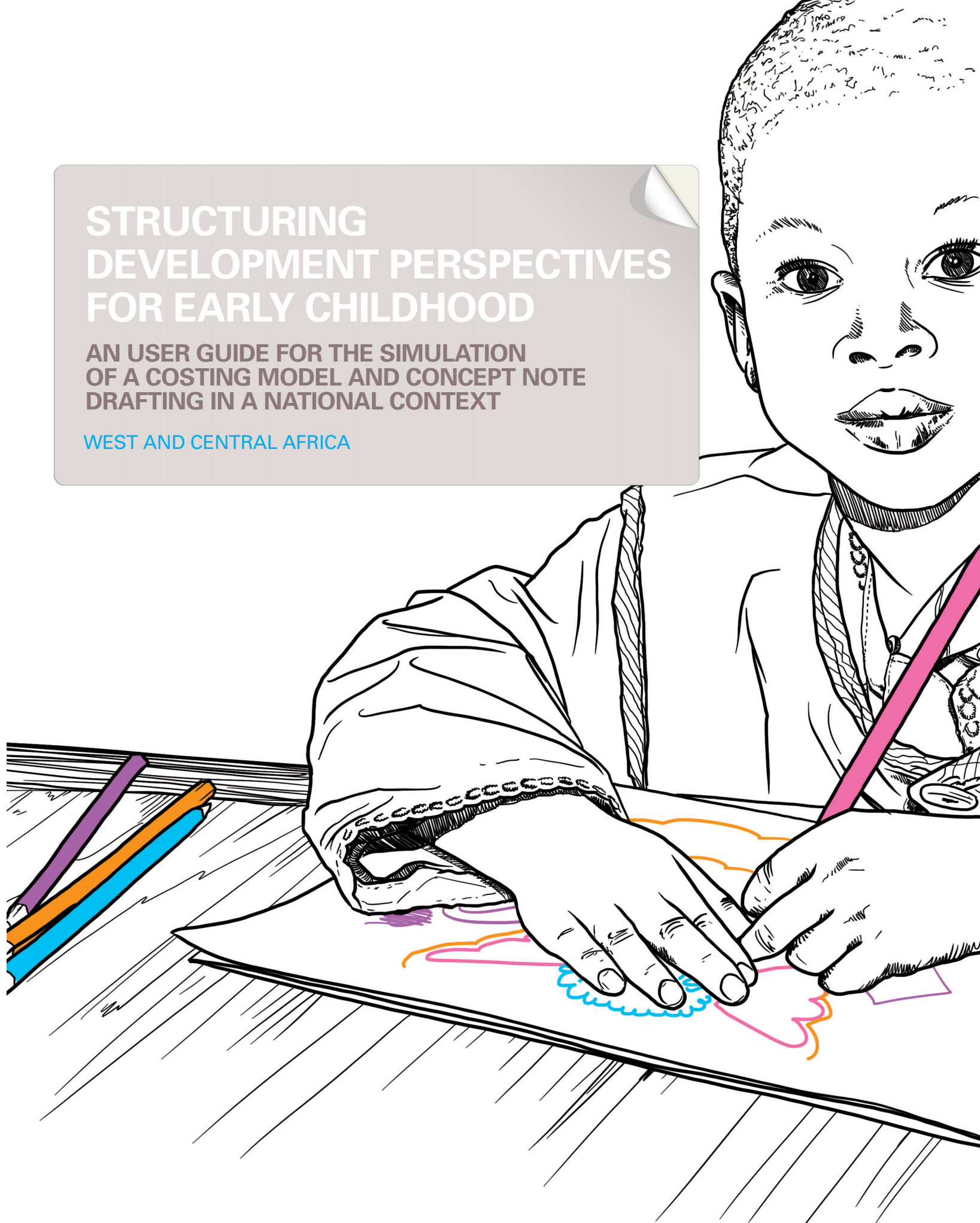# STRUCTURING DEVELOPMENT PERSPECTIVES FOR EARLY CHILDHOOD

AN USER GUIDE FOR THE SIMULATION OF A COSTING MODEL AND CONCEPT NOTE DRAFTING IN A NATIONAL CONTEXT

WEST AND CENTRAL AFRICA

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1 INTRODUCTION

Arguments in favor of developing early childhood activities have existed for a long time[1]; but little has been done over the past 10 years in most Sub-Saharan African countries, in spite of the First objective stated by the Dakar Forum, which outlined clear targets in this respect by 2015. There are two possible reasons for this "oversight": i) a strong priority was given to the quantitative development of primary education (often with quite convincing, albeit partial outcomes); ii) proponents of early childhood generally failed to build credible programs for scaling up these activities, or to organize them as part of a structured national program attached to a broader program, namely in the context of educational sectoral programs.

It certainly ought to be pointed out that the progress made in terms of primary education coverage over the last ten/fifteen years was mostly of a quantitative nature, and that the current situation, arising from this progress, raises two types of (new) problems for educational policy: the first relates to post-primary education, with a large number of additional candidates, mostly rural, who wish to seek an education beyond the primary cycle; the other relates to the qualitative dimension of the primary cycle itself, with two partially linked aspects, namely that i) completion gains derive more from access gains than from retention gains within a cycle and ii) the quantitative dimension has been prioritized at the expense of service quality and actual learning outcomes for pupils, these being often considered as lacking direly.

In this context, awareness is currently building around the likely gains from early childhood activities, given the overall demonstrated positive effects of these activities, but also more specifically throughout the primary cycle, especially in terms of repeating, retention and learning.

However, there are many reasons why this prevailing enthusiasm must be kept in check:

- The first is that it makes sense to operate a shift from an activist approach, with experimentations only covering limited segments of the reference population, to a programmatic approach building on systems that can cover larger numbers.

- The second is that the cost of early education activities amounts on average to 18 % of the GDP per capita, whereas that for primary education only amounts to 12 %, which means that extending early education to three years would cost the equivalent of 54 % of the GDP per capita, or 75 % of a full six-year education. This is therefore clearly a costly method for activities related to the quality of primary education.

- The third reason is that we need to ensure that the concept (which is good) efficiently translates into concrete implementation steps, which can sometimes be the case, but sometimes not; as an example, we find a whole range of early education content on a spectrum spanning from a strong focus on play and socialization aspects, to ambitions of engaging with structured learning in reading and numeracy, with many intermediary steps in between those two extremes.

Une façon de contribuer à la structuration de la réflexion et de lui donner la dimension programmatique indispensable dans une perspective d'action, peut être de l'organiser dans la structure formelle d'un modèle de simulation spécifique.

- This approach is useful, and no doubt necessary, in order to shape this early childhood policy and have it approved on the basis of i) targeted coverage by a given deadline, ii) logistical requirements of the services offered, iii) related unit costs and iv) budgets needed to finance the program.

- This is however not sufficient, because for the program structure to receive political backing, it is also crucial to endeavor to provide an operational definition of i) contents (both for parenting education for very young children and for early education services in the period which precedes primary cycle access) and ii) all the practical steps that should be envisaged for its implementation.

This guide only addresses the first of these two steps; it seeks to facilitate access to generic modeling and its costing (possibly its adaptation) in the context of a specific country, for people who do not have prior knowledge of modeling beyond the basic functions of a spreadsheet.

2 ORGANIZATION OF THE PROCESS AND STRUCTURE OF THE MODELING INSTRUMENT

2.1 A WORKSHOP TO CONDUCT THE WORK

The definition of the Strategy and Master plan of the Early Childhood National Policy should start with a workshop that should be attended by members of the ministries in charge of early childhood and early education (statistics, inspection and finance) as well as private and community actors in charge of this type of activities.

2.1.1 A BASELINE DESCRIPTION OF THE CURRENT SITUATION

Before beginning to build the prospective framework, some **data on the existing situation should be compiled.** This useful step helps to accurately describe the system, consolidate the group and secure the active involvement of its members. Data should therefore be collected in the following areas: i) number of pupils in the various systems (public, private, community) in the current period as well as their trends over time, ii) organizational modes within each of them (which teaching and non-teaching staff are used, by status, academic level, training, which pupil groups, which teaching materials are available), iii) content taught (social skills, cognitive development, language, introduction to primary content) and iv) financial aspects (aggregated amounts mobilized, staff pay levels, unit costs and service user fees). In some areas, information will no doubt be based on estimates; data shall be collected in raw form, with the possibility of obtaining more detailed information later.

All the information collected needs to be structured in Excel-compatible format in order to highlight the relations that exist between these various elements.

2.1.2 ELEMENTS OF AN EXISTING EVALUATION

The idea is to seek information on the relevance of existing organizational modes and operational aspects of the various formulas that have just been described for evaluation purposes (critical assessment). Assessments should mostly be of a subjective and qualitative nature, but they should nevertheless retain some relevance (the percentage of untrained teachers in such a formula proves problematic, there is often a shortage of supplies that prevents pupils from conducting planned activities, some families are put off by the high cost asked of them, content focuses more on socialization and not enough on cognitive learning, the language used in early education raises difficulties, etc). If an assessment of children's skills has already been conducted (second prototype of the UNICEF Regional Program), its findings can also inform that phase of the discussion.

The goal is to retain the structure of the information collected as per the previous point, in order to anticipate what aspects should be kept when shifting from the current situation to the vision that should be defined later.

2.2 STRUCTURAL STEPS OF THE TECHNICAL WORK TO BE CARRIED OUT

A fundamental element of the approach is that the master program eventually developed is essentially a policy choice. The two latter terms are of significance: it is up to policy-makers to make overall arbitration and agree on the program that shall be financed and implemented over the medium-term; but the program agreed is the outcome of a choice between several possible options, both in terms of quantity (system coverage) and quality (targeted options according to population groups, more or less favorable organizational terms, etc.). Before embarking on an Early Childhood program, all possible approaches must be envisaged, bearing in mind their social relevance as well as the cost for the collectivity and for the Government budget. This is why the instrument selected should help to easily simulate as many options or scenarios as seem worth testing (even though in reality, a set of ten options will do, as it will make the results of the exercise more easily manageable for policy makers).

An important point relates to the timeframe envisaged for the exercise; two useful aspects can be mentioned, namely that i) a long enough timeframe ought to be defined, because such structural decisions require a long time to implement (typically 10 years), and ii) it is preferable to choose a timeframe that is compatible with what has been defined for the educational sector strategy; indeed, the idea is that the strategy for early education and early childhood should not exist autonomously and in isolation from the sectoral strategy, but should be part of it, a specific part, but one that belongs to the whole. Such a precaution can at once boost the credibility of the early childhood program and facilitate the search for funding (public and foreign). As is the case with the overall sectoral program, the medium-term vision for the early childhood segment (early education and parenting education) should, once political backing has been secured, be structured into action plans that define relevant actions to be taken over the next three years as a commitment to implementing the strategy within 10 years.

In order to structure the specific reflection around the early childhood strategy, it is useful to organize it around the following themes, bearing in mind that for each of these themes and at each of these steps, various possibilities are available:

i) The first step relates to **the global coverage targeted within the medium-term timeframe identified.** One possible approach consists in treating coverage on the basis of the gross enrollment rate, as is often the case with school-related statistics (and as is done by UNESCO). This approach is not recommended, particularly because the GER defines the pre-school population in terms of the 3-to-5 age group, whereas we often observe that many children go into pre-school for only 2 or even one year, before moving to the primary cycle (either because they only entered pre-school at the age of 4, or because they stopped at the age of 5 before entering the primary cycle).

Besides, as the duration of pre-school education represents a possible variable in the definition of the future Early Education strategy, it is preferable not to rely on the GER to define an initial flow target based on the proportion of new pupils in the primary cycle who have received some form of early education, in whichever form or duration by program end. In this context, it is anticipated that this percentage of new primary school pupils

who received prior early education in one form or another is also used as a reference for the provision of parenting education activities to families with young children.

On the basis of this percentage and of the country's demographic base (and under the no-doubt widely accepted assumption that access to the primary cycle is anticipated to become universal by program end, i.e. by 2025), this step is scheduled to be completed with the identification of the number, in flow, of those who, having reached the official age for entry into the primary cycle by program end in 2025, have received prior early childhood education.

ii) The second step introduces **the duration of activities envisaged** both for the parenting education period and that for pre-school. Here, a baseline setup (which is variable) is on the one hand that the parenting education period lasts 3 years (children aged 0 to 2 full years) and on the other, that the pre-schooling period can last between one and three years. The suggested model allows for either a homogeneous duration (one, two or three years) of early education activities in the country's strategy, or for a distribution of these durations, as some children may in theory have had only one year, while others may have had two or three[2], especially when we are within a given scenario. Concretely, the goal in this second step is to determine the proportion, in terms of flow, of those who may have had one, two or three years of early education by the time they reach the primary cycle by program end.

On this basis, we can shift from a measure of numbers in flow terms to one of numbers in pre-school (in stocks), still by program end. When it is expected that children enter the primary cycle after a single year in pre-school, the stock is equal to the flow; but if X number of children enter the primary cycle after two years in pre-school, the stock is 2X, which refers to the number of places to be created and funded in pre-schools (or 3X when children are expected to stay in pre-school for 3 years).

iii) The third step is the **distribution of the identified numbers of pupils in the previous point across the various formulas** that could contribute to achieving these objectives. For instance, pre-school today is made up of: i) public formal, ii) private formal and iii) community-based, representing respectively P1, P2 and P3 % of the number of pupils, bearing in mind that by program end, these proportions could change and become P'1, P'2 and P'3; even if a formula does not exist today, it could be introduced in the years to come (for instance with the renewed Quranic formula), and its number of pupils could therefore represent P'4 of the total numbers of pupils by program end. On the basis of the pupil-numbers in stock, distributed across the number of pre-schooling years defined in the previous step, the proportions P' identified in the third step simply have to be taken into account in order to determine the equivalent number of pupils to be enrolled in pre-school in each of the formulas envisaged.

iv) The fourth consists in determining (with a degree of detail that remains to be defined) the organizational modes attached to each of the formulas envisaged in the previous point; as this requires that several parameters are taken into account (for instance group size, type and level of staff pay, current operational resources, etc.), it opens up the possibility of defining several variants that match these operational modes as well as a more or less favorable service structure (for instance, a "desirable" quality variant and a substantially lower, though still "acceptable", quality variant).

v) The fifth step seeks to assess the estimated value of the operational unit cost on the basis of the parameters identified in the previous step, for the purpose of defining the service organizational mode in each of the formulas envisaged.

vi) The sixth step consists in a needs assessment exercise seeking to ensure adequate funding of operating expenses across the whole system (for parenting education and early education, in each of the formulas envisaged and across the sub-system envisaged for in-country activities targeting children aged 0 to 6), and this for each year between the baseline year and the program end date, based on the variants identified in the four previous steps.

vii) The seventh step consists in producing capital expense estimates (building of infrastructures) linked to extending system coverage.

viii) Finally, in the eighth step, which is optional but often useful, one can identify a benchmark that sets a level considered acceptable for early childhood current spending; this can either be done globally by assessing a likely level of current spending in the educational sector overall, or by setting a reasonable "ceiling" percentage for early childhood expenditure.

The table below summarizes these various steps.

These steps precede the development of the modeling and simulation instrument, which is designed to include a degree of flexibility in the various open choices in each of these steps; however, it may prove necessary to perform later adjustments pertaining to the format itself.

POPULATION BASE: POPULATION AGED 0 TO 6 PER AGE YEAR

STEP 1

**COVERAGE OPTIONS
(% OF NEW PRIMARY SCHOOL PUPILS WITH PRIOR PRE-SCHOOLING)**

Identical coverage target for pre-schooling and parenting education

Number of pupils entering primary cycle (flow) with prior pre-schooling
by program end

STEP 2

OPTION ON THE DURATIONS OF SERVICES OFFERED BY PROGRAM END

3 years (0-2 years-old)	3 years (3-6 years-old)
3 years (0-2 years-old)	2 years (4-5 years-old)
3 years (0-2 years-old)	1 year (5 years-old)

Number of children (stock) in the various services offered by program end

STEP 3

OPTIONS ON THE WEIGHTING OF THE VARIOUS TYPES OF FORMULAS BY PROGRAM END

A	B		C	D	E

STEP 4

ORGANIZATIONAL MODE OPTIONS FOR THE VARIOUS FORMULAS

A1	B1	Feature 1	C1	D1	E1
A2	B2	Feature 2	C2	D2	E2
A3	B3	Feature 3	C3	D3	E3
A4	B4	Feature 4	C4	D4	E4

STEP 5

CALCULATING THE UNIT COST OF THE VARIOUS FORMULAS (UC)

UC A	UC B	Unit cost	UC C	UC D	UC E

STEP 6

CALCULATING THE UNIT COST OF THE VARIOUS FORMULAS (CE)

CE A	CE B	For each formula and globally	CE C	CE D	CE E

STEP 7

CALCULATING CAPITAL EXPENDITURE (KE)

KE A	KE B	For each formula and globally	KE C	KE D	KE E

STEP 8

COMPARISON WITH MAXIMUM FINANCIAL THRESHOLD

3 USE OF THE MODELING AND SIMULATION INSTRUMENT

3.1 OVERALL CONSIDERATIONS

The instrument is built using the Excel software, which is widely available, and for which skills exist in all countries.

It is made up of two main parts: i) one that essentially includes **the various levers of the Early Childhood Educational Policy** and where the formulas and organizational modes envisaged for the program target year (2025 in the prototype model) are defined, and ii) another where **the various calculations on the pre-schooled pupil numbers in the various formulas are calculated, as well as the financial amounts** required between the baseline year (2012) and the target year (2025) according to the parameters defined in the first part.

It also includes boxes (cells) with a colored background, and mostly, other boxes with a white background. It is possible to modify the boxes with a colored background, but not the others, as this might destroy the instrument's functional structure.

The background color used in colored cells refers to differentiated features:

∗ If **the background is yellow**, it means that you should look for the numerical value that matches your country. This generally relates to information on the baseline year (2012 in the case of our prototype country). For instance, a yellow cell is used for macroeconomic data during the baseline year (GDP, population, State revenue, current public spending on education, pupil numbers in the various pre-school formulas and beneficiaries of parenting education activities). Some yellow cells also refer to demographic projection data per age year between 0 and 6)[3].

∗ **Pink** cells have similar features to yellow ones, as they must be filled in with external sources to document any possible trends in macroeconomic, demographic and public finance information between the baseline and target years.

∗ If the background is **green**, it means that you should choose a numerical value for the parameter relating to an element of educational policy. Some of these green cells are obviously more important than others, particularly if they express a "strong" policy option for the Early Childhood Strategy by program end (for instance the percentage of primary cycle children that should have been pre-schooled, or the duration of early education activities, or the share allocated to the community-based formula across the sub-system, or again the size of child-management groups). As far as some other green cells are concerned, you are required to make your own choices, although they express a technical dimension of lesser

importance, without real impact on the definition of sub-sector strategic choices; this is the case for instance for the number of days of initial training specific to community-based teachers or the amount of per-diem they receive in this training workshop.

Let us now examine in turn the various blocs that make up the suggested instrument.

3.2 THE BLOCS FOR GLOBAL COVERAGE QUANTITATIVE CHOICES (BLOC A)

• The first parameter offers a benchmark for the share (%) of public spending that could be allocated to early childhood activity funding. This benchmark is mostly indicative of spending estimates and it does not have an actual impact on the model.

• The second important parameter is the target, by program end, for the share (%) of the population of newly-enrolled primary school students estimated to have previously benefited from early childhood activities by program end (2025 in this case), this proportion being the same, in the specification chosen here, for the parental support segment and in the pre-school segment (green cell in D8). Besides, in reference to the number of children aged 5 by program end (Q96 cell in the demographic projection), the bloc gives the number of relevant individuals **in flow terms.**

3.3 THE BLOC FOR FORMULA IMPLEMENTATION CHOICES (BLOC B)

Three aspects are taken into account here:

i) The first is the distribution, in percentage and by program end, of the population aged 6 in the previous bloc that is expected to have received an early education based on the probable duration of the latter. The proportion that should have been applied a formula over a year is indicated in green cell 17 (0 % if there is no such possibility in the scenario envisaged), while the proportion that received early education services in one formula for a two-year period is indicated in green cell 18. The model also provides for the possibility to choose a specific percentage of new primary cycle pupils who received an early education over a three-year period, but, although a cell is indeed available for this purpose (I9), it is not green but white. Indeed, as soon as the green cells 17 and 18 have been filled in, cell I9 automatically, or structurally, receives its value, as the sum of all three probabilities should be 100 %.

On the basis of these three percentages, the values in cells J7 through J9 provide the distribution, in numbers this time, of the figure previously identified in cell D8 (the total in I10 should amount to the value of D8); but these are flow numbers. And as it is important to determine the number of children in the services provided to them, we should shift from numbers to stocks, on the basis of the duration of services; these are calculated in cells K7 to K9 (K10 being the sum).

ii) The second aspect in the sequence is the proportion of services envisaged in the framework of the community formula, with a variation possibility ranging from zero to 100 % (green cell I10); the proportion covered on the basis of the formal modalities appears in cell I11, but the latter has a white background, as it serves to round off to 100 % cell I10, which indicates the relevant structural choice.

iii) On the basis of indications from previous points i) and ii), the third aspect offers estimates of the population which should be found in each of the pre-schooling formulas by program end; the calculation is instant as far as the community formula (I15) on the one hand, and the formal services (I16) on the other, are concerned. Regarding the distinction between public and private within the formal pre-school sector, the option chosen in this model has been selected on the basis of the notion that pupil numbers in the private sector would maintain their current trend (cell D18, whose calculation includes this trend) and that it is therefore the public sector that is likely to absorb a rather significant share of the developments envisaged over the coming years (cell I18, calculated on the basis of the difference between i) the anticipated pupil numbers in the formal sector, given the parameters previously selected, and ii) the expected pupil numbers in the private sector.

The estimated numbers for parenting education depend on the number of those arriving in the primary cycle with prior «Early Childhood» activities (calculated previously, as it was decided here that the coverage would be homogeneous between pre-school and parenting education). But the number of children whose parents received parental education activities during a given year also depends on the duration in years of these activities. The latter element is an option in the early childhood policy and it is materialized in green cell I12. The number of children that will benefit from parenting education activities is then divided into two groups, depending on whether they belong to the community formula context (cell I13, calculated by taking into account the community weighting previously chosen in I10) or to that of the formal organization of services (cell I14).

3.4 CHOICE OF SERVICE QUALITY; CURRENT SPENDING (BLOC C)

This large bloc of choices on the quality of services is made up of several sub-blocs, as the service features to be envisaged vary depending on whether these are i) family support activities (and on whether these are organized in a formal context - urban setting - or in the community context – rural setting) or ii) pre-schooling activities; and again, within these, on whether they are managed according to the formal or community mode.

3.4.1 FORMAL PRE-SCHOOL (BLOC C1)

It is obviously the formula whose features are the most conventional and the simplest. In a given specification, it may be that a class group is taught by a teacher **and** that the latter is helped by a support staff who could share this activity across several classes. Six parameters are taken into account:

* The first parameter is the student/teacher ratio (green cell D18), which normally corresponds to the size of the class group.

* The second parameter allows for the teacher to receive help from a support staff, possibly on a part-time basis. The value of the parameter (indicated in green cell D19) is **1** if a support staff is allocated on a full-time basis to each class group; it is **0.5** if the support staff activity is shared across two classes and **0.33** if the activity is shared across three classes. The value is **0** if the formula does not involve support staff for classroom management.

* The third parameter refers to the average monthly wage (in the country's currency unit) for teachers in charge of pre-school activities. The modeling format is such that the educational policy's main parameters are grouped within the "dashboard" tab, which will be discussed later; this applies to the level (of qualification/status) of the formal pre-school teacher that can take two values (1 and 2). Value 1 refers to a higher level of qualification, while value 2 refers to a lesser level. Green cell D20 is linked to this binary value (1/2) which defines the level of qualification; but it is in fact calculated through an "If" function that allocates a value to this cell, corresponding to the teacher's monthly remuneration level [if the teacher is in category 1, his/her monthly wage is, in the prototypical case, 220,000 UM, while in a lower category, the monthly wage is only 150,000 UM]. If two possibilities are envisaged however, both corresponding wage levels should be put in the formula contained in cell D20. Let us point out that these amounts are given in the value of the country's currency unit during the baseline year and that they will be «automatically» adjusted to reflect any change over time.

∗ The fourth parameter refers to the average monthly wage (in the country's currency unit) for any staff that supports teachers in charge of pre-school activities. This cell (D21) has a yellow background, which means that its value is recorded in the baseline year and that it is not included in the educational policy. If however, there is reason to believe that this figure "should" be different from the one recorded in the baseline year, then this cell should have a green background (for the sake of homogeneity) and the desired number should be added to it.

∗ The fifth parameter (green cell D21) corresponds to the amount (in the country's currency) of supplies for the classroom and pupils, mobilized per pupil in order to run the pre-school services offered. This amount is such that it should ideally be recorded at program end (even if it is expressed in the currency unit as at the baseline year).

∗ Finally, the sixth parameter corresponds to the system support needs (administrative and pedagogical); this parameter (yellow cell D23 with the same qualifications as cell D21 above) is expressed as a percentage of total spending allocated to administrative and pedagogical support in the formula.

On the basis of the numerical value of these various parameters, an appropriate formula (visible when clicking on cell D24) helps to calculate the unit cost, first of all in the national currency unit as at the baseline year (cell D24), then in national GDP-per-capita units (cell D25).

3.4.2 COMMUNITY PRE-SCHOOL (BLOC C2)

The community formula can be organized in many different ways. It is therefore important that these variation possibilities are taken into account by the specification. Thus, we must envisage on the one hand the possibility of a greater or lesser share of public resources (as well as community resources) in the formula, and on the other, an activity structure that is either targeted at the local level, or includes at once local operation and community monitoring. The choice of the various parameters envisaged can determine how these two aspects are organized

Besides, the no-doubt reasonable idea being considered in the suggested formula is to ensure that the quality of services offered is as close as possible to that of services delivered in a formal framework. In this perspective, in addition to providing training and targeted monitoring on the activities that the community educational system should implement, it is anticipated that the parameters for the average group size on one hand and for the equipment and consumables on the other are at the same level as those used in the formal context. Finally, and also for the sake of sustaining both the services and the accountability of those who provide them, a form of State-funded wage, probably much lower than that of formal teachers, is deemed necessary and should be envisaged in the model. This said, there is still some flexibility, as not only is it easy to modify the provisions included on the similarity between functional parameters and the formal sector, but also, the level of remuneration of community teachers can be set (including with a value of zero) to take into account specific national conditions.

3.4.2.1 Local level (Bloc C.2.1)

The first parameter is the size of the average group taken care of by a community extension worker (D29 cell, which is white, based on the assumption that it is similar to the corresponding value in the formal sector, but can become green if we wish to give it an independent value); the second is the amount of monthly public subsidies allocated to the community to ensure remuneration of the person in charge of providing services at the local level (green cell D30, bearing in mind that the remuneration is provided over a 10-month period; a change in this provision requires an adjustment of the formula through the coefficient in D30 that calculates the unit cost in cell D33). An individual with the minimal skills for the exercise of the community extension worker function should be chosen; but this person should receive training to ensure that s/he is able to implement the activities identified in the Early Education Program. The value of the unit cost for this training is indicated again in cell D31, which has a white background as it is derived from the calculation done in Bloc C.2.1a, located on the right of Bloc C.2.1. The annual amount per pupil for small equipment and consumables is indicated in cell D32 (whose color is white, if we accept the assumption that this amount is equal to that for the same item in cell D22 of Bloc C1 relating to formal early education services).

- Located next to Bloc C.2.1, Bloc C.2.1a identifies the features and cost of training for community extension workers at the start of the year. The following elements are therefore indicated: i) number of days of training (green cell H29), ii) size of the group of community extension workers to be trained (H30), iii) per-diem amount (national currency units) received by the extension workers to be trained (cell H31), iv) cost of transport for each extension worker (cell H 31 in national currency units), v) per-diem amount (national currency units) for the trainer (cell H33), and vi) daily wage (national currency units) for the trainer in cell H34; here, no figure has been entered as it is assumed that this is part of the community extension worker's standard activities (see the next point); but we can use a different approach and use cell H34 for the trainer's daily wage.

  This information can be useful to calculate both the overall cost of training (in national currency units) and the cost of training per participant (UM), number which therefore appears in cell D31 within Bloc C2.1.

Bloc C2.1 also includes the cost (in national currency units) of small equipment and consumables for the classroom and pupils mobilized by pupil for the proper running of the service throughout the year (cell D32, with the qualifications given above). Finally, on the basis of the value of the various parameters envisaged, a formula helps to calculate the unit cost, first in national currency units (D33), then in GDP-per- capita units (D34).

3.4.2.2 Community monitoring level (Bloc C.2.2)

Community monitoring consists in having a qualified supervisor who conducts frequent visits and provides regular support to community extension workers delivering services at the local level;

- The first parameter seeks to determine the number of community extension workers who will be monitored by a supervisor throughout the year (green cell D38);

- The second parameter identifies the supervisor's monthly wage level in national currency units (green cell D39), which can be the same as that of a pre-school teacher, although this is not the option chosen here where the two numbers (in cells D20 and D39) may be different.

- The third parameter pertains to the supervisor's annual training (which appears in cell D40). The specificities of this training are described in Bloc C.2.2a, which has a similar structure to that of Bloc C.2.1a, described above. As in Bloc C.2.2.a, no number is given in cell H43 in reference to the trainer's wage, as this function is normally filled by a formal pre-school inspector (there is nevertheless a possibility for entering a number in cell H43).

- The fourth parameter relates to the amount of consumables that should be allocated to supervisors (cell D41, determined by cell L41 in Bloc C.2.2b) in reference to each of the community extension workers being monitored: i) the first aspect considered is the number of visits envisaged by the supervisor to each community extension worker across the year (green cell L38); ii) the second refers to an estimation of the average cost to be envisaged (per-diem and transport or, better, a fixed amount) for a monitoring visit to a community extension worker (cell LC9); the third aspect refers to a fixed amount for the consumables needed for the community extension worker monitoring over a one-year period (cell L40). This information is useful to calculate the overall cost of consumables (in national currency units) to be prepared per extension worker; this amount is entered in cell D41 of Bloc C.2.2.

All the parameters included in Bloc C.2.2 help to determine the unit cost (per child receiving the service) attached to monitoring community extension workers, expressed first of all in national currency units (cell D42), then in national GDP-per-capita units (cell D43).

3.4.2.3 Totals (C.2.3)

This last bloc consolidates the unit costs of service delivery at the local and community levels and of the regular monitoring conducted by supervisors (white cell D47), and also, the administrative and pedagogical staff spending (as a percentage of total administrative spending) for pre-school community training; this percentage is given in green cell D48. The total unit cost, including for the running of community pre-school services and the administration of this sub-system, is calculated in the national currency (white cell D49) and in GDP-per-capita units (cell D50).

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3.4.3 EDUCATIONAL AND PARENTING SUPPORT ACTIVITIES (BLOCS C3 AND C4)

During the early childhood years (two or three years according to the choice made previously in green cell I12 (Bloc B), the holistic Early Childhood Program includes parenting education activities. The following structure is envisaged:

- The first point is to understand to what extent these activities are conducted by dedicated staff, or if pre-school activity staff are also used. Assuming that the former case applies, the remuneration level for the agent dedicated to parenting education must be indicated.

- The second point is to identify the number of families that will receive support from an extension worker; this is important for reasons of ease and homogeneity in the simulation structure, bearing in mind that it is on the basis of the number of children that the whole model structure is organized.

- The third point relates to the likelihood that parenting education activities are organized according to i) basic intensity for all the families (family gatherings, communication activities, discussion groups on specific themes) and ii) enhanced intensity with visits of the extension worker at the family home (supplying small equipment, nutrition, child suffering from a handicap, specific activities in the local context, …). This mode of organization requires first of all that the cost (in national currency units) is defined for resources (per child) that will be required so that "conventional" parenting education activities are conducted throughout the year and secondly, that the proportion of families that could be recognized as vulnerable (a proportion that may differ depending on localization) is defined, as well as the amount of resources that are required for enhanced activities (still on a per-child basis). But of course, the model is flexible enough so that the weighting of these latter activities can vary from being absent to being a major mechanism.

The structure of the framework model also provides for the possibility that the distinctive parameters of the parenting education structure are different depending on whether the parenting education activities are organized in an urban or rural (community) setting; two separate blocs are envisaged: i) Bloc C3 for the urban setting, and ii), Bloc C4 for the rural setting. For each of these blocs, and in relation to the numerical value of their respective parameters, an appropriate formula is used to calculate the unit cost value in the national currency unit (in cells D59 and D69 respectively for the urban and rural setting), then to transcribe it in GDP-per-capita units (cells D60 and D70).

Let us point out that the model first of all describes the relevant relations between structural variables, and secondly monitors the trends between a situation in the baseline year (here 2012) and the program target date (2025) on the basis of the chosen parameters indicated in the previous blocs. Let us also note that all the model values and simulations are expressed in constant monetary value, that of the baseline year (here 2012).

3.5 RESOURCES LIKELY TO BE MOBILIZED (BLOC D)

The public resource bloc is derived from the type of bloc commonly used in simulation models developed within the global education sector. Macro-economic and fiscal data is to be obtained from the Finance, Budget or Planning Ministries.

The model starts with the country's GDP in the baseline year (yellow cell D77) and with the average economic growth rate forecast over the program duration (pink cell C77); forecasting is then automatically done on the basis of this data. Next, the model introduces the country's population data, using identical criteria as for the GDP; it then calculates the GDP per capita as well as expected growth trend.

State revenue data for the baseline year is introduced in cell D80 and the model calculates its relative values in terms of percentage of GDP (fiscal pressure in white cell D81). The expected fiscal pressure trend by the year 2025 (identified through its target value in pink cell C81) is used to calculate the expected growth in the country's public revenue between 2012 and 2025.

Data on the State's current expenditure for the year 2012 is introduced in yellow cell D82; it is translated into a percentage of State revenue (in D83), given the fact that State revenue is also used to fund investment spending, with the possibility of a fiscal deficit (or surplus). The figure in cell C83 (in pink) indicates fiscal perspectives for 2025 relative to the balance between State's current expenditure and investment spending funded by national resources; forecasts over this figure can help to assess trends in the State's current expenditure (in currency units as at 2012) between 2013 and program end, i.e. 2025 (cells E82 to Q82).

Current education spending for the year 2012 is indicated in yellow cell D84: this helps to assess the level of priority given by the country to its educational and training system (current spending in education in % of the State's current expenditure in cell D85 for the year 2012). Factoring in the target on this aspect for the year 2025 (cell C85) leads to an estimation of the growth of this priority level between 2012 and 2025; this therefore leads to an estimation of global current education spending over the period covered by the program (cells E84 to Q84).

Finally, the amount of current public spending for Early Childhood (including pre-school) for the year 2012 is indicated in yellow cell D86[4]. In percentage terms, this figure is linked to that of total current spending in the education sector (cell D87). On the basis of the target value

for the year 2025, copied from cell D7 (Bloc A), the evolution of this percentage between 2013 and 2025 (cells E87 to Q97) is modeled to infer the volume of current resources that Early Childhood could receive across the various years covered by the program until 2025 (cells D86 to Q 86).

3.6 PUPIL NUMBERS (BLOC E)

This bloc starts with demographic information, i.e. the number of children aged 0 to 5 per age year. This can be obtained either: i) based on the number of children during the baseline year of 2012 (cells D91 to D96) and including the anticipated growth rate for this age group (C91 to C96), or ii) by directly including demographic forecasts per age year between 2012 and 2025.

The model then takes into account the pupil numbers noted in the year 2012 in the various formulas envisaged[5] and for the two components of the program (yellow cells D98 to D100 for pre-school, and D102 to 103 for parenting education). Finally, the model imports the coverage target values defined for 2025 in Bloc B (cells Q98 to Q100 on one hand, and Q102 and Q103 on the other); on this basis, the number of young beneficiaries in the various formulas is inferred for each of the years between 2012 and 2025, so as to ensure a gradual transition between the situation identified in 2012 and that which is envisaged for 2025.

3.7 CURRENT SPENDING (BLOC F)

This bloc is divided into two sequential steps: i) the first relates to the unit costs associated to each of the formulas envisaged; ii) the second directly calculates the fiscal spending for each of the formulas by multiplying pupil numbers by estimated unit costs.

For unit costs, the target values in GDP-per-capita units indicated in cells C107 and C109 are imported from blocs C3 and C4 examined above, respectively from cells D60 and D70 for parental education and support in urban and rural settings. Likewise, target units in GDP-per-capita units indicated in cells C111 and C113 are imported from blocs C1 and C2, respectively cells D25 and D50 for the formal and community-based pre-school sector.

A specific qualification applies to the various values of the unit cost taken into account for the year 2012. It has been assumed that reliable numerical data for the year 2012 is not always available, either for parental support or for community pre-schooling; if such is the case, the target values (column C) are carried over in the respective cells of column D. The unit cost values are therefore used in a consistent manner for each of the program years; but these unit costs, expressed in national currency units, increase throughout the program in so far as it is anticipated that the GDP-per-capita value will increase gradually over the period (in monetary terms as at the baseline year). If we have the initial values (2012) of the unit cost for one or the other of these formulas, we can use the same procedure as that envisaged for public formal pre-schooling.

In the case of public formal pre-schooling, for which we assume that we know its value or can assess it (in national currency units) for the year 2012, the value is thus entered in yellow cell D111, as this is expressed in GDP-per-capita units in cell D112. Joint inclusion of the target value by program end imported from cell D25 to cell C111 helps to determine the unit cost evolution (in GDP-per-capita units) between 2012 and 2025, and to infer from it the unit cost evolution for public formal pre-school in national currency units between the years 2013 and 2025 (cells E111 to Q111).

The unit costs being determined, it is now possible to obtain the amount of current spending attached to the various formulas by applying the pupil numbers previously identified in Bloc E. These figures are consolidated to determine the global amount of the program current spending over the period envisaged, and in particular for the year 2025. This figure (cell Q122) can then be meaningfully compared to the value identified in cell N86 for public resources that have been deemed likely to be mobilized, given the sectoral choices already made. A comparison can also be done by comparing the figure already envisaged for the share of current spending for Early Childhood within the sector's current spending (cell D7 in Bloc A) and the actual share of spending for Early Childhood estimated with the parameters envisaged in the current scenario (cell Q123).

3.8 CAPITAL EXPENDITURE (BLOC G)

Capital expenditure is calculated on the basis of standards used in sectoral simulation models. Thus, capital expenditure during a given year is calculated as the product of i) a measure of the number of facilities to be built in each of the formulas envisaged during that year and ii) the unit cost of infrastructures envisaged in each of these formulas.

3.8.1 FORMAL URBAN PRE-SCHOOL (BLOC G1)

Based on group sizes, it is possible to work out the number of classrooms which should be available in the system in any given year. Thus for 2025, the required number of classrooms (cell Q128) is equal to the value of pre-schooled pupil numbers in this formula at that date (cell Q98) divided by the expected size of the pupil group under this scenario (cell D18). Thus, the required number of classrooms can be assessed for each program year. On this basis, we can easily move from an estimation of the number of new classrooms to be made available in a given year n (cell G129 for instance for the year 2015), this figure being equal to the difference between the number of classrooms required in year n (cell G128 in 2015) and that of already available classrooms in (n-1), in cell F128 in 2014).

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The unit cost for a classroom fitted to accommodate pupils and pre-school activities in 2012 is given in green cell D130. This cost is translated into GDP-per-capita units in cell D131 and it is anticipated that, as expressed in this unit, it will remain valid until program end in 2015. But as the GDP per capita is expected to change over this period, it is also expected that the cost of a classroom in monetary value as at 2012 also changes accordingly (value of cell G130 in 2015, which amounts to the product of cell G131, for the value of the classroom in GDP per capita unit, and of cell G79 for that of the GDP per capita (in monetary value as at 2012), at the same date of 2015.

Finally, the aggregated capital expenditure for this part of the program, which is equivalent to public formal pre-school infrastructures, is simply calculated for any given year (for example expenditure for the year 2015 in cell G132), as the product of the number of classrooms to be built that year (in cell G129) and the estimated value of the cost of a classroom at the same date (in cell G130).

3.8.2 RURAL COMMUNITY PRE-SCHOOL (BLOC G2)

The same overall approach can be adopted for modeling community pre-school capital expenditure, although some parameters, including the amount of subsidies for building a facility, can be modified.

4 ADDITIONAL STEPS FOR THE PRODUCTION OF MULTIPLE SCENARIOS

The steps described above essentially seek to introduce and explain the development process for a given scenario by describing the structure and connections between various calculations that help to produce estimates. But the purpose of this exercise is not simply to assess a given policy, identified through its inherent structural parameters; indeed, this exercise is most relevant for providing policy-makers with a wide range of possible scenarios that can gradually steer them towards the solution that suits them the best, in other words, one that best combines quantitative and qualitative objectives within the sub-sector in a context of financial sustainability and balance with other sub-sectors of the overall educational sector.

In order to produce this range of scenarios and to facilitate their "prioritized" assessment by policy-makers (and thus make a structured presentation of the results in a concept note), two operational approaches can commonly be used:

i) The first consists in **organizing the scenarios sequentially. I**n practical terms, an initial scenario with relatively ambitious parameters can be defined, one that we feel will not be matched (probably by a great margin) by the resources likely to be available. By assessing the resources required for this first trial and by identifying in broad terms the necessity to have scaled down ambitions, a second scenario is defined, which i) copies the values of the first scenario's parameters and ii) makes relevant adjustments in order to reduce the level of spending by tweaking parameters that are both likely to have a significant impact on spending and maintain a high degree of ambition for the program. For instance, if we target a 60% coverage rate over a ten-year period whereas the current rate is only 10 %, then a target of 50% still is quite ambitious; likewise, if we target a three-year cycle while empirical studies in the country have shown that the main benefits can be achieved with two years of pre-school, then moving from a three-year objective to one of only two years can help reduce spending without undermining actual objectives.

Then, once the second scenario is defined and assessed and that its results have been analyzed, it can be copied if need be into a third scenario within which additional adjustments can be made on specific parameters; and so on and so forth in a perspective of convergence towards a sustainable program; at a certain point in this process, the option of an increased resource mobilization may have to be envisaged; this can especially prove necessary if what has been deemed possible to achieve in terms of social outcomes with the initial level of resource mobilization is considered to be unsatisfactory.

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ii) The second approach consists in using an Excel worksheet for each of the scenarios envisaged and an additional worksheet in the global file in order to **monitor the various scenarios tested.** This monitoring worksheet includes the main parameters that can be adjusted in order to refine a given scenario, namely parameters on i) the system's global coverage, ii) the structural options on the duration of pre-schooling and parenting education services, iii) the weighting of formal and community sectors in Early Childhood service implementation, and iv) the organization, quality and unit costs for pre-schooling and parenting education services in the various formulas envisaged. Each scenario is characterized by a particular set of these various parameters, given that for each scenario envisaged in the worksheets, the value of the parameters used is obtained from the monitoring worksheet.

Inversely, worksheets for each scenario send outcome data in financial form back to the monitoring worksheet. This is a convenient way of accessing at once the main levers of the Early Childhood Educational Policy and its related financial implications.

The process for building a monitoring worksheet in which are included the definition of the main parameters for n scenarios presented in a sequential order, each attached to a worksheet that performs the necessary calculations, corresponds to the architecture of the Excel file for which this document is the user guide. In this configuration, it is preferable not to insert values in the green cells contained in the various scenario pages and attached to the monitoring worksheet, as this would ruin the monitoring architecture; we can however do so if we are not concerned with the overall architecture of the monitoring worksheet, each scenario now becoming a standalone instrument.

Given the risk of misuse by users unfamiliar with the instrument, it is recommended to save a copy of the instrument with a different name, and to use it as a working instrument (while always having the possibility to go back to the original version if required).

Let us point out finally that the instrument suggested here as a prototype is not designed to be used in a rigid manner. First of all, it has been developed with a concern for relative flexibility; but it is also possible, and even likely, that adjustments are made in various areas of the model in order to better meet the specific needs of a given national system or take into account the choices envisaged by policy-makers in a given country when they attempt to build their own specific Early Childhood System.

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To conclude, let us point out that based on experience, a **rather long time** is required to produce and assess a simulation model adapted to the specific context of a country. This duration may vary depending on the initial availability of national data on parenting education services (generally at a low level of development) and on pre-schooling services in the various formulas as well as on the institutional complexity of the existing approaches; but a five-day duration can no doubt be considered reasonable.

Experience has also shown that this time may not be sufficient for complete ownership by actors, who are then supposed to explain and justify the work done to the country's authorities; to achieve this, it has sometimes proven useful to adopt a formula where:

i) Participants to the initial workshop meet amongst themselves (generally with UNICEF monitoring and support), possibly several times, in order to be fully conversant with the structure of the instrument, the meaning of its parameters and the results achieved;

ii) A consolidation workshop (two or three days) is then organized during which the process is reviewed, any arising questions are addressed and potential additional scenarios are assessed.

Such an approach has proven very effective in ensuring the creation of a sound framework and good dynamics between actors of the sub-sector.

5 DRAFTING THE EARLY CHILDHOOD DEVELOPMENT PROGRAM CONCEPT NOTE

In a broad sense, the concept note is a report on the work conducted with the simulation instrument, but its relevance immediately goes well beyond this aspect. Indeed, while the simulation model initially has structuring virtues that facilitate reflection amongst actors of the relevant sub-sector, as well as technical and instrumental virtues useful for the production of scenarios, the concept note in fact has policy and "armed" advocacy virtues. The goal is to bring the Government to develop a framework decision that will inscribe Early Childhood medium-term development into both the country's policy objectives and the broader sectoral strategy for education and training of the country's human capital.

Drafting the concept note is the very reason why the simulation work described above has been conducted. Given its objectives and the fact that policy makers were not involved in the ground work accomplished during the technical workshop, the concept note should first of all include a descriptive (without redundant details) and pedagogical dimension, and on the other, it should be designed as a "comprehensive" document that seeks to be convincing and ultimately helps to achieve a framework decision.

This concept note is certainly not meant to have a rigid structure. However, the following aspects should probably be included:

i) A summary of the **rationale** which underlies the importance of developing structured activities for the period ranging from age 0 to the year of entry into the primary cycle;

ii) A summary of the **current situation** in terms of parenting education and pre-schooling activity coverage (various existing formulas), identifying the specificities of the beneficiary populations (geographical settings and social backgrounds). This description can also highlight the enrollment temporal dynamics as well as the mobilization of public and private resources involved; data likely to be used is first of all of an administrative nature (school statistics, demographic forecasts – with comments about the sometimes dubious quality of both these data sources) and secondly, based on household survey databases (these should include variables that identify pre-schooling information; this is namely the case for MICS surveys, as DHS data is often lacking in this area).

iii) A summary of the **advantages attached to early education from the perspective of primary education** in the country, provided that this information exists or can easily be inferred. These advantages pertain to schooling trends (impact on the likelihood that pupils drop out or repeat classes, on the time spent by pupils to complete a cycle, etc.) as well as to the level of formal skills, namely in reading/language and mathematics;

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iv) A structured identification of the **agreed general principles shaping the vision** of services that could be put into place within a given timeline; these principles may relate to population targeting, the types of formulas that might prove useful to develop, as well as the significant operating features of these formulas that could usefully be envisaged;

v) A presentation of the **overall structure of the instrument used to conduct physical simulations** (targeted pupil numbers, distribution of these numbers across the various formulas and staff needs assessment, etc.) as well as financial simulations (unit costs in the various formulas, current spending and capital spending), and to assess various possible scenarios;

vi) An **identification of the volume of public resources** that can be mobilized by program end based on various mobilization scenarios;

vii) A **structured overview of estimated scenarios.** It is generally useful to start with a scenario that targets an ideal situation, without prior concern for financing; the consequence being of course that it lies well above the financial benchmarks identified in the previous point. The concept note can then describe the process as well as the compromises made during the workshop before arriving at scenarios that would be at once socially desirable and compatible with the identified financial benchmarks. Let us point out that when the scenario is in relative "conformity" with these benchmarks, several possibilities continue to exist depending on whether we allocate a little bit more to an aspect, and therefore a little bit less to another;

viii) An overview of **the finalization process.** Following the presentation of the note to the country's policy-makers and the discussions that follow, it may prove necessary to assess one (or several) additional scenarios. It is also very useful that the note provides a description of the roadmap and schedule of activities that will be conducted to achieve the concrete framework program implementation; this can refer both to the institutional mechanisms that remain to be clarified or defined, and to the numerous practical considerations to be envisaged (content of parenting education and pre-school syllabus, identification of the schedule of pedagogical activities and of the equipment needed to conduct them, training of trainers' modules, monitoring and evaluation mechanism, definition of contracting terms to be applied when working with the private sector, NGOs, communities, etc.) with clearly defined responsibilities for all parties.
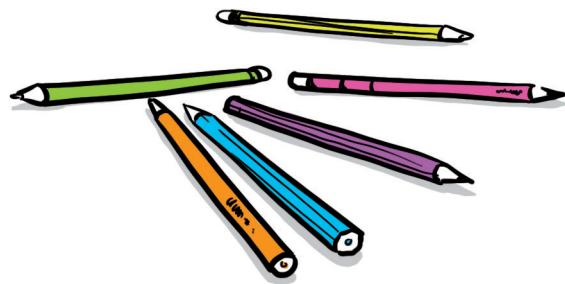
Notes

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1 They gained greater visibility, namely following research by J. Heckman, 2005.

2 In theory, all combinations are possible (provided that the sum of the three possibilities amounts to 100 %). However, in actual fact, countries are more likely to only envisage a single duration or a combination of two types of durations, at least for each of these options.

3 Experience shows that one should be vigilant about the quality of demographic data; it is indeed possible that national, official and approved data includes gross inconsistencies.

4 This figure is rarely available directly and should therefore be inferred; an easy way of doing this is to: i) estimate the unit cost by making a simulation of the unit cost in the current circumstances with the use of a cost function comparable to that of Bloc C.1 for the State formal (and C.2.1 for community-based, if applicable) and to multiply these figures by those of the pre-school pupil numbers, that are generally better known.

5 We should point out that if we envisage developing a formula during the program whereas it does not currently exist, a line should be prepared for it; its pupil numbers would therefore be 0 in 2012 before reaching the 2025 target value already indicated in Bloc B.

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