planning context (UNESCO, 2006).

Result-Based Management (RBM) is a management strategy, with improving performance and achieving results as the central orientation. It provides a coherent framework for strategic planning, management and monitoring, based on a result framework / result chain (OECD/DAC, 2010):

Result Framework/Chain: The programme logic that explains how the development objective is to be achieved, including causal relationships and necessary sequences - beginning with inputs, moving through activities and outputs, and culminating in outcomes and impacts.

- Inputs: financial, human, and material resources mobilized for a development intervention and its use to produce specific outputs.
- Outputs: products, capital goods and services, which result from a development intervention, relevant to the achievement of outcomes.
- Outcomes: likely or achieved short-term and medium-term effects of an intervention's outputs.
- Impacts: positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.

[6] Whereas General Budget Support is a contribution of an external partner to a national budget without earmarking for any specific programme or sector, Sector Budget Support is a contribution to a national budget earmarked for a specific sector, and Targeted Budget Support is a contribution earmarked for a specific programme within the national budget or within the national budget of a specific sector.

Implementing result-based management during the planning process, usually the Logical Framework Approach (LFA) is applied. It is a management tool to improve the design of development interventions by identifying strategic elements (inputs, outputs, outcomes, impact), their causal relationships, and the assumptions that may influence success (OECD/DAC, 2010; UNESCO, 2006):

Logical Framework: A top-down hierarchy of objectives that a development intervention should contribute to, directly and intended – beginning with the overall goal to contribute to, moving down to the purpose of the intervention and necessary outputs and activities.

- Goal: the higher-order objective to which a development intervention is intended to contribute (comparable to the positive, primary, directly intended impacts of the RBM approach).
- Purpose: the publicly stated objectives of the development programme or project (comparable to the positive, primary, directly intended outcome of the RBM approach).

The result-based management approach results from an evaluation perspective and is reflective of the positive and negative, primary and secondary, directly or indirectly, intended or unintended effects (outcomes/impacts) of a development intervention. However, the logical framework approach is a planning tool and therefore aims to focus on the positive, primary, directly and intended objectives (purpose/goal) an intervention is supposed to contribute to.

Within the education planning process, the LFA can be used as an analytical technique to structure the assessment of the current situation of the sector. Collecting and analysing data, carefully reviewing how the education system functions and examining various contextual factors, can help identify critical issues and challenges, thus constructing remedial actions. Following an in-depth investigation, collecting, analysing and compiling available data in a synthetic form, a problem analysis should be conducted and a logical hierarchy of problems should be established (UNESCO, 2006).

Usually, a Problem Tree Analysis is used for the purpose of analysing sector functions and identifying constraints in service delivery: Carefully list existing problems within the education sector and identify a core problem. Determine which of these issues are causes and which are effects of the core problem. Arrange both causes and effects in hierarchy and identify how the causes relate to each other and what the root causes of the core problem are. Those identified as causes are placed below the core problem, while those identified as effects are put above. The root causes are those placed at the very bottom of the problem tree. One will have to act on these root causes in order to improve cause, core problem and effects.

Based on such a sector diagnosis and problem analysis, the LFA can be applied to establish a logical hierarchy of objectives; ways and means by which these objectives will be achieved. Translating the problem tree into an objective tree can be used to analyse and formulate education policy objectives and alternative strategies, and to prepare an action programme and implementation plan.

In addition to establishing a hierarchy of objectives, external factors, which relate to the relationship between the different levels of the cause-problem-effect chain, need to be taken into account. Such assumptions about factors or risks, which could affect the progress or success of a development intervention, require further assessment regarding their importance and probability of being true. The more important and more risky the assumption is, the greater the need to consider reducing the risk by internalizing the problem or preparing a contingency plan (UNESCO, 2006).

Measuring the achievement of a goal, purpose, outputs and the progress made through implementing the activities, it is necessary to formulate measurable and objectively verifiable indicators. An indicator is a quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement to reflect the changes connected to an intervention. In this context, measurable means that there is an unambiguous definition and the indicators are specified in terms of quantity and time to be achieved.

The education sector analysis and the identified hierarchy of problems lead to the prioritization of issues to address and the design of a hierarchy of objectives. However, some questions related to the economic, technical and financial feasibility might still be open. To assess alternative strategies to achieve the set objectives, it is useful to identify a number of criteria against which alternative actions can be ranked or scored.

4. Comparing Alternatives and Formulating Policies

When comparing alternative strategies, it has to be considered, that many educational recommendations that show promise in terms of greater effectiveness are so costly relative to their contribution to effectiveness that they may not be appropriate choices. They may require far greater resources to get the same effect than an intervention with somewhat lover effectiveness, but high effectiveness relative to costs. Hence, both the costs and the effectiveness have to be taken into account when ascertaining the most efficient means of attaining particular educational goals (Levin H. & McEwan P., 2000).

There are mainly three analytical approaches to weighing the costs of an educational intervention against its outcomes, and therefore compare alternative strategies through their cost-effectiveness (Levin H. & McEwan P., 2000; Levin H. & McEwan P., 2001; McEwan P., 2011):

A Cost-Effectiveness Analysis (CEA) compares two or more educational interventions according to their effectiveness and costs in accomplishing a particular objective. By combining information on effectiveness and costs, it can be determined which intervention provides a given level of effectiveness at the lowest cost or conversely, which intervention provides the highest level of effectiveness for a given cost. It is useful for analysing and comparing investment alternatives that have a single or small number of objectives as measurement of effectiveness, but becomes unwieldy if there are multiple measures. It allows choosing which alternative is most cost-effective, but cannot judge overall worth of a single alternative.

A Cost-Benefit Analysis (CBA), on the other hand, evaluates alternatives according to their costs and benefits, both of which are directly expressed in monetary terms. Presuming that monetary benefits can be fully measured, they can be compared directly to monetary costs. This approach can be used to directly assess whether benefits outweigh costs and allows a clear statement of whether the intervention is desirable in an absolute sense. The main limitation of this approach is that it is often difficult to place monetary values on all relevant educational benefits and in many fields it is rarely feasible to express outcomes in monetary terms. Thus, cost-benefit analysis often focuses on a narrow range of outcomes, such as job earnings, with risks understating the size of benefits.

Another analysing tool, not very popular in education so far, is the Cost-Utility Analysis (CUA), which evaluates educational alternatives according to the overall utility of stakeholders, or their satisfaction. It incorporates individual preferences for units of effectiveness and promotes stakeholder

participation in the decision-making process. However, sometimes it is difficult to arrive at consist and meaningful measures of individual preferences, which can produce a range of conflicting results. Further, this approach cannot support arguments as to whether a single alternative is worth the investment, and is only useful for comparing two or more alternatives.

The two most common approaches, CEA and CBA, measure the impact of an intervention in achieving a given policy goal against its costs. This ratio, when calculated for a range of alternative strategies addressing the same policy goal, allows a comparison of those interventions in terms of their cost-effectiveness. The value of cost-effectiveness analysis lies in its ability to summarize a complex intervention in terms of an illustrative ratio of effects to costs and its ability to use these common measures to compare multiple interventions against each other. When done correctly, such analysis can be a useful tool for decision makers to compare the results of alternative strategies when deciding how to allocate limited resources in the most effective way (Dhaliwal I. et al., 2011).

As the CBA puts both costs and benefits onto the same scale (usually a monetary scale) it delivers not just a relative but also an absolute judgment, whether or not an intervention is worth the investment, and which intervention, among several, yields the best rate of return. On the downside, a CBA requires a number of assumptions about the monetary value of benefits, where different people or organizations may place very different values on outcome measures. A CEA, on the other hand, allows the user to apply their own judgment about the value of the benefits. It provides information on the costs required to achieve certain goals, leaving the user to decide whether or not it is worth it (Dhaliwal I. et al., 2011).

For CEA to be a useful alternative to CBA, however, it is necessary to agree on an outcome measure, which would be the key objective of many different interventions and policymakers. International goals and commitments, such as MDGs and EFA, highlight the importance of 'access to quality education for all'. While there are several indicators agreed on to measure 'access' to education (e.g. admission rate, enrolment rate, attendance rate), a more challenging question is how to appropriately measure the 'quality' of learning in a comparable way. Some important aspects of learning can be captured through measuring test scores, and internationally standardized tests are carried out on a regular basis to provide comparable information on learning achievements.[7]

The fundamental challenge of a CEA or CBA lies in identifying the causal relationship between an educational alternative and a measure of effectiveness. This is determined by the particular context of the analysis and by the objectives of the investment alternatives. However, to assess whether individuals reap better educational outcomes from an educational intervention, it is necessary to estimate how they would have fared in the absence of the intervention. Such a 'control group'[8] essentially, has to be the same, before an alternative is implemented to serve as a good estimate of the counterfactual. Subsequent differences between the groups can then be attributed with great confidence to the impact of the alternative intervention (Levin H. & McEwan P., 2002).

[7] e.g. Programme for International Student Assessment Test (PISA), Trends in International Mathematics and Science Study (TIMSS), The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ), Latin American Laboratory for the Assessment of Quality in Education (LLECE), etc.
[8] The control group can be defined randomly through randomized experiments, assigned through a quasi-experimental selection, or voluntarily through non-experimental approaches.

The broad definition of costs as the value of all resources that are utilized, had they been assigned to their most valuable alternative uses, highlight the understanding of costs as the sacrifice of an opportunity that has been forgone (opportunity costs). In other words, by using resources in one way, the ability to use those resources in another way has been given up. Thus, all resources used for an intervention, whether measureable in monetary term or not, have to be considered (Levin H. & McEwan P., 2000).

Once estimated costs and outcomes are in hand, they must be jointly interpreted in order to rank alternative investments from most the desirable to the least desirable. In a CEA, the cost-effectiveness ratio of each alternative is obtained by dividing the costs of each alternative by its effectiveness (C/E)[9], and is interpreted as the cost of obtaining an additional unit of effectiveness. Those alternatives with smaller ratios are relatively more cost-effective than alternatives with higher ratios. They provide a given effectiveness at a lower cost and are the better candidates for new investments. However, the cost-effectiveness ratio cannot be used to judge an investment's absolute desirability, as there is no means of weighing pecuniary costs against non-pecuniary effects (Levin H. & McEwan P., 2000; McEwan P., 2011).

In a CBA, the ratio of costs to benefits is interpreted in a similar fashion, by dividing the costs of each alternative by its benefits (C/B). Because the analysis expresses costs as well as outcomes in monetary terms, this cost-benefit ratio has an additional interpretation. The overall worth of an alternative investment can be assessed in addition to its desirability, relative to other alternatives. If the costs outweigh the benefits of an intervention (C/B >1), the investment should not be implemented. As the CBA expresses outcomes in pecuniary terms, there are several alternative measures of project worth that can be employed, as such as net present value and internal rate of return (Levin H. & McEwan P., 2000; McEwan P., 2011).

Cost-effectiveness comparison can be a powerful tool to inform the debate about the feasibility of investment alternatives. Policymakers will always make comparisons across development interventions, giving limited resources and the large number of alternatives aimed at similar outcomes that compete for those resources. However, as economic analysis highly depends on the availability, quality and reliability of the data that go into the analysis, it should be taken as one more input into a decision, along with other considerations, and not the only factor (Dhaliwal I. et al., 2011).

5. Analysing and Projecting Data and Costs

The 2001 UNESCO EFA Planning Guide, the 2005 EFA Implementation Handbook and the 2006 Result Based Planning Handbook, further outline considerations of analysing and projecting data and indicators, and categorizing and projecting costs. Furthermore, in 2003 the World Bank published a learning manual 'Tools for Education Policy Analysis', containing a set of analytical tools that can assist in identifying policy choices that best serve the set objectives considering limited resources (UNESCO, 2001; UNESCO, 2005; UNESCO, 2006; Mingat A. et al., 2003).

For an education plan to be realistic it needs to be based on quality data and robust research results. Main sources for data and other information relevant to analysis and projections are the Education Management Information System (EMIS) used within the Ministry of Education and its de-central

[9] It is also common to calculate effectiveness-cost ratios (E/C), indicating the units of effectiveness that are obtained for each unit of cost that is incurred (e.g. 1 Dollar).

bodies (districts, schools, etc.), Demographic Household Surveys (DHS) and other relevant surveys conducted by the National Statistic Office and used by the Ministries of Planning, Finance and Labour. Other potential sources are data collected at district and school level, studies conducted by international organizations, civil society and private education service providers (UNESCO, 2001).

External information concerning the environment of the education sector, influencing the structure, organization and performance of the sector, are usually produced by organizations outside the education sector and typically include following:

- Demography and geography, e.g. total population and growth rate, population by age, sex, religion and ethnicity, population located urban/rural and migration of population groups;
- Economy, e.g. Gross Domestic Product (GDP) per capita and growth rate, national budget and public expenditures by sector, personnel costs and market prices;
- Social conditions, e.g. poverty indicators, health and nutrition indicators, access to water and sanitation, living conditions of women and children.

Internal information concerning the education system itself, including statistics on enrolments, teachers, infrastructure, teaching and learning material, equipment, budget and expenditures, are required for the situation analysis of the education sector:

- Early childhood education and pre-school education, e.g. enrolment by age, sex, region and social status, number of pre-schools, pre-school curriculum, expenditure and financing;
- Formal basic education, e.g. enrolment primary/lower secondary by grade, internal efficiency of primary/lower secondary, completion rate and transition to secondary, expenditures;
- Out-of school youth and children, e.g. number and reason of dropouts; region and social status, enrolment in non-formal education, child labour and activities in non-formal labour market;
- Youth and adult literacy, e.g. years of schooling, region, sex and social status, enrolment in non-formal youth/adult education, activities in formal and non-formal labour market.

The most common analysis and planning aspects, corresponding indicators and techniques used for formal basic education (i.e. primary education and lower secondary education) include for example:

- Access to education: admission rates, enrolment rates, attendance rates and transition rates, applied to school population (by level/grade) compared to the whole population (by age);
- Equity in education: admission rates, enrolment rates, attendance rates, transition rates, and drop-out rates and repetition rates, applied to a certain population sub-group (by level/grade) in comparison to national or provincial average;
- Quality in education: pupil/teacher ratio, pupil/classroom ratio, pupil/textbook ratio (by level/grade), qualification of teachers, quality of teaching-learning process and adequacy of teaching content, in comparison to student test scores;
- Relevance of curriculum: graduate tracer studies employment/unemployment rates by years of schooling and degree level, admission of university graduates, labour market feedback on job opportunities by degree level and field;
- Internal efficiency: promotion rate, repetition rate, drop-out rate, graduation rate (by level/grade) in relation to indicators measuring access to education and quality in education
- External efficiency: rates of returns (relation of net-present-value of benefits of education and costs of education expressed in monetary terms) by level/grade compared to other countries;

- Cost and financing: costs per pupil, costs per graduate, education expenditure in relation to GDP, education expenditure in relation to total budget, public vs. private costs.

The UNESCO Result Based Planning Handbook 2006 Annex 1 provides a comprehensive set of principal indicators and their calculation commonly used to analyse and diagnose the education sector. Furthermore, UNESCO published standards for the classification of education systems suitable for assembling, compiling and presenting statistics of education, as well as technical guidelines on education indicators to support better comparison of educational systems and statistics (UNESCO/UIS 2009/11; UNESCO, 2001).

The term cost has different meanings, depending on the context and purpose for which it is used. In governmental education plans, the terms 'cost' designates the monetary value of all inputs required for the functioning of the education sector, as foreseen in the plan, and which must be provided for by the education authorities. Hence, a government education plan contains only 'direct costs', i.e. costs of goods and services required for the functioning of the educational institutions and for sector management. Further, the plan only covers 'public costs', which are financed with funds from the budgets of the authorities, which operate the institution through the public budgets.

'Private/indirect costs' such as expenditures by parents to send their children to school as well as opportunity costs to the families in the form of income foregone are not included. However, assessing these indirect costs of education is nevertheless important for the formulation of the plan; as such costs are a decisive factor in determining the demand of families for education and influencing the government's budget allocation pattern.

Public/direct costs of an education system are usually standardized into two categories of costs:

- 'Capital costs' (investments), which occur only once, or from time to time, but not regularly every year, and not continuously; and
- 'Recurrent costs' (consumption), which occur regularly and continuously every year, which are used the same year and therefore cannot be used again the following year.

Further, it is useful for purposes of analysis and projections to group costs according to whether they are directly related, and therefore significantly sensitive to changes in the number of pupils, or teachers, or schools, or whether they are relatively insensitive.

With regard to outcome-based planning and budgeting, long-term and medium-term education plans are structured in the form of programmes, groups of measures and activities corresponding directly to the same objective(s). On the one hand, this can follow the structure of the education sector designing programmes by sub-sector. On the other hand, the programmes can be oriented towards major functions with a programme for quality improvements, or one for access to education.

An approach, which has proven to be practical in costing a plan, consists of grouping activities into three functional programme cost categories, based on the EFA goals (UNESCO, 2001):

(1) Category 1: Costs related to access to education (e.g. construction of classrooms, expansion of existing schools, provision of furniture and equipment, replacement of obsolete facilities, teacher pre-service training, printing and distribution of teaching/learning material, scholarship and special programmes for out-of-school children)
(2) Category 2: Costs related to quality and relevance of education (e.g. construction of laboratories and libraries, provision of technical equipment, teacher in-service training, revision and

development of teaching/learning material, inspection and pedagogical advisory services, learning achievement tests and further research and studies)

(3) Category 3: Costs related to management of the education system for administrative services which serve the entire education sector, not directly related to the number of pupils, teachers and schools (e.g. staff and operations of the central ministry as well as de-central education offices).

For each of above categories projections must be made for each plan-year and the entire plan-period. There is no standardized way of making such projections, but an approach, which has proven to be reliable and relatively simple, consists of the following five cost projection steps (UNESCO, 2001):

(1) Step 1: Determining the costs prevailing in the base year (the year preceding the first plan-year), by using standard 'unit costs' (average costs per unit of output, calculated by taking the total cost and dividing it by the total output);

(2) Step 2: Projection of the development of each 'cost creating component' of the plan (number of pupils, of teachers, of schools, of textbooks, etc.), which may be broken down into a number of sub-components (e.g. pre-service teacher training, in-service teacher training, etc.);

(3) Step 3: Assessment of resource implications of each of the projected components (e.g. increasing number of pupils will require an increase in trained/recruited teachers, construction/maintenance of classrooms and printed/distributed textbooks);

(4) Step 4: Projection of the likely availability of funds, taking into account (i) the share of the government budget likely to be allocated to the education sector, and (ii) the likely allocation of these funds within the education sector and between sub-sectors;

(5) Step 5: Comparison of required resources with likely available resources to assess possible resource gaps; Three types of measures may be considered to close such gaps: (i) cost components must be reviewed to identify possibilities of reducing the costs by changing targets and/or changing technical coefficients (e.g. increasing pupil/teacher ratio), (ii) possibilities of increasing the funds must be explored through more cost-sharing (e.g. increasing fees/charges, reducing subsidies/scholarships), and (iii) lobbying for a higher share for a sub-sector within the education budget or for the education sector within the national budget.

Usually the classification of financial resources follows the accounting regulations and practices in place. The budget items that are used are often a combination of the different classifications by nature, level of education and function. In any case, a credible multi-year projection of resources can hardly be estimated without a computerized simulation model. Simulations can provide advance information on annual costs for implementing educational reforms and development plans, foresee budgetary gaps, and identify fields for which additional investments are required (UNESCO, 2006).

A systemic forecasting tool helps in considering the dynamics of the education sector and the detection of the interrelations of a number of parameters, which influence the operation and the improvement of educational services. The UNESCO 'EFA Planning Guide' and the 'Implementing National EFA Plans Handbook' suggest a data management and planning tool 'Analysis and Projection Model' (ANPRO) (UNESCO, 2001; UNESCO, 2005).

III. Education Programming and Humanitarian Approaches

1. Introduction

In December 1948 in Paris, the nations of the world, speaking through the Universal Declaration of Human Rights asserted that everyone has a Human Right to Education (UN 1948/12, page 76):

> *"(1) Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.*
>
> *(2) Education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms. It shall promote understanding, tolerance and friendship among all nations, racial or religious groups, and shall further the activities of the United Nations for the maintenance of peace.*
>
> *(3) Parents have a prior right to choose the kind of education that shall be given to their children."*

Already in its Education Strategy, adopted by the Executive Board in 2007, UNICEF[10] fully obliges to the international commitment to universal education and defines its contribution to national efforts to fulfil children's right to education. The broad objectives are: (i) achieve universal primary education by making education systems inclusive and focused on quality, (ii) achieve elimination of gender disparity and address other disparities, and (iii) restore normalcy for children in emergencies and post-crisis situations. It further states, that UNICEF will be a champion for addressing disparities in education and will put special emphasis on the most disadvantaged population groups (UNICEF, 2007/05).

Founded on the principles of universal human rights, the United Nations established mechanisms to mainstream rights-based approaches in their country programming. In the following, the relevant (1) Human Rights Based Approach to programming, relevant for all UN country programmes, and the (2) Equity Based Approach to programming, crosscutting priority within UNICEF's country programmes are further discussed. In addition to earlier discussed criteria for the adaptation and comparison of education planning models, further relevant criteria will be deduced to cover those two important aspects for programming within the United Nations Children's' Fund.

2. Human Rights Based Approach

In 2003 the United Nations Development Group (UNDG) adopted a common understanding of a 'Human Rights-Based Approach to Development Cooperation' (HRBA), to assure that human rights are mainstreamed in the various activities and programmes of all UN entities. The common understanding highlights the importance to further the realization of human rights as laid down in the Universal Declaration of Human Rights and other international human rights in all programmes of development co-operation, policies and technical assistance. Within the United Nations the human rights standards guide all development cooperation and programming in all sectors and in all phases of the programming process. Therefore, development cooperation contributes to the development of the capacities of duty-bearers to meet their obligations and rights-holder to claim their rights.

[10] UNICEF – United Nations Children's Fund

The approach distinguishes several universal principles that inform a rights-based approach (UNDG/HRBA, 2003):

(1) Universality and Inalienability: all people everywhere in the world are entitled to human rights, and cannot voluntarily give them up, nor can others take them away from him or her;

(2) Indivisibility: human rights are all inherent to the dignity of every person and have equal status as rights, they cannot be ranked in a hierarchical order;

(3) Interdependence and Interrelatedness: the realization of one right often depends, wholly or in part, upon the realization of other human rights;

(4) Equality and Non-Discrimination: all individuals are equal as human beings and are entitled to their human rights without discrimination of any kind;

(5) Participation and Inclusion: every person is entitled to actively, freely and meaningfully participate and contribute to development in which human rights can be realized;

(6) Accountability and Respect for the Rule of Law: states and other duty-bearers are answerable for the observance of human rights and have to comply with legal norms and standards.

The implementation of the human rights-based approach is monitored through the Human Rights Mainstreaming (HRM) mechanism established 2009, which focuses on promoting a coordinated and coherent UN system-wide approach towards the integration of human rights principles, on providing coherent and coordinated support in mainstreaming human rights, and on contributing to the integration of human rights issues in the overall advocacy and development agenda.[11]

In 2007 the rights-based approach was further fine-tuned by UNICEF and UNESCO to address the educational rights, as 'A Human Rights-Based Approach to Education for All'. The goal of a rights-based approach to education is to assure every child a quality education that respects and promotes his or her right to dignity and optimum development. The right to education was founded in 1948 in Article 26 of the Universal Declaration of Human Rights, highlighting the right to free elementary education directed to the full development of the human personality and the prior right of parents to choose the kind of education for their children. This concept was affirmed in 1989 in Article 28 and Article 29 of the Declaration of the Rights of a Child (CRC), further strengthened through the principles of non-discrimination, best interest of the child, the right to life, survival and development, and the right of the children to express their views in all matters affecting them (UNICEF/UNESCO, 2007/09; UN, 1948/12; UN, 1989/11).

The approach fully obligates to the six universal principles described above and further distinguishes following application steps and elements (UNICEF/UNESCO 2007/09):

(1) Situation Assessment and Analysis:

  (a) Analyse legislative, policy and practice environment, especially its actual implementation through adequate resources, capacities, public information and awareness;

  (b) Focus on primary responsibility of government, while being aware of the responsibilities and capacities of other duty-bearers, such as local authorities, schools, teachers, parents, etc.;

  (c) Analyse rights violations and denials, and its immediate, underlying and structural causes, extended to access to education, quality in education and respect for children's rights;

[11] http://hrbaportal.org/human-rights-mainstreaming-mechanism (17th July 2012); http://www.undg.org/index.cfm?P=1452 (17th July 2012)

(d) Focus on the poorest and most vulnerable, as these groups are usually the most disempowered and at greatest risk of violation or denial of their right.

(2) Assessing Capacity for Implementation:

(a) Capacity of right-holders to claim their rights: obstacles in the capacity of children and parents may occur through a lack of information on their rights and mechanisms;

(b) Capacity of duty-bearers to fulfil obligations: obstacles in the capacities of government and public authority may derive from lack of resources, responsibility and commitment.

(3) Programme Planning, Design and Implementation:

(a) Engage with government in a constructive dialogue regarding its obligations, and if necessary provide incentives, technical assistance and capacity building;

(b) Involve claim holders in the assessment, decision making and implementation of education law, policies and interventions, and involve civil society to promote government accountability;

(c) Pay special attention to the most marginalized and discriminated groups, and develop programming specifically to reach the poor and disadvantaged groups.

(4) Monitoring and Evaluation:

(a) Measure changes in the lives of children, and whether educational rights are better realized or no longer violated; Measure changes in legislation, policy and practice, and their impact;

(b) Measure changes in relation to equity and non-discrimination in respect of access to education, the quality of that education and experiences of children within it;

(c) Address opportunities for participation and active citizenship of children and other stakeholders in the wider development of education policy.

Adopting a rights-based approach to education further requires a framework that highlights the need for a holistic approach to education, reflecting the universality and indivisibility of all human rights. The framework has to address the right of access to education, the right to quality in education and the respect for human rights in education. These dimensions are interdependent and interlinked, and a rights-based education necessitates the realization of all three.

The rights-based conceptual framework consists of following sector-specific dimensions (UNICEF/UNESCO, 2007/09):

(1) The right of access to education:

(a) Education throughout all stages of childhood and beyond: The Committee on the Rights of the Child[12] interprets the right of education as beginning at birth, which in this context implies the right to (i) early childhood education. Whereas the human rights law and the Education for All goals clearly affirm that every child is entitled to free, compulsory (ii) primary education. The obligations in respect of (iii) secondary education are to encourage its development and to make it available and accessible to every child, and free where possible. In terms of (iv) higher education, governments should provide education opportunities, which are accessible on the basis of capacity by every appropriate means.

[12] Committee on the Rights of the Child (1999): General Comment No. 13 - The right to education; 1999

(b) Availability and accessibility of education: To achieve free primary education, each child must be provided with an available school place or learning opportunities. All learning environments must be physically and economically accessible for every child. Governments have the obligation to establish (i) appropriate legislative and policy framework and provide (ii) qualified teachers and (iii) adequate resources and equipment.

(c) Equality of opportunities: Governments should take action to ensure the provision of education that is both inclusive and non-discriminatory and that is adapted to ensure the equal opportunity of every child to attend. It has the obligations to develop legislation, policies and support services to remove all direct and indirect (i) economic, (ii) social and (iii) cultural barriers in the family and community that impede children's access to school.

(2) The right to quality[13] in education:

(a) A broad, relevant and inclusive curriculum: The Committee on the Rights of the Child stipulates that the curriculum must be of direct relevance to the child's social, cultural, environmental and economic context, and his or her present and future needs and take full account of the child's evolving capacities. The curriculum must enable every child to (i) acquire the core academic curriculum and basic cognitive skills, together with (ii) essential life skills that equip children to face life challenges and make well-balanced decisions. Further, it must develop (iii) respect for human rights and fundamental freedoms.

(b) Rights-based learning and assessment: There should be respect for the role of the learners, who should be recognized as active contributors to their own learning, rather than passive recipients of education. Teaching and learning should (i) respect evolving and differing capacities of learners and must involve a (ii) variety of interactive methodologies to create stimulating and participatory learning. For the assessment of learning achievements (iii) sensitive and constructive methods, taking into account differing abilities of the learners. As a great instrument of accountability and transparency in education, the dissemination of such assessment results should be used to (iv) assess the achievements of educational objectives and to (v) adjust policy and resources accordingly.

(c) Child-friendly, safe and healthy environments: Schools should take measures to contribute towards children's health, safety and well-being, to ensure optimum development of the child.

(3) The right to respect in the learning environment:

(a) Respect for identity: The Convention on the Rights of the Child stresses the right of the children to enjoy their own culture, practice their own religion and use their own language.

(b) Respect for participation rights: Further, the Convention on the Rights of the Child establishes that children are entitled to express their views on all matters of concern to them.

(c) Respect for integrity: The Convention on the Rights of the Child[14] not only demands that children are protected from all forms of violence, but that school discipline is administered in a manner consistent with the child's dignity.

[13] Although there is no officially established definition of quality in education, most attempts to define it incorporates two fundamental perspectives: (1) cognitive development as primary objective, with the effectiveness of education measured against its success in achieving this objective; (2) creative and emotional development, by passing global and local cultural values, such as peace, citizenship, security and equality down to future generations. UNICEF/UNESCO (2007/09)

[14] Convention on the Rights of the Child (1989), Article 28 (2)

3. Equity Based Approach

An equity-based approach can be deduced from the human rights-based approach, mainly through the two principles of: (1) Universality and Inalienability: all people everywhere in the world are entitled to human rights, and cannot voluntarily give them up, nor can others take them away from him or her; (2) Equality and Non-Discrimination: all individuals are equal as human beings and are entitled to their human rights without discrimination of any kind. Moreover, an equity-based approach to education can be based on the human right to education itself, claiming that everyone has the right to education, and the corresponding Education for All goals to ensure that all children, particularly girls, children in difficult circumstances and those belonging to ethnic minorities, have access to and complete free and compulsory primary education of good quality (UNDG/HRBA, 2003).

The World Bank 2006 World Development Report focused on 'Equity and Development', arguing that poverty reduction comes about through individuals, families and communities taking advantage of the opportunities available to them to better their lives, and that a focus on equity should be a central concern in the design and implementation of policies for development and growth. The report states that globally the mean years of schooling increases continuously from 3.38 years in 1960, over 4.67 years in 1980, to 6.30 years in 2000, while inequality declined. Despite the progress, mean levels of educational attainment in Low-Income Countries, especially in Sub-Saharan Africa and South Asia remain low, even for the youngest generation (The World Bank, 2006).

Perhaps the oldest manifestation of concern with equity and the avoidance of deprivation come from religion, where the notion of social justice and a duty toward the poor are endorsed. Equity is also a key theme in political and ethical philosophy highlighting the concept of fairness and economic distribution. Different cultures and religions around the world may differ in important respects, but they all share a concern with equity and fairness. Furthermore, arguing from an economic point of view, the report documents that high levels of inequality make it more difficult to reduce poverty.

Since equity is multidimensional with economic, social and political aspects and can have many different interpretations, it is important to clarify the type of equity to discuss. Typically equity is defined as inequality of outcomes, but considering that outcomes are dependent on a number of factors, such as exogenous circumstances, individual effort and available opportunities, it has been argued that it would be better to focus on equitable access to resources necessary to improve one's well-being (Fritz V. et al., 2008).[15]

The World Bank defines equity in terms of two basic principles (The World Bank, 2006):

(1) Equal opportunities: that a person's life should be determined primarily by his or her talents and efforts rather than by pre-determined circumstances such as race, gender, and social background;

(2) Avoidance of deprivation in outcomes: that a person is not meant to suffer based on bad luck or even because of own failing, although the principle of equal opportunities has been upheld.

[15] The note is based on presentations and comments by Bourguignon, Steward, Wantchekon and Birdsall at the conference 'Political Economy and Inequality: Implications for Inclusive Growth' of the Poverty Reduction and Economic Management Network of the World Bank in 2008.

Equal opportunities, defined as enjoying a certain kind of success or advantage consists of three main factors: (i) circumstances an individual enjoys, which are exogenous to the individual and independent of their own choice, (ii) efforts that an individual exerts, which are endogenous and an individual's own choice, and (iii) a society's chosen policy to weight external circumstances and individual effort. In terms of measuring equity, it is helpful to partition the population into groups that consists of all individuals with identical circumstances such as gender, location, socio-economic situation, social-cultural grouping and family background. Within this group of individuals facing similar circumstances, the individual effort is the main source of differences among the individuals (Bourguignon F. et al., 2007; Roemer J., 2000).[16]

Measuring equity, it is necessary to distinguish between different approaches (Fritz V. et al., 2008):

(1) Vertical inequalities: differences between individuals with similar circumstances (differences within a group), which mainly result from exerting different individual efforts;

(2) Horizontal inequalities: differences between individuals with different circumstances (differences between groups), which can root in discrimination based on the exogenous circumstances.

Since horizontal differences are independent of an individual's choice and effort, they can be perceived as unjust and provoke resentment and increase the potential for conflict. Further, these inequalities undermine the quality of institutions important for development, may result in a suboptimal allocation of resources, compromises efficiency and weakening economic growth.

The optimal policy set to achieve equity, should incorporate the following characteristics: (i) maximize the advantages for the least-advantaged groups of the population; (ii) absence of severe deprivation, defined by having no individual advantage below some critical level; and (iii) belonging to a permissible set, based on feasibility of the policy, but not deliberately excluded by social choice (e.g. forced labour, forced fertility control). This optimal policy set captures the two principles, which makes up the definition of equity above, equal opportunities and avoidance of deprivation in outcomes (Bourguignon F. et al., 2007; Roemer J., 2000).

The Education for All – Global Monitoring Report 2010 published by UNESCO,[17]titled 'Reaching the Marginalized' , distinguishes between (1) education poverty - young adults aged 17 to 22 who have fewer than four years of education; (2) extreme education poverty, - young adults who have fewer than two years of education; as well as (3) the bottom 20%, those with the fewest years of education in a given society. The DME[18] data set introduced in the report highlights the findings from sixty-three mostly low-income countries: in 24 of those countries, 30% of the young adults suffer education poverty; in 26 of those countries, 20% suffer extreme education poverty (UNESCO, 2010).

The report further identified three broad sets of policies that can combat marginalization, called the inclusive education triangle (UNESCO, 2010):

[16] The authors, Bourguignon and Ferreira from the Development Economics Vice-Presidency of the World Bank and Walton from Harvard University led the team that produced the World Bank's World Development Report 2006 'Equity and Development'.
[17] UNESCO – United Nations Educational, Scientific and Cultural Organization
[18] DME – Deprivation and Marginalization in Education, with data from between 1999 and 2007, depending on the country; http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/efareport/dme/

(1) Expanding access and affordability: Cutting the costs of entry to school[19]; Bringing classrooms closer to marginalized children; Providing a second chance to out-of-school children and adolescents[20]; Responding to non-state local initiatives of non-formal education; etc.
(2) Providing a suitable learning environment: Allocating teachers to marginalized areas and schools; Providing inclusive education instead of ability grouping; Targeting financial and pedagogical support to disadvantaged schools; Learning in an appropriate language and through a relevant curriculum; Reaching children with disabilities; etc.
(3) Establishing equal entitlements and opportunities: Enforcing rights and law; Expanding political mobilization; Increasing social protection, through cash transfer for example; Budgeting in consideration of marginalized groups and minorities; etc.

With regard to developing an integrated policy response that addresses the multiple and overlapping structures of disadvantage that restrict opportunities for the marginalized learner, each set of policies referred to in the triangle needs to be viewed in relation to the others. Making primary education accessible and affordable without tackling the issue of the learning environment, might just lead to excessive demand with extreme shortfalls in terms of the quality of education. Conversely, raising the average level of learning for the majority while leaving behind a substantial minority, would just lead to even more marginalization. The wider pattern of entitlements and enabling environment is vital to shape conditions in which the 'human rights to education' is translated into meaningful claims.

In September 2010, UNICEF focused its Progress for Children on 'Achieving the MDGs with Equity', stating that a greater equity focus is both imperative and appropriate for three reasons: (i) robust global growth in 1990s and 2000s has failed to narrow disparities between nations and in some areas disparities between regions have actually increased; (ii) progress measured by national aggregates often conceals large and even widening disparities among sub-national social and economic growth; (iii) the global context with food and financial crisis, climate change, rapid urbanization and humanitarian crisis most profoundly affects the poorest countries and the most impoverished communities within them (UNICEF, 2010/09).

Within the report, UNICEF calls for greater international investment and collaboration fostering equity to: (i) enhance understanding of disparities and their causes through better and more disaggregated data at national and sub-national level; (ii) addressing underlying and basic causes of inequity including systemic, social and cultural forces that underlie patterns of inequities; (iii) take proven interventions to scale by implementing integrated, multi-sectoral packages with considerable potential; (iv) foster innovative solutions and strategies that can expand access to services and can be made available at scale and on an equitable basis; (v) expand and target resources to equity-focused solutions to reach the most excluded and hardest to reach.

A special report on a study by UNICEF 'Narrowing the Gaps to meet the Goals', also published in September 2010, shows that an equity-focused approach to child survival and development[21] is the most practical and cost-effective way of meeting the health MDGs for children. The report states that emerging data and analysis increasingly confirm that deprivations of children's rights are

[19] e.g. School Fee Abolition Initiative (SFAI), launched by The World Bank and UNICEF in 2005
[20] e.g. Out-of-School Children Initiative (OOSCI), launched by UNESCO/UIS and UNICEF in 2010
[21] Child survival and development is a Focus Area of UNICEFs Medium-Term Strategic Plan (MTSP) 2006 to 2013, and covers sectoral topics such as child mortality, child health, child nutrition, and related water, sanitation and hygiene initiatives.

disproportionately concentrate among the poorest and most marginalized populations within countries. The report further suggests that a refocus of efforts on an equity-based approach is right in principle and right in practice, accelerates progress towards the MDGs faster than the current path, and is even more cost-effective and sustainable.

At the outset of the study, UNICEF staff representing a range of disciplines reviewed the data, literature and country experiences of mainstream and pro-equity agenda in four key areas: child survival and development, HIV and AIDS, basic education and gender equality and child protection. The extensive review informed broad policy recommendations and provided a base for examining the organization's initial hypothesis that an equity-based approach could accelerate progress towards the MDGs in a cost-effective way.

To test the hypothesis further, UNICEF assembled a research team of in-house specialists and international health experts to model an equity-focused strategy and compared its predicted outcomes against those of the current mainstream strategies for achieving the health MDGs. The modelling process involved a highly complex simulation running both strategy models, the current mainstream strategy and the equity-focused strategy, through different country typologies, ranking from low-income to middle income countries.

For the simulation, the research team employed the Marginal Budgeting for Bottlenecks (MBB) model, jointly developed by the World Bank and UNICEF in 2002. The model is a tool for designing and testing development strategies and has been widely employed in international public health research. Its central premise is that the success of strategies lies in their ability to overcome barriers limiting the supply of and demand for essential services. For each strategy, the model generates the predicted impact on intervention coverage and health outcomes.

The initial results of the simulation exercise state that (UNICEF, 2010/09):

(1) An equity-focused approach will accelerate progress towards the health MDGs faster than the current path of mainstream strategies;

(2) An equity-focused approach will be considerably more cost-effective and sustainable than the current path in all country typologies.

This analysis together with the intense literature review led to UNICEF's renewed commitment to meeting the MDGs by adopting equity-focused approaches in its work. While the implications are perhaps most appropriate for primary health care, UNICEF beliefs that they are also applicable to numerous other child development areas.

In support of implementing its equity-based approach, UNICEF published 'Equity and Reaching the most Marginalized - Selected Innovations and Lessons Learned', sharing experiences and good practices of its programmes in February 2011. Further, the Annual Report 2010, published June 2011, focused on growing inequities, questioning the conventional wisdom that reaching the most marginalized children and communities is too costly and suggesting more efficient strategies and tools to reach them. UNICEF commits to renew and enlarges its efforts to reach the most marginalized to build a strong foundation of expertise, commitment and results. In the Annual Report 2011, published June 2012, UNICEF again highlights the importance to expand its efforts to reach the most disadvantaged children and to significantly deepen the implementation of the equity agenda (UNICEF, 2011/02; UNICEF, 2011/06; UNICEF 2012/06).

IV. Outline of the Marginal Budgeting for Bottlenecks model

1. Introduction

Shifting the focus of concern from lack of resources to the limited capacity for effective absorption of available funding and impact of resource allocation on development outcomes, the roles of other system-wide constraints become more and more important. This calls for innovative approaches to make sector strategies and budgets explicitly result-driven and focused on overcoming policy and operational constraints to achieve national outcomes and international development goals (The World Bank, 2002/11).

With the new Millennium and the commitment to the Millennium Development Goals, pressure increased to make policies and budgets more result driven and to give structure and functionality to necessary but unwieldy programme-based approaches. The World Bank called for a focus on costing what it takes to overcome system-wide bottlenecks in service delivery and lift constraints of the utilization of those social services, rather than the delivery of basic service packages only.

Arguing that traditional approaches to budgeting and costing do not take into account national constraints and cost structures, are not explicitly linked to outcomes committed to and do not address underlying service delivery policies, a new costing and budgeting model has been suggested. The Marginal Budgeting for Bottlenecks model (MBB) is an analytical costing and budgeting tool, with the mainstay to identify implementation constraints of social service delivery and estimate the marginal costs to overcome those.

The Marginal Budgeting for Bottlenecks model builds upon the Service Coverage Concept published by T. Tanahashi in 1978. This Service Coverage Concept expresses the extent of interaction between the service and the people for whom it is intended, not limited to a particular aspect but ranging over the whole process of service provision. It measures the ability of a social service to transform the intention to serve people into a successful intervention, not only focusing on the development of new resources and technologies, but also the effective use of available resources and technologies (Tanahashi T., 1978).

The Marginal Budgeting for Bottlenecks model is an analytical costing and budgeting tool developed by teams from the World Bank, jointly with UNICEF and the World Health Organization (WHO) in 2002. To be applied within an equity-focused approach to programming, UNICEF further refined the MBB model in 2011. It can be used for two main purposes, identifying bottlenecks in health service delivery and estimating the marginal cost to overcome those, and estimating potential costs and impacts of different scenarios of interventions to improve health service delivery (UNICEF, 2011/01; UNICEF, 2011/03).

Providing a comprehensive analysis of the applicability of the Marginal Budgeting for Bottlenecks model, first the application of the conceptual framework and theoretical assumptions to education will be discussed. This builds upon the coverage concept and the five coverage measurements defined through the Service Coverage Concept, as well as the three service delivery modes and six coverage determinants later defined by the Marginal Budgeting for Bottleneck model.

In the following, the Service Coverage Concept and the Marginal Budgeting for Bottlenecks model, as developed for and used within the health sector, will be introduced. Building upon this conceptual

framework and defined elements of the model, the adaptation of the theoretical assumptions and different determinants for the education sector will be discussed in the next chapter.

2. Service Coverage Concept

The Service Coverage concept, published by T. Tanahashi in the Bulletin of WHO[22] in 1978, expresses the extent of interaction between the service and the people for whom it is intended, and is the theoretical foundation of the Marginal Budgeting for Bottlenecks model (Tanahashi T., 1978).

Service coverage depends on the ability of a service to interact with the people who should benefit from the service, the target population. Thus, service coverage measures the ability to transform the intention to provide a certain service into a successful provision of this service. This transformation process involves a variety of factors, such as availability of resources (e.g. commodities, facilities, personnel), people's attitude to the service (e.g. acceptance, social norms, religion), as well as the actual quality, i.e. 'successful provision' of the service.

For the measurement of coverage, several key stages are first identified, each of them involving the realization of an important condition for providing the service. A coverage measure is then defined for each stage, namely the ratio between the number of people for whom the condition is met and the target population. The evaluation of coverage on the basis of these concepts enables the identification of bottlenecks in the operation of the service, the analysis of constraining factors responsible for such bottlenecks, and the selection of effective measures for service development.

2.1 Variations and Measurements of Service Coverage

Service coverage is normally expressed as the proportion of the target population who can receive, or have received the service. The number of people the service can be provided for expresses the Service Capacity and indicates the potential of the service, the Potential Coverage. The number of people the service has been provided for expresses the Service Output and indicates the actual performance of the service, the Actual Coverage (Tanahashi T., 1978).

- Potential Coverage = Service Capacity / Target Population
- Actual Coverage = Service Output / Target Population

The relationship between service capacity and service outcome is another important aspect, which is called Service Utilization, expressed as the ratio between Service Output and Service Capacity.

Looking at essential requirements of service provision, the concept classifies five measurements of coverage that when accumulated, lead to an effective service intervention (Tanahashi T., 1978):

- Availability Coverage - amount of service that can be made available to the target group, limited through the availability of essential resources always required to provide the service.
- Accessibility Coverage - amount of service made available and that can be reached and used by the target group, limited through geographical and financial accessibility.
- Acceptability Coverage - amount of services accessible and accepted by the target group, limited by religious, cultural, economic or other constraints.
- Contact Coverage - amount of services accepted that is actually contacted by the user, limited by the quantity of the actual coverage.

[22] WHO – World Health Organization

- Effectiveness Coverage - amount of services contacted that provided an effective intervention related to the users problem, limited by the quality of actual coverage.

Progress in the provision of a service means that the service must meet more requirements; hence the service satisfies the requirements of fewer people. The measurements of coverage corresponding to the five intermediate stages of the process follow the same trend; effective service is the consequence of successful service provision.

In order to differentiate the coverage related to particular subgroups from that related to the whole target population, three variations in coverage measures can be chosen (Tanahashi T., 1978):

- Provision-specific coverage: taking as the denominator a part of the target group for whom the criteria related to a certain method of service provision has been met (provision of a certain service, or provision through a certain service provider, e.g. public/private health facilities).
- Population-specific coverage: taking as the denominator a part of the target group for whom the criteria related to a certain attribute of population has been met (provision of services to a certain population sub-group, e.g. urban/rural, rich/poor population).
- Provision and population specific coverage: a combination of the above two.

Comparing total coverage with either provision-specific coverage or population-specific coverage allows for analysis of constrains and bottlenecks in the provision of certain services for certain population sub-groups. This is a very important aspect in terms of an equity-focused analysis of social service provision.

2.2 Identification and Analysis of Service Bottlenecks

A large difference between an adjacent pair in the coverage measures implies that, for a significant proportion of the target population, the service failed to meet the requirements for progress in service provision. A bottleneck shows where the difficulty in service provision lies, but does not pinpoint the factor responsible for the poor coverage.

Good knowledge of the service and the situation of the target population are required in order to analyse the constraining factors. Supposing that existing knowledge is insufficient to identify any particular cause, other approaches to analyse constraining factors are available (Tanahashi T., 1978):

- Compare provision-specific coverage: The areas of comparison would differ in situation and processes of service provision with respect to the factor suspected to be responsible for the bottleneck. If a high correlation is found between the degree of coverage and circumstances involving the factor, the suspicion is likely to be justified.
- Compare population-specific coverage: In the subdivision of the target population, the factor that appears likely to be responsible for the bottleneck is selected as the differentiating factor. If the right factor is chosen, there will be significant variation in the target-specific coverage.
- Change conditions experimentally: Compare the coverage before and after the change of conditions associated with the suspected factor. If a significant difference is observed, the suspicion may very well be justified.

This does not exhaust the possible approaches to the analysis of constraints; nor is any approach suggested as being better than others.

2.3 Selection and Effectiveness Analysis of Remedial Actions

Once the factors constraining service development become known, an effective form of remedial action has to be selected. A cost/effectiveness analysis provides a basic approach for this purpose and requires knowledge of the service output or actual coverage, in particular the effectiveness coverage that is expected from the implementation of the remedial action. The effective service is the consequence of successful service provision and the effectiveness coverage can only be assessed in conjunction with the accumulation of the other measurements of coverage (Tanahashi T. 1978).

However, a remedial action normally changes only certain aspects of service provision, which is an advantage for the calculation of the prospective coverage achieved through the remedial action:

- For example, the expansion of service increases the availability and accessibility of the service, but it may not change its acceptability or effectiveness. Therefore it is possible to estimate the increase of availability and accessibility from the details of resources and facilities involved in the expansion. Assuming that the people who gain access to the service have similar conditions and attitudes towards the service, the same acceptability and effectiveness coverage as the people who already have access to the service can be expected. By combining these two results the prospective coverage achieved through the expansion of services can be estimated.
- Another application of this concept can be illustrated through the adaptation of a new service technology, chosen as remedial action to improve service provision. Assuming that the new technology is provided through the same delivery channel as the existing service and that there is no significant difference in resource requirements, availability and acceptability, this coverage measures up to acceptability and remains the same. In this case only the changes of contact and effectiveness coverage need to be calculated to estimate the prospective coverage for this action.
- These are examples of two typical applications of provision-specific coverage in the assessment of two typical forms of remedial actions for service development. For the assessment of other forms, other applications of prospective coverage can be made. For example, if some actions involve changes in the target population, the application of population-specific coverage would need to be applied.

The Service Coverage Concept provides a very useful framework for social sector analysis, especially with focus on an equity-based approach. The comparison of coverage measures for different population sub-groups allows an assessment of coverage gaps with specific focus on poverty reduction and pro-poor targeting as well as emerging issues such as gender and urbanization.

The Marginal Budgeting for Bottleneck model build upon the concept of service coverage, in an attempt to highlight functional constrains of service delivery as well as the utilization of social services. It further provides an instrument to compare remedial actions to overcome those policy and operational bottlenecks and to assess the expected impact of development interventions.

3. Marginal Budgeting for Bottleneck Model

The Marginal Budgeting for Bottlenecks (MBB) model is an analytical costing and budgeting model developed by teams form the World Bank, jointly with UNICEF[23] and WHO[24]. The model has been developed in the context of HIPC[25] and PRSP[26] to respond to the request of low-income countries to plan, cost and budget marginal allocations to health services and assess their potential impact.

The MBB model is intended for medium term sector analysis, planning, costing, budgeting, financing and impact assessment. It aims to answer the following questions (UNICEF, 2011/01):

- Which high impact interventions are priorities for integration into existing service delivery arrangements, to accelerate progress towards achieving sector goals (MDG, PRSP, etc.)?
- What are the major systems hurdles or 'bottlenecks' (supply side) and 'barriers' (demand side) hampering the delivery of services and what is the potential for their improvements?
- What would be the potential investment required by alternative options to alleviate the identified systems hurdles (bottlenecks/barriers) to achieve the desired service coverage?
- What could be achieved, in terms of outcomes, by removing system hurdles (bottlenecks/barriers) and increasing service coverage of effective interventions?

The approach can be used for two rather different but related purposes (The World Bank, 2002/11):

- Budgeting Tool: The mainstay of the approach is to identify implementation constraints of the health system and to estimate the marginal costs to overcome those. This can be used as a basis for a country to develop its expenditures programme and its MTEF[27], taking into account country specific policies and including strategic directions outlined by the PRSP.
- Simulation Tool: Other than budgeting purpose, the approach can also be used as a simulation tool to access how much health services can contribute to reach goals like PRSP and MDG[28]. Such an exercise can be conducted as a way to examine the potential cost and impact of various scenarios aiming at using marginal funding to lift constraints to implementation.

3.1 Rationale and theoretical foundation of the MBB model

The MBB model incorporates a two-level production function process aimed at producing better health status or improving health outcomes. The service production function captures the process of how inputs are used to produce outputs (used for the Costing and Budgeting Module). The health production function, on the other hand, reflects the process of transforming health outputs into health outcomes and impacts (used for the Impact Assessment Module).

As the name suggests, marginal costing is a central concept to the MBB budget output. Marginal costs are defined as the change in total cost that arises when the quantity produced (or purchased) changes by one unit, and assign costs into either fixed or variable costs. As the number of units produced/purchased increases, variable costs occur for each new unit, but the total fixed costs do not change in the short run. The proportion of fixed costs for all units is divided by an increasing number of units, thus the portion of each unit's fixed costs will decline as more units are produced.

[23] UNICEF – United Nations Children's Fund
[24] WHO – World Health Organization
[25] HIPC – Heavily Indebted Poor Countries
[26] PRSP – Poverty Reduction Strategy Papers
[27] MTEF – Mid-Term Expenditure Framework
[28] MDG – Millennium Development Goals

Within the approach, three service delivery modes are distinguished and further grouped into four sub-packages based on their similarity, delivery mode, and/or beneficiaries. The critical assumption for sub-packages is that interventions delivered via the same delivery mode and for similar beneficiaries share similar bottlenecks (UNICEF 2011/03):

- Family-oriented community based services are health interventions that families and communities can provide and practice by themselves, with only limited inputs through the public health system. This includes, but is not limited to, preventive and hygiene practices and minor illness management.
- Population-oriented scheduled services include health interventions of preventive care that are delivered according to a regular scheduled service or through outreach. This covers all iterative preventive health services, as such as family planning, vaccinations and regular health checks.
- Individual-oriented clinical services are interventions of birth delivery or individual illness management that are provided in standing clinical facilities as the case arises.

Three Service Delivery Modes	Twelve Sub-Packages
1.Family-oriented community based services (interventions that families and communities can provide/practice by themselves or with limited inputs)	1.1 Family preventive / Water and Sanitation services
	1.2 Family neonatal care
	1.3 Infant and child feeding
	1.4 Community illness management
2. Population-oriented scheduled services (interventions of preventive care that are delivered according to a regular schedule or through outreach)	2.1 Preventive care for adolescents and adults
	2.2 Preventive pregnancy care
	2.3 HIV/AIDS prevention and care
	2.4 Preventive infants and child care
3. Individual-oriented clinical services (interventions of birth delivery or individual illness management that are provided as the case arises)	3.1 Maternal and neonatal care of primary clinical care
	3.2 Management of illnesses at primary clinical care
	3.3 Clinical first referral care
	3.4 Clinical second referral care

Table 1: Service Delivery Modes within the Health MBB model (see UNICEF, 2011/03, Figure 1.1)

Building upon the five coverage measurements of the Service Coverage Concept, the MBB utilizes six coverage determinants to determine the extent to which the health system is able to support the delivery of effective interventions. On the supply side of the public health system these are the availability of essential commodities, qualified human resources as well as the geographic accessibility of health facilities. On the demand side, the initial as well as the timely continuous utilization of multi-contact services, and the effectiveness of health services are the critical factors (UNICEF 2011/03).

Categories	Six Coverage Determinants
Supply Side	1. Availability of essential commodities (quantity and quality)
	2. Availability of human resources (quantity and quality)
	3. Geographic accessibility (distance to reach facility)
Demand Side	1. Initial utilization of multi-contact service
	2. Timely continuous utilization of multi-contact service
	3. Effective, quality coverage (effective interventions/needed interventions)

Table 2: Coverage Determinants within the Health MBB model (see UNICEF, 2011/03, pages 11-12)

This distinction of three service delivery modes and the six coverage determinants is essential for the different application steps, the data entry process as well as the analysis of outcomes within the different modules of the MBB model. Nevertheless, this is only a snapshot of the reality in public

health systems in order to structure and simplify the analysis of bottlenecks, and the delivery modes and coverage determinants can vary based on the specific country context.

3.2 Modules and Application Steps of the MBB model

The MBB approach can be used for two rather different but somewhat related purposes. First it can be used as a budgeting tool for the development and costing of sector strategies and policies. But it can also be used as a simulation tool to assess the effectiveness and impact of development interventions. To service these two different functions, the model is organized in three main modules and structured in five major application steps and required data entry (The World Bank, 2002/11).

The MBB approach is organized in three main modules:

- Bottleneck Identification Module: using country and health system specific data, this module identifies bottlenecks within each of the service delivery modes. By assessing the bottlenecks and barriers of the present coverage, possibilities of expanding the coverage are analysed and scenarios on tackling the bottlenecks and increasing performance can be established.
- Costing and Budgeting Module: based on demographic and economic data, this module helps define strategies to tackle the bottlenecks within each of the service delivery modes. Through an estimate of marginal costs of additional resources required, the financial impacts and budget implications of increasing effective coverage of service provision can be calculated.
- Impact Assessment Module, relying on the results of an epidemiological model, this module gives the policy makers a view of the consequences of their choices, as basis for the debate.

Further, the MBB model is structured in five major application steps (UNICEF 2011/01):

- Setup the analysis and parameters: set up analysis parameters that the tool will use to perform the required analysis and choose analysis options.
- Analysis of bottlenecks and objectives for coverage: set up country/system parameters that the tool will use to perform required analysis and enter baseline data for the areas of inputs.
- Development of policy scenarios: analyse plausible causes of bottlenecks and identify appropriate corrective measures to reduce bottlenecks on the supply and demand side.
- Calculation of budget and finances: inform the tool on items to be included in the cost and budget calculations, adjust quantities and efficiency factors and define funding source.
- Analysis of results and outputs: develop different scenarios and planning options, adjust targets and decide the new target coverage for each intervention of interest.

The organization in three modules follows the original outline of the MBB model from 2002[29], whereas the differentiation of the application steps is based on the slightly modified MBB approach from 2011[30]. In the following, the main modules and the major application steps, as well as the logical interrelation between them are explained in more detail.

[29] The World Bank (2002/11): Marginal Budgeting for Bottlenecks – A new Costing and Resource Allocation Practice to buy Health Results

[30] UNICEF (2011/01): Marginal Budgeting for Bottlenecks – An analytical Tool for evidence based Health Policy, Planning, Costing and Budgeting, Concise User Guide; UNICEF (2011/03): Marginal Budgeting for Bottlenecks – An analytical Tool for evidence based Health Policy, Planning, Costing and Budgeting, Technical Note

3.2.1 Bottleneck Identification Module

The first step in applying the MBB model is to decide on the objective and parameters of the analysis. This could be a comparison of up to three different scenarios of scaling up coverage, a comparison of up to three defined population groups or an analysis over time of up to three time phases or periods.

Application Step 1

Setup of Analysis and Parameters: set up analysis parameters that the tool will use to perform the required analysis, and choose analysis options (compare scenarios, population groups, overtime).

The second step is the entry of country specific data on demographics, epidemiology, economics as well as health system, interventions and coverage. This has to be done in relation to the three defined service delivery modes and the six coverage determinants previously discussed (UNICEF, 2011/01).

Application Step 2

Analysis of Bottlenecks and Objectives for Coverage: set up country/system parameters that the tool will use to perform the required analysis, and enter baseline data for the areas of inputs (data on demographic, epidemiological, economic, health system, health interventions, health coverage. [31]

For each service delivery mode[32] and each corresponding coverage determinant, proxy indicators need to be defined. While a rough estimate is possible with readily available indicators through DHS[33] and MICS[34]; some countries may prefer to do a more refined analysis, but the choice depends on the time and resources available for the exercises. However, proxy indicators need to be defined for each of the six coverage determinants[35] within each of the three service delivery modes (UNICEF, 2011/03; The World Bank, 2002/11).[36]

Based on this information provided on country and health system specific data, new performance frontiers for the increase of coverage can be defined. Firstly, bottlenecks and barriers on the present coverage can be assessed to define the limits of reduction of those bottlenecks. Secondly, the interpretation of the information base allows the analysis of possibilities of expanding the coverage and establishing scenarios for tackling the bottlenecks. Thirdly, an estimate on the increase in performance for each service delivery mode can be prepared (The World Bank, 2002/11).

3.2.2 Costing and Budgeting Module

Coverage extension scenarios to overcome the identified bottlenecks to increase effective coverage are defined through new coverage frontiers[37] for each of the service delivery modes. They entail a set of strategies or programmes aimed at closing gaps in availability of commodities and human

[31] UNICEF (2011/03): Marginal Budgeting for Bottlenecks – An analytical Tool for evidence based Health Policy, Planning, Costing and Budgeting, Technical Note
[32] In the original MBB model from 2002 service delivery modes are described as operational packages and coverage determinants are named bottlenecks. [The World Bank (2002/11)]
[33] DHS – Demographic and Health Survey
[34] MICS – Multiple Indicator Cluster Survey
[35] See Table 2 on page 28
[36] See Table 1 on page 28
[37] In the original MBB model from 2002 new coverage frontiers are named new performance frontiers [The World Bank (2002/11)].

resources, geographic accessibility (supply side determinants), initial and timely continuous utilization, as well as gaps in effective and quality coverage (demand side determinants).[38]

For the three service delivery modes, MBB costing has seven remedial components/strategies[39], six of which correspond to the coverage determinants identified above at each service delivery level. The seventh component is for expected costs of overcoming bottlenecks in terms of stewardship to steer the increase in coverage (The World Bank, 2002/11; UNICEF, 2011/03).

Application Step 3

Development of Policy Scenarios: analyse bottlenecks and remedial strategies related to each of the six coverage determinants. Define new coverage frontiers for tracer interventions based on bottleneck reduction proposed for each determinant and maximum, theoretically achievable frontiers.

Through the economic data provided on recurrent and capital costs of interventions in the health sector (Application Step 2), the additional resources required to increase coverage can be calculated. The MBB tool distinguishes between Fixed Costs; costs that do not change in the short-run even as the quantity of an intervention of service being provided varies, and Variable Costs; costs that vary due to a change in the level of volume of a service provided. Fixed Costs are further subdivided into service-specific costs to provide a specific service at any level of the service, and shared costs the health sector must incur to provide a group of services (UNICEF, 2011/01; UNICEF, 2011/03).

Application Step 4

Calculation of Budget and Finances: choose inputs, investment phasing, source of finance, efficiency adjustment (budgeting), calculate additional cost estimates (marginal costing) and simulate economic growth, revenues, expenditures etc.(fiscal space). Output is per capita marginal cost by service delivery mode, capital investments and recurrent costs, additional budget needed and fiscal space.

Due to difficulties in defining a single unit of service delivery in the health sector, the MBB model uses incremental costs instead of marginal costs. This simplified version of marginal costs is obtained by dividing the additional costs to achieve a one per cent increase in coverage, by the additional units of output needed for the target group (UNICEF, 2011/03).

3.2.3 Impact Assessment Module

The main purpose of the impact module is to estimate change in health outcomes resulting from an increase in effective, quality coverage. The MBB impact module calculates the efficacy and effectiveness of each intervention based on global census published and reviewed. MBB predicts the effect of intervention packages based on the effective, quality coverage of each intervention and evidence based efficacy with residual calculations to avoid double counting (UNICEF, 2011/03).

This overall impact estimation model defines impact as a function of the change in coverage, the difference between the baseline and the coverage frontier, and the population efficacy of the intervention upon the health outcome being assessed. Using baseline coverage and epidemiology inputs, the tool estimates the change in coverage for the specific context (UNICE, 2011/03).

[38] See Table 2 on page 28

[39] In the original MBB model from 2002 a total of six components have been identified based on five bottlenecks [The World Bank (2002/11)], whereas the slightly revised MBB approach from 2011 names seven components based on the six determinants [UNICEF (2011/03)].

Figures on expected impact cannot be used in a straight forward manner as health outcomes are very much influenced by many non-health factors (environmental, social, economical, etc.). However, they are still very valuable for the process of planning and budgeting. They make it possible to guide the choice of scenarios by comparing both expected costs and effects and can help to set realistic targets (The World Bank, 2002/11).

For assessing the impact of the selected policy scenarios, the MBB model Module 3 refers to the Lives Saved Tool (LiST). The available excel-tool is automatically connected to the LiST computer tool. The entered data on demographics, health system and health interventions, together with the selected policy scenarios are sent to the computer tool, which feeds the results of the impact assessment on 'lives saved' automatically back into the MBB tool.

The Lives Saved Tool (LiST) is a computer programme for making child survival projections, developed by USAID[40] in cooperation with UNICEF in 2011 (USAID, 2011/04). LiST estimates the reductions in cause specific mortality by applying intervention effectiveness and affected fractions to intervention coverage changes. It estimates the mortality impact in the different stages, antenatal, childbirth, neonatal and infant period. Each child 'saved' is added to the projection of possible death causes of the subsequent age period.

Further, the AIDS Impact Module (AIM) calculates the impact of prevention of mother-to-child transmission of HIV/AIDS (PMTCT) and antiretroviral therapy (ART) for children and feeds the results directly back into the LiST model. The Family Planning (FamPlan) module and the Demographic Projection (DemProj) module also feed into the LiST model via changes in the number of births, resulting in varying numbers of child deaths upon which to apply the interventions impacts.

Application Step 5

Analysis of Results and Outputs: analyse the different scenarios and planning options and compare estimated costs and simulated impact of changes in effective, quality coverage. Adjust new coverage frontiers based on fiscal space and budgetary constraints, as well as expected target achievements.

The Marginal Budgeting for Bottlenecks model presented above is an approach for countries to estimate the potential realistic contribution of health services to reach national and international goals in a pro-poor way. This tool can help to estimate the marginal benefits to health outcomes of investing in health services as well as a method to estimate the marginal cost of this contribution to be integrated in the countries expenditure framework and budget (The World Bank, 2002/11).

[40] USAID - United States Agency for International Development

V. Conceptual Adaptation of the MBB model for its use in Education

1. Introduction

Developed in the context of Poverty Reduction Strategies, the Marginal Budgeting for Bottlenecks model has mainly been used to prepare Mid-Term Expenditure Frameworks and to assess the cost and project potential impact of health service interventions to the Millennium Development Goals (The World Bank, 2002/11).

With regard to the three levels of education planning, defined by the EFA planning guide (UNESCO, 2001), the MBB model could therefore be used for planning at national level (Planning Level III) and, with regard to population size, at district and province level (Planning Level II). Since the MBB model requires extensive data input, investment, time and specialist expertise, the use for education planning at school or community level (Planning Level I) would not be advisable.

A similar conclusion can be drawn with regard to the three stages of education planning (UNESCO, 2001). The MBB model can be a useful approach in preparation of long-term strategic plans (Planning Stage 1) as well as medium-term operational planning (Planning Stage 2). The use of the MBB model for short-term implementation planning (Planning Stage 3) would only be advisable in the context of larger countries and major sector reviews and investment programmes.

The MBB model is structured in three modules: (1) identification of service delivery bottlenecks and planning of remedial actions; (2) costing and budgeting of strategies to tackle service delivery bottlenecks; and (3) assessment of potential development impacts.

For its use within the education planning process, the MBB model can provide added value for following planning phases within the Education-for-All initiative (UNESCO, 2001): analysing sector functions and identifying issues to address (Planning Phase 1); setting policy goals and strategic objectives (Planning Phase 2); monitoring and reviewing of strategic plans (Planning Phase 5) and evaluating of long-term development impacts (Planning Phase 6).

Planning Phase 3, drawing education implementation plans, and Planning Phase 4, adopting plans as official government documents, would not be directly influenced by an application of the MBB model. However, the outcome of the MBB model in terms of bottlenecks identified and impact expected could be very important inputs to inform the policy dialogue of government officials.

Especially within the so-called programme-based approaches (UNESCO, 2005), the development of Mid-Term Expenditure Framework, the resource allocation through Targeted Budget Support, and within the framework of Sector-Wide Approaches to education could the application of the MBB be of importance. As the MBB model, all these initiatives and approaches have been developed with regard to improve the effectiveness of development interventions and aid.

Based on the international commitments laid out in the Paris Declaration on Aid Effectiveness (OECD/DAC, 2005), these new approaches have been developed to improve the quality of aid and its impact on development. Addressing the 'how' to plan and implement development cooperation instead of only focusing on the 'what', ownership, alignment and harmonization as well as result-orientation became more important.

In the same context, the MBB model has been developed with regard to the limited capacity for effective absorption of funds and with specific focus on overcoming system-wide policy and operational constrains. The main purpose of the MBB model is to improve the result orientation within sector analysis, planning and implementation (The World Bank, 2002/11).

Therefore, with regard to the education planning process as suggested to achieve the international commitment of Education-for-All, the MBB model could be defined as a budgeting and simulation tool for medium to long-term planning at national and provincial planning. Especially in the context of new programme-based approaches, the model could provide a new approach for comprehensive sector analysis and result-oriented policy and strategy planning.

In the following, the adaptation of the theoretical foundation of the model, the Service Coverage Concept, will be discussed. A special focus will lie on the five measurements of coverage and an adapted approach for education planning. Building on this first discussion of the coverage concept, it will be further analysed in such a way that the basic elements of the MBB model, the three service delivery modes and the six coverage determinants, can be adapted for the use within educational planning.

2. Service Coverage Concept in Education

Service coverage, as outlined by T. Tanahashi, is supposed to measure the ability to transform the intention of providing health services into a successful provision of the service. The transformation process involves a variety of factors, which Tanahashi classifies in five measurements of coverage: availability, accessibility, acceptability, contact and effectiveness coverage (Tanahashi T., 1978).

Generally defining the service as 'education', for reasons of simplification the following discussion will focus on the service provision of 'quality, basic education for all', with basic education defined as the first six years of formal education provided through public institutions. Further types of education, distinguished by target group and expected outcome (pre-primary, primary, secondary, higher, etc.), as well service provider (public vs. private) and service delivery mode (formal vs. non-formal) will be discussed later in this paper, as part of Chapter V. Section 3.

The relevant target group for education services is the eligible official school-age population corresponding to the relevant level of education in a given school year. Within most countries, the relevant target group of basic education can be defined as all children aged between 6 and 12 years. Usually the age of entry to formal basic education is neither younger than 5 years nor older than 7 years, and most basic education services last six years (UNESCO, 2011).

2.1 Coverage Measures in Education

Based on the Service Coverage Concept discussed in Chapter IV. Section 2, the following outlines some ideas of coverage measures for education. For all five coverage measures (availability, accessibility, acceptability, contact and effectiveness) relevant indicators as commonly used within education are discussed. Relevant sources for the classification of the education sector and the statistical definition of education indicators are the International Standard Classification of Education (UNESCO, 2011) and the Education Indicators Technical Guidelines (UNESCO/UIS, 2009/11).

Availability Coverage is the amount of service that can be made available to the target group, limited through the availability of essential resources, which are always required to provide the service.

The most important inputs to education, the curriculum, the syllabus and the teaching and learning methodology with direct impact on the students learning, are difficult to measure and to compare. Only the long-term impact of these 'soft'-inputs and its expected outcome 'quality education' can be measured through changes in students learning achievements and school completion ratio.

However, the issue of 'quality education' gains more and more importance and attempts to define it incorporate two fundamental perspectives: (1) cognitive development of learners as primary objective, and (2) creative and emotional development of students in relation to global and local cultural values (UNICEF/UNESCO, 2007/09). In the following, these 'soft'-inputs and the issue of quality in education will be factored out, with regard to the extensive and complex discussion such issues would require.

Therefore, the essential resources required to provide the service of basic education can be broadly categorized into learning facilities, i.e. classrooms, learning and teaching material, i.e. textbooks, and teachers. As all three resource-categories are important for the learning process, and experiences prove potential bottlenecks within all three categories, it might be useful to sub-group this coverage measure by at least these three highlighted resource-categories.

Related indicators could be:[41]

- Pupil-Classroom Coverage: % of school-aged population, that can be covered by available classrooms, for a given Pupil-Classroom Ratio
- Pupil-Textbook Coverage: % of school-aged population, that can be covered by available textbooks, for a given Pupil-Textbook Ratio
- Pupil-Teacher Coverage: % of school-aged population, that can be covered by available teachers, for a given Pupil-Teacher Ratio (or Pupil-Qualified Teacher Ratio)

The corresponding ratios defining how many children fit into a classroom, how many children have to share a textbook and how many children can be handled by one teacher are predetermined through education policies and standards. Furthermore, eventual policies on multiple-shift schooling for a more cost-effective use of education resources have to be taken into account.[42]

However, as mentioned above 'soft'-inputs with regard to the quality of the learning process, e.g. the relevance of the curriculum and the textbook, the training and qualification of teachers as well as the applied teaching method, are not covered under this measure. In contrast to the health sector, where there is a clearer cause-effect relationship between illness, treatment and recovery, it is more complicated to define the relationship between inputs in the learning process and corresponding outcomes in terms of learning achievements.

Accessibility Coverage is the amount of service made available, that can be reached and used by the target group, limited by geographical and financial accessibility.

[41] In an attempt to harmonize and standardize education indicators for better cross-country comparison, UNESCO Institute for Statistics published 'Education Indicators – Technical Guidelines' (UNESCO/UIS 2009/11). The definition of all indicators in education used in the following is based on these guidelines.

[42] Further literature: UNESCO/IIEP (2008): Double-shift schooling – design and operation for cost-effectiveness, Fundamentals of Educational Planning #90

Main constrains in accessing the provided education service could be geographical access to schools, which can be measured through the distance or the duration to get from home to school, as well as financial constrains in terms of direct and indirect private costs for the education service. Direct private costs could be school fees, as well as costs for textbooks and stationery. Further indirect costs could occur through transportation, compulsory school-uniforms and so-called opportunity costs, as the children are not available to contribute to household chores and care of family members.

Indicators to measure accessibility to education could be:

- School-Distance Coverage: % of school-aged population that can be covered by available resources (i.e. availability coverage), that has geographical access to school, for a given home-school distance/duration
- School-Costs Coverage: % of school-aged population, that can be covered by available resources (i.e. availability coverage), that has financial access to school, for given school costs[43]

The corresponding distance and/or duration to get from home to school, and affordable school costs are usually predefined through international and national standards.

Regarding private costs of education, it has to be further considered whether the costs are economically not affordable, or whether the costs are economically not profitable for children and their parents. Whereas in the first one, costs which are economically not affordable, would be an indication for the accessibility of education, in the second one, costs which are economically not profitable, would be an indication for the acceptability of education through the target group.

Acceptability Coverage is the amount of services accessible, which is also accepted by the target group, but limited by religious, cultural, economic or other constraints.

Input-oriented measurements would allow measuring demand-side factors only, i.e. the number of learners that would go to school within the given religious and cultural norms as well as economic context. Since input-oriented religious, cultural and economic constraints are difficult to measure in an impartial way, for this coverage measure output-related indicators would need to be defined. However, output-oriented measurements cover the actual school enrolment and attendance, which also depends on expectations on supply-side factors, e.g. the number of additional learners the school can cover within its limited capacity.

Relevant output-related indicators could be:

- Enrolment Coverage: % of school-aged population that can access education (i.e. accessibility coverage), and is enrolled into basic education, e.g. Gross/Net Enrolment Ratio
- Intake Coverage: % of school-aged population that can access education (i.e. accessibility coverage), and is entered into basic education, e.g. Gross/Net Intake Rate
- Attendance Coverage: % of school-aged population, that can access education (i.e. accessibility coverage), and is attending basic education, e.g. Gross/Net Attendance Ratio

With the difficulty of defining input-oriented measurements for acceptability coverage as described above, a clear distinction between acceptability coverage and contact coverage is problematic.[44]

[43] For the detailed definition of school costs, please refer to studies and policy suggestions of the School Fee Abolition Initiative (SFAI), launched by The World Bank and UNICEF in 2005.

[44] This problem has been tackled within the Marginal Budgeting for Bottleneck model, as it defines slightly different coverage measurements and distinguishes between initial utilization and timely continuous utilization.

Contact Coverage is the amount of service accepted, that is actually contacted by the user, limited by the quantity of the actual coverage.

With the output-oriented coverage measures as defined for acceptability coverage, the amount of service accepted and actually contacted by the user has been covered. However, contrary to health services, basic education is not achieved through a one-time only service provision, but mainly the continuity of the service throughout the year and the different grades of schooling.

Important indications related to the continuity of education service could be taken into account:

- Survival Coverage: % of school-aged population that accept education (i.e. acceptability coverage) and continue education services up to a certain grade without interruption, e.g. Survival Rate by Grade
- Expected School-Life Coverage: % of school-aged population that accept education (i.e. Acceptability coverage) and are expected to receive a certain number of years of schooling e.g. School-Life Expectancy
- Promotion Coverage: % of school-aged population, that accept education (i.e. Acceptability coverage), and are promoted to the next grade of schooling, e.g. Promotion Rate by Grade

Besides these positive measures of successful education service, failures of the education system can also provide additional information. However, the indicators are formulated in an adverse way:

- Repetition Coverage: % of school-aged population that accept education (i.e. acceptability coverage), but has to repeat the previous grade of schooling, e.g. Repetition Rate by Grade
- Drop-Out Coverage: % of school-aged population that accept education (i.e. acceptability coverage), but the dropped out of school, e.g. Drop-Out Rate by Grade[45]

It also has to be taken into account, that repetition and drop-out rates highly depend on the quality of schooling. The main reasons for drop-out are considerations of comparing opportunity costs and expected benefits resulting from continue education. Relevance of curriculum and quality of teaching as perceived by parents and students build the foundation for this decision.

Effectiveness Coverage is the amount of services contacted, that provides an effective intervention related to the users problem, limited by the quality of actual coverage.

For the education sector most common indicators for effectiveness are:

- Completion Coverage: % of school-aged population enrolled in education (i.e. contact coverage) and entering the last grade of primary education, e.g. Primary Completion Rate
- Graduation Coverage: % of school-aged population enrolled in education (i.e. contact coverage) who graduate from the last grade of primary education, e.g. Primary Graduation Ratio
- Transition Coverage: % of school-aged population enrolled in education (i.e. contact coverage), graduating from the last grade of primary education and enrolled in the first grade of secondary education, e.g. Secondary Transition Rate

Besides these common quantitative indicators, the effectiveness in terms of quality of education can be measured through:

[45] For more information on reasons for drop-out and initiatives to cover out-of school children, please refer to the Out-of-School Children Initiative (OOSCI), launched by UNESCO/UIS and UNICEF in 2010.

- Test Score Coverage (national): % of school-aged population, enrolled in education (i.e. contact coverage) achieving a certain test score in a national student assessment test
- Test Score Coverage (international): % of school-aged population enrolled in education (i.e. contact coverage) achieving a certain test score in an international student assessment test[46]

These measurements allow the comparison of quality in education cross-country (international student assessment tests) as well as over-time within a country.

The different suggestions for service coverage measures in education, based on the Service Coverage Concept of Tanahashi, will be further refined in proxy indicators in line with the service coverage determinants as defined by the Marginal Budgeting for Bottlenecks model in Chapter V. Section 3.

2.2 Coverage Concept in Education

It is important on the Service Coverage Concept to apply the five measurements of coverage in an accumulative way. Only for those parts of the target group, for whom all five conditions (availability, accessibility, acceptability, contact, effectiveness) are met, effective service is provided. Therefore all coverage measurements are closely linked to the overall objective of the service.

In the case of 'quality education for all' this is: (1) % of target group the service can be made available to, through provision of essential resources; (2) % of target group the service is available to and accessible to, geographically and financially; (3) % of target group the service is accessible to and accepted by, within religious and cultural norms and economic context; (4) % of target group the service is accepted by and used by, within its limited quantity; and (5) % of target group the service is used by and effective service has been provided to, with a pre-defined quality.

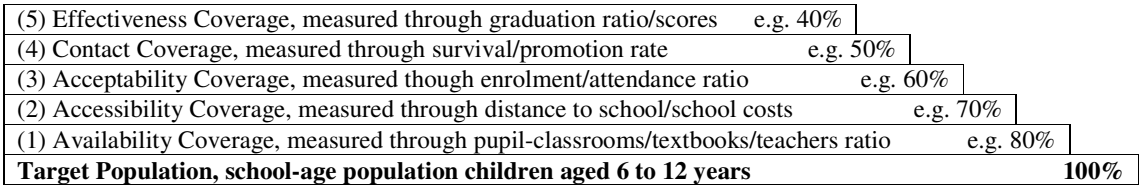

Figure 1: Example of Service Coverage Measures for Education for All (see Tanahashi T., 1978, Figure 2)

The relationships between the different measurements of coverage are the key factor in analysing the service coverage. The 'gaps' between the different coverage measures indicate the main bottlenecks of the service provision, in comparison to the 'gaps' of the other measures.

For example, the Availability Coverage would indicate service provision for up to 80% of the target population, but the Accessibility Coverage for only 50%, this would indicate the availability of enough essential resources (classrooms, textbooks, teachers), but a major bottleneck in the distribution of such resources to the target population. One remedial action in this case could be the redistribution of schools and teachers and/or financial resources in terms of school fees.

Further, the Accessibility Coverage would indicate service provision for up to 70% of target population, but the Acceptability Coverage for only 40%, this would indicate a more or less

[46] e.g. Programme for International Student Assessment Test (PISA), Trends in International Mathematics and Science Study (TIMSS), The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ), Latin American Laboratory for the Assessment of Quality in Education (LLECE), etc.

satisfactory availability of essential resources and geographical distribution of services, but a major bottleneck in acceptance of the service within the target population. Appropriate action to take in this case, could be interventions to promote the advantages of education to achieve behavioural change.

Once the bottlenecks of service delivery become known, some form of remedial action can be selected. If the Availability Coverage is identified as bottleneck, the provision of essential resources needs to be increased, e.g. construction of classrooms, distribution of textbooks, training of teachers. If the Effectiveness Coverage is the major constraint of providing quality basic education, the curriculum might need to be updated, or teaching and learning approaches need to be revised.

It further has to be taken into account that the coverage depends on the previously defined objective and policies. How many children fit into a classroom, how many children have to share a textbook and how many children one teacher can handle are usually predefined through education policies and international studies? The form of graduation exam and the test scores have to be analysed in comparison with other countries with similar context and international standards.

Since the coverage measures are calculated in an accumulated way, for each change of one coverage measure, all subsequent measures need to be recalculated as well. If the provision of essential resources has increased, for example, the coverage measure for accessibility, acceptability, contact and effectiveness need to be calculated based on this increase Availability Coverage.

Assuming disaggregated information is available, the accumulated coverage measures could be compared for different services (e.g. formal vs. non-formal basic education), for different service providers (e.g. public vs. private service provider), and for different population sub-groups (e.g. female vs. male population, rural vs. urban population, poor vs. wealthy population, etc.).

Again, the relationship between the different measurements (the 'gap') would then indicate the different bottlenecks for different services and population sub-groups. A comparison of different population sub-groups, rural vs. urban or poor vs. wealthy, could especially provide important information of bottlenecks on the supply-side (e.g. school distance, school costs) as well as demand-side (e.g. social norms, opportunity costs).

3. Marginal Budgeting for Bottlenecks Model in Education

The Marginal Budgeting for Bottlenecks model is intended for medium-term to long-term planning, financing and assessment of expected impact of development interventions. It has been developed to analyse major system constraints, to compare potential investment options, and to budget for major sector interventions or sector reforms.

Originally developed by the World Bank, UNICEF and WHO in 2002, the MBB model has been further refined by UNICEF in 2011. The following discussion is based on the theoretical concept of the MBB model, which has been unchanged, with the three service delivery modes, six coverage determinants and seven remedial actions as further revised in 2011.[47]

[47] In the original MBB model from 2002, service delivery modes are described as operational packages, coverage determinants are named bottlenecks, and new coverage frontiers are called new performance frontiers. The 2002 MBB model defines six remedial components based on five bottlenecks, the 2011 MBB model discusses seven remedial strategies based on six coverage determinants.

The comparison with commonly used concepts and models in education are based on the EFA Planning Guide (UNESCO, 2001), the EFA Handbook for decentralized Education Planning (UNESCO, 2005) and the Result-based Planning Handbook (UNESCO, 2006). Within these documents, the use of the Analysis and Projection model (AnPro) is suggested, a template model from which specific country planning models can be adapted aligned to the specific country context.

The AnPro model can be applied in all phases of the planning process, sector analysis, priority setting, financial analysis and implementation monitoring. The data produced support the analysis of how the education system functions at present, the identification of possibilities for improving functions through different utilization of resources, the projection of likely future developments of major components, the assessment of the feasibility of set goals and targets, the setting of implementation priorities as well as the setting of indicators for monitoring implementation (UNESCO, 2005).[48]

In the following, different options on defining service delivery modes in education will be discussed and two options will be suggested for the adaptation of the MBB model. The previously discussed coverage measurements will be further refined into six coverage determinants relevant for education. Finally, a summary of the different elements will be presented and the adaptation of the conceptual framework of the MBB model for its use in education will be discussed.

3.1 Service Delivery Modes in Education

The MBB model segments health service provision into three service delivery modes, further grouped into twelve sub-packages (UNICEF, 2011/03):

- **Family-oriented community based interventions** comprise interventions that can be provided directly by families and communities, e.g. applying hygiene standards, infant and child feeding, management of common illnesses.
- **Population-oriented schedulable services** of preventive care that are delivered according to regular schedule, e.g. preventive pregnancy care, infant care, child immunization.
- **Individual-oriented clinical services** include case-based interventions of birth delivery and individual illness management.

The corresponding twelve sub-packages are based on the assumption that interventions delivered via the same delivery mode and for similar beneficiaries share similar bottlenecks.

The figure below outlines the relationship between the three service delivery modes (The World Bank, 2002/11): In an attempt to maintain the health of the population, population-oriented schedule services interventions of preventive care (e.g. pregnancy care, HIV-AIDS prevention, immunization) are carried out. In case these interventions are not effective, family-oriented community based service (e.g. family preventive care, community illness management, healthy infant and child feeding) is the first step of illness management. For cases where both previous steps are not effective, individual-oriented clinical services (e.g. maternal ad neonatal care, clinical illness management) are approached.

[48] For further information see: www.inesm.education.unesco.org/en/esm-library/esm/anpro

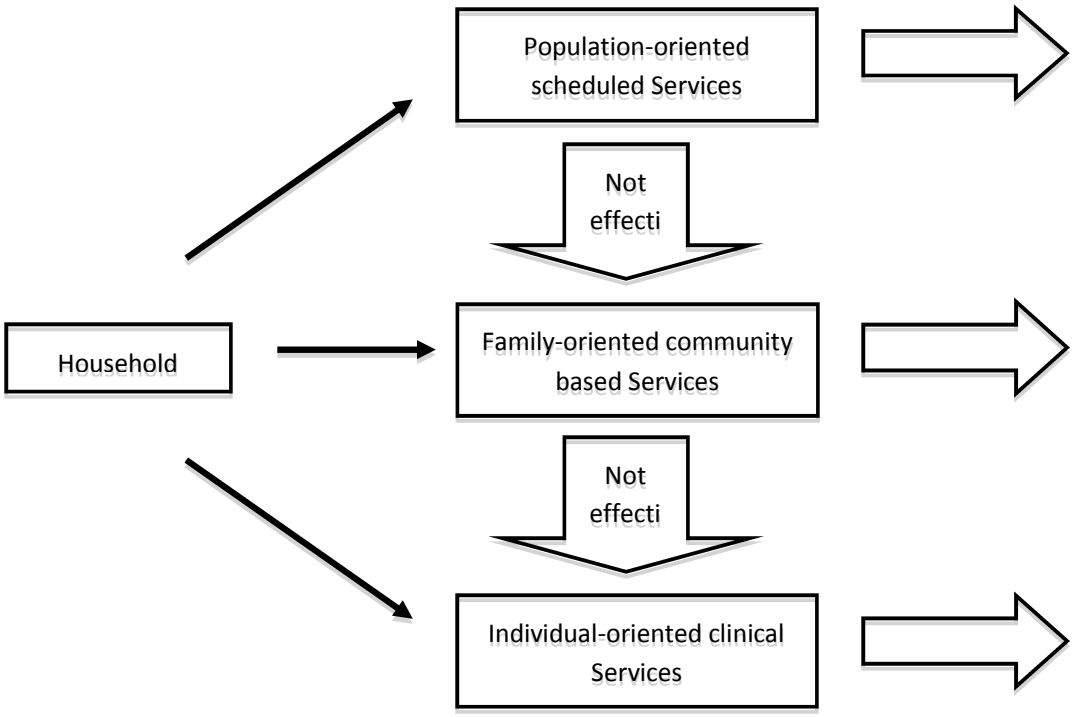

Figure 2: Household Behaviours and Packages of Services in Health (see The World Bank, 2002/11, Figure 1)

This service provision model is based on the overall goal to maintain the health of the population, to prevent illnesses, and to provide effective illness management and treatment on needs-basis. It outlines the co-responsibility of the individual, its family, the communality members and the government as the assigned overall caretaker.

Below, a detailed outline of the different service delivery modes and the corresponding sub-packages as used within the MBB model for the health sector.

Three Service Delivery Modes	Twelve Sub-Packages
1.Family-oriented community based services (interventions that families and communities can provide/practice by themselves or with limited inputs)	1.1 Family preventive / Water and Sanitation services
	1.2 Family neonatal care
	1.3 Infant and child feeding
	1.4 Community illness management
2. Population-oriented scheduled services (interventions of preventive care that are delivered according to a regular schedule or through outreach)	2.1 Preventive care for adolescents and adults
	2.2 Preventive pregnancy care
	2.3 HIV/AIDS prevention and care
	2.4 Preventive infants and child care
3. Individual-oriented clinical services (interventions of birth delivery or individual illness management that are provided as the case arises)	3.1 Maternal and neonatal care of primary clinical care
	3.2 Management of illnesses at primary clinical care
	3.3 Clinical first referral care
	3.4 Clinical second referral care

Table 3: Service Delivery Modes within the Health MBB model (see UNICEF, 2011/03, Figure 1.1)

In translating the concept of service delivery modes of the MBB model to education, the example of 'quality basic education for all' can be considered. With the overall objective of providing basic education for all, free access to formal basic education has to be guaranteed. In the case of high numbers of out-of school children a corresponding non-formal basic education system has to be established. For the remaining population that has not been captured within the formal and non-formal

basic education system, youth and adult literacy and continuing education programmes are introduced.

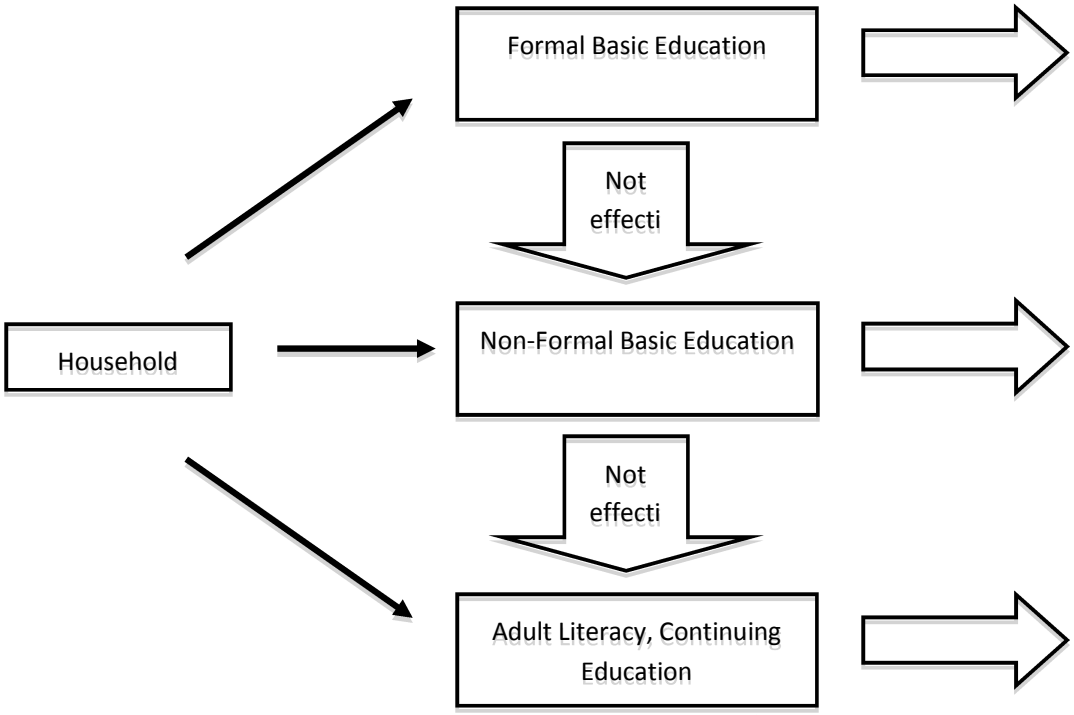

Figure 3: Suggested Packages of Services for Quality Basic Education for All

The corresponding service delivery modes including sub-packages could be outlined as following:

Three Service Delivery Modes	Six Sub-Packages
1. Formal Basic Education	1.1 Public Formal Basic Education
	1.2 Private Formal Basic Education
2. Non-Formal Basic Education	2.1 Public Non-Formal Basic Education
	2.2 Private Non-Formal Basic Education
3. Adult Literacy, Continuing Education	3.1 Youth and Adult Literacy Interventions
	3.2 Continuing Education

Table 4: Suggested Service Delivery Modes for Quality Basic Education for All

Meanwhile, the traditional education planning structure follows a life-cycle approach, capturing the different level of education (pre-primary, primary, secondary, higher education). The EFA Planning Guide and the AnPro model follow a mixed approach with regard to the international commitment to the six Education-for-All Goals.

The suggested structure of a EFA Plan is based on the different target groups of the six EFA goals (UNESCO, 2005): (1) Early Childhood Care and Pre-School Education for children age 0 to 6; (2) Formal Basic Education grade 1 to 7; (3) Non-Formal Basic Education for Out-of-School children; and (4) Non-Formal Education and Continuing Education for adults below the literacy level.

Within the AnPro model, six different sub-sector models and eight analysis and projection modules are distinguish (UNESCO, 2005): (1) Pre-school sub-sector; (2) Primary education sub-sector; (3) Secondary education sub-sector; (4) Pre-service teacher training sub-sector; (5) In-service teacher

training sub-sector; (6) Technical-vocational secondary education sub-sector; (7) Non-formal education sub sector; and (8) Girls pre-school, primary, secondary education.

With regard to the Education-for-All international goals and the traditionally used planning approach in education, the suggested service delivery modes could be adjusted as following:

Five Service Delivery Modes	Ten Sub-Packages
1. Pre-School Education	1.1 Public Early Childhood Education
	1.2 Private Early Childhood Education
2. Formal Basic Education	2.1 Public Formal Basic Education
	2.2 Private Basic Education
3. Non-Formal Basic Education	3.1 Public Non-Formal Basic Education
	3.2 Private Non-Formal Basic Education
4. (Lower) Secondary Education	4.1 Public Secondary Education
	4.2 Private Secondary Education
5. Adult Literacy, Continuing Education	5.1 Youth and Adult Literacy Interventions
	5.2 Continuing Education

Table 5: Amended Service Delivery Modes for Quality Basic Education for All

The suggested service delivery modes above can also be drawn directly from the six international goals to achieve Education-for-All goals as agreed on in 2000 (UESCO 2000/04):

- EFA Goal (1): Expanding and improving Early Childhood Care and Development
- EFA Goal (2): Ensuring complete, free and compulsory Primary Education for all
- EFA Goal (3): Ensuring access to appropriate Learning and Life Skills programmes
- EFA Goal (4): Achieving improved Adult Literacy and Continuing Learning

Early Childhood Care and Education emerges as an extension of Basic Education, recognizing that learning begins at birth. Hence, the awareness of the importance of the early years has grown and attention continues to be concentrated on Pre-Schooling for children about to enter Primary Education (UNESCO, 2000/04). In a growing number of countries, Basic Education is considered a complete cycle of nine years of formal education. In some countries Basic Education is one single continuous cycle of nine years, in other countries, Basic Education comprises two stages, Primary Education and lower Secondary Education (UNESCO, 2001).

Therefore, it is suggested to include Pre-School Education as well as lower Secondary Education. As outlined above, Basic Education can include lower secondary education depending on the specific country education system. However, with regard to availability of data and definition of indicators, the whole secondary education sector could be included in the sector analysis and projection.

The issue of pre-service and in-service Teacher Education is covered within the Availability Coverage determinant, and does not otherwise match within the education cycle as understood within the MBB model. However, since Teacher Education is a major input for the learning process (a 'soft'-input as discussed earlier) it might make sense to separately calculate and projection this major input.

Technical and Vocational Training and Professional Secondary Education could be included as one of the service delivery modes. Though, the conditions within this sub-sector are slightly different, as the demand of the labour market has a major impact on the supply of technical and professional education. The same can be assumed for Tertiary and University Education.

A separate analysis of Gender Disparity and Girls Education could be done within a population-specific coverage analysis, comparing the provision of the different service delivery modes for male and female students. Also, a comparison of population-specific coverage for rural vs. urban living population and poor vs. wealthy situated population, for the different service delivery modes suggested, can provide useful information for further analysis.

3.2 Service Coverage Determinants in Education

The Marginal Budgeting for Bottlenecks model distinguished six different coverage determinants for the analysis of bottlenecks of health service provision (UNICEF, 2011/01; UNICEF, 2011/03):

Supply side determinants:

- **Availability of essential commodities**: Assessing the availability of critical health system inputs such as drugs, vaccines and supplies.
- **Availability of human resources**: Assessing availability of a sufficient pool of human resources, such as doctors, nurses and community health workers.
- **Geographic accessibility**: Assessing beneficiaries' geographic access to health services, in terms of time taken or distance to reach a health facility.

Demand side determinants:

- **Initial utilization of multi-contact service**: Assessing the first use of multi-contact health services, as for example first antenatal visit or first series of childhood vaccinations.
- **Timely continuous utilization of multi-contact service**: Assessing utilization with respect to the number of recommended contacts for care.
- **Effective, quality coverage**: Assessing the proportion of population in need of an intervention who have received an effective intervention.

In comparison to the coverage measurements of the Service Coverage Concept, as discussed earlier, the Availability Coverage is split into two components; the availability of essential resources and the availability of human resources. Since the availability of qualified teachers is a very important input into the education process, this distinction would be useful to apply in education as well.

In terms of Accessibility Coverage, the MBB model as applied in the health sector focuses on geographical accessibility only. With regard to the importance of free education and the remaining impact of school-fees and indirect school costs, it would be suggested to use a proxy indicator combining both issues for the application in the education sector. In cases where school costs are not a major issue, the proxy could be calculated in a way that school cost can be left on zero.

The overlap of Acceptability Coverage and Contact Coverage, as previously discussed, has been solved within the MBB model by distinguishing between initial utilization and continuous utilization instead. The importance of continuous education, as highlighted before, would suggest a similar structure for the education sector as well.

With regard to the earlier discussed indicators for coverage measures, following service coverage determinants within MBB model adapted for education would be suggested:

	Six Service Coverage Determinants	Indicator
Supply side	**1. Availability of essential commodities**	Pupil-Classroom Ratio by grade
		Pupil-Textbook Ratio
	2. Availability of human resources	Pupil-Teacher Ratio (or Pupil-qualified Teacher Ratio) by grade

	3. Geographic and financial accessibility	School-Distance
		School-Costs by grade
Demand side	**4. Initial Utilization**	Net-Enrolment Ratio (or Gross-Enrolment Ratio) by grade
	5. Continuous Utilization	Survival Rate by grade
	6. Effective Utilization	Graduation Ratio
		Graduation Test Scores

Table 6: Amended Service Coverage Determinants for Quality Education for All

These six Service Coverage Determinants, together with the five Service Delivery Modes build the conceptual foundation of the MBB model suggested for the education sector. However, it needs to be considered that for each of the five Service Delivery Modes corresponding data for each of the six Service Coverage Determinants has to be available. Based on the country context and the availability of data, the Service Delivery Modes might therefore still be adjusted.

3.3 Budgeting for Bottlenecks Model in Education

The Marginal Budgeting for Bottlenecks model is an excel-based budgeting and simulation tool available on the Internet.[49] It is structured in three main modules and five major application steps:

Bottleneck Identification Module:

Application Step 1: Setup analysis parameter and choose analysis option, the comparison of up to three different scenarios of scaling up coverage, the comparison of up to three defined population sub-groups, or the comparison of up to three time phases or periods.

Application Step 2: Analysis of bottlenecks and objective of coverage, based on entered data on demographics, epidemiology, economics, health system, health interventions and health coverage.

Besides general demographic and economic information, the relevant data and proxy indicators for the five Service Delivery Modes and the six Service Coverage Determinants need to be entered. The relationship between the Service Delivery Modes and Service Coverage Determinants would be stored within the excel calculation,. It would be based on two production-functions, the Service Production Function reflecting the process of how education inputs are used to produce education outputs, and the Education Production Function, capturing the process of transforming education outputs into education outcomes and impact. Whereas the first would be the foundation for the Bottleneck Identification Module and the Costing and Budgeting Module, the second is a very complex calculation within the Impact Assessment Module (UNICEF, 2011/01).

The Service Production Function is comparable with cost-effectiveness measures commonly used within the education planning process. It usually calculates the increase in the number of students enrolled, graduated within the new service coverage, projected for the additional inputs provided. However, this calculation would be based on average data available and does not cover such 'soft'-inputs related to the quality of education. It is based on a simplified cause-effect relation and does not cover any effect of factors, which are not considered within the function.

The Education Production Function, on the other hand, would allow a calculation of the impact of such increased service coverage on effective service provision. Within the MBB model in the health

[49] http://www.devinfolive.info/mbb/mbbsupport/index.php

sector, this component of the Impact Assessment Module is covered through an additional comprehensive computer simulation, the Lives Saved Simulation Tool (LiST).

Based on the data entered, the MBB module would calculate the current service coverage within each of the six Service Coverage Determinants of each of the five Service Delivery Modes. This calculation would allow an analysis of the corresponding bottlenecks within each of the Service Delivery Modes hindering an effective service provision.

Costing and Budgeting Module:

Application Step 3: Selection of remedial actions and development of policy scenarios to achieve new coverage frontiers for the different service delivery modes.

Analysing the bottlenecks indicated within the Service Delivery Modes, it is now possible to choose remedial action to overcome such sector constrains. For each of the Service Coverage Determinants one remedial action would be suggested, based on available global research findings, which proved effectiveness. The remedial strategies are pre-set by the MBB model and could cover commonly used education interventions, e.g. construction of classrooms, and provision of textbooks, training of additional teachers, reduction of school costs and provision of scholarships, as well as interventions to improve the quality of education by reviewing the curriculum or introducing new teaching methods.

Application Step 4: Calculation of budget and finances, by choosing investment phasing, source of finance and simulated economic growth.

Based on the remedial action chosen, the MBB model would then calculate the additional resources required. Country parameter and average capital and current costs provided under Application Step 2 would be used to calculate the additional resources for implementing the remedial action chosen. Due to difficulties in defining a single unit of service delivery in the health sector, the MBB model uses incremental costs instead of marginal costs (UNICEF, 2011/01). This simplified version of marginal costs, is obtained by dividing the additional costs to achieve a one per cent increase in coverage, by the additional units of output needed for the target group. However, for the education sector per-pupil costs are a commonly used measurement and the MBB model could be adjusted to reflect this.

Impact Assessment Module:

As mentioned above, for assessing the impact of the selected policy scenarios, the Marginal Budgeting for Bottleneck model Module 3 refers to the Lives Saved Tool (LiST). The available excel-tool is automatically connected to the LiST computer tool. The entered data on demographics, health system and health interventions, together with the selected policy scenarios are sent to the computer tool, which feeds the results of the impact assessment on 'lives saved' automatically back into the MBB tool. LiST estimates the reductions in cause specific mortality by applying intervention effectiveness and affected fractions to intervention coverage changes. It estimates the mortality impact in the different stages, antenatal, childbirth, neonatal and infant period. Each child 'saved' is added to the projection of possible death causes of the subsequent age period (USAID, 2011/04).

So far a corresponding assessment tool for the education does not seem to be available. However, several simulation tools in education are building upon the concept of Cost-Effectiveness Analysis,

calculating the relationship between inputs to education and impact in terms of increased learning achievements. Although, the calculation would exclude several factors, especially 'soft'-inputs on improving quality in education, a cost-effectiveness module assessing the impact of remedial action on increasing test scores and learning achievements could be developed for the use within the MBB. It would need to be aligned with the six Service Coverage Determinants and provide information for all five Service Delivery Modes (pre-school, primary, non-formal, secondary, continuing education).

Application step 5: Analysis of results and output of different scenarios and compared estimated costs and simulated impact of changes, with the option to adjust coverage frontiers.

Based on the data provided on economic context, current service coverage, remedial education interventions and average costs of education, the MBB model would then provide information on additional resources required and impact to be expected. The different parameter of the model, the remedial actions chosen and the coverage frontiers estimated could still be adjusted within the fiscal space and with regard to the expected vs. projected impact.

The Marginal Budgeting for Bottlenecks model presented above could be an approach for countries to estimate the potential realistic contribution of education services to reach national and international goals in a pro-poor way. This tool could help to estimate the marginal benefits to education outcomes of investing in education services as well as be a method to estimate the marginal cost of this contribution to be integrated in the countries expenditure framework and budget.

VI. Opportunities and Limitation of the MBB model and its use in Education

Within the suggested education planning process in the context of the international commitment to achieve Education for All, as outlined in Chapter II., the Marginal Budgeting for Bottleneck model could provide added value for the planning, budgeting and simulation of education interventions.

It could be applied for planning at national level, as well as district and province level based on the population size. However, it would be too comprehensive for the planning at community and school level. Its main purpose is to support planning of medium-term to long-term strategies and plans, with specific focus on Mid-Term Expenditure Frameworks and in the context of Targeting Budget Support and Sector Wide Approaches in education. For the short-term implementation planning the application of the MBB model would only provide added value in the context of major sector reforms.

An adapted Marginal Budgeting for Bottleneck model for education could be applied for a comprehensive sector analysis, comparing intervention alternatives and setting policy goals and strategies. It could further be used to monitor the implementation of major sector reforms with regard to the comparison of potential versus actual impact of interventions on learning achievements. The MBB model follows the result-based management approach, by applying a result chain within its two production functions reflecting the input-output as well as the output-outcome/impact relationship.

Applying two production functions, the MBB model applies the basic principle of Cost-Effectiveness Analysis, comparing the costs of education interventions with the corresponding expected impact on increased service coverage. If corresponding data on test scores are available, the MBB model could further be adjusted to compare intervention costs with the effect on learning achievement. Within the MBB model used for the health sector incremental costs are used to calculate additional resources required, out of reasons of simplification. However, since the calculation of unit costs by pupil is a proven instrument used in education, the MBB model could be adjusted accordingly.

Please note that applying further analysis on humanitarian aspects of programming always depends on the availability of disaggregated information. However, with regard to humanitarian approaches within the programming in education, outlined in Chapter III., the following conclusion can be drawn.

The MBB model applies service coverage determinants of both supply and demand sides. Therefore the approach could be a helpful instrument in the context of the Human Rights-based Approach as used within programming of the United Nations and UNICEF. Furthermore, with the option of comparing service coverage for different population sub-groups, the MBB model could be used for more detailed analysis in the context of an Equity-focused Approach. This could comprise comparison of coverage of male vs. female, rural vs. urban, or poor vs. wealthy population groups.

Based on the outline of the Service Coverage Concept and the Marginal Budgeting for Bottlenecks model in Chapter IV and the conceptual adaptation of the MBB model for its use in education in Chapter V, the following suggestions can be made:

With regard to the Education-for-All international goals and the traditionally used planning approach in education, the suggested service delivery modes could be adjusted as following:

Five Service Delivery Modes	Ten Sub-Packages
1. Pre-School Education	1.1 Public Early Childhood Education
	1.2 Private Early Childhood Education
2. Formal Basic Education	2.1 Public Formal Basic Education
	2.2 Private Basic Education
3. Non-Formal Basic Education	3.1 Public Non-Formal Basic Education
	3.2 Private Non-Formal Basic Education
4. (Lower) Secondary Education	4.1 Public Secondary Education
	4.2 Private Secondary Education
5. Adult Literacy, Continuing Education	5.1 Youth and Adult Literacy Interventions
	5.2 Continuing Education

With regard to the earlier discussed indicators for coverage measures, following service coverage determinants within MBB model adapted for education would be suggested:

	Six Service Coverage Determinants	Indicator
Supply side	**1. Availability of essential commodities**	Pupil-Classroom Ratio by grade
		Pupil-Textbook Ratio
	2. Availability of human resources	Pupil-Teacher Ratio (or Pupil-qualified Teacher Ratio) by grade
	3. Geographic and financial accessibility	School-Distance
		School-Costs by grade
Demand side	**4. Initial Utilization**	Net-Enrolment Ratio (or Gross-Enrolment Ratio) by grade
	5. Continuous Utilization	Survival Rate by grade
	6. Effective Utilization	Graduation Ratio
		Graduation Test Scores

However, with regard to a practical adaptation of the excel-based MBB tool, additional adjustments have to be discussed. Detailed inputs, outputs, outcomes and impacts and the corresponding correlations would need to be defined for a Service Production Function (input-output) and an Education Production Function (output-outcome/impact). This could be done based on commonly used cost-effectiveness relationship used within existing education planning models (e.g. AnPro). However, a comprehensive tool assessing the potential impact of education interventions on learning achievements, as applied within the Impact Assessment Module of the MBB tool (i.e. LiST), seems to be unavailable for education yet one would need to be developed.

Further, a selection of globally proved remedial actions to overcome sector bottlenecks need to be specified. Education interventions largely depend on the country context and different countries and regions apply different remedial actions. Since the relationship of input and impact is not as linear as the illness-treatment relationship in health, international research and comparison of effective interventions would need to be conducted.

Overall, an MBB model in education could have added value for education planning, budgeting and impact simulation. However, it has to be considered that applying the model requires extensive data input for all six Service Coverage Determinants for each of the five Service Delivery Modes. Although, the MBB model could be adjusted to only cover a certain sub-sector or specific criteria within Quality Education for All.

Furthermore, the actual adaptation and application of the excel-based MBB tool requires specialized expertise and knowledge of the education sector and the relationship of its different sub-sectors and the corresponding input-output-outcome/impact relationships. Unfortunately, the actual adaptation of the comprehensive MBB model and tool exceeded the scale and scope of this research, but hopefully it raised interest to build on these first thoughts and to continue with the adaptation of the MBB tool.

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