Documento del Banco Interamericano de Desarrollo

**Surinam**

**Consolidating Access to Quality and Inclusive Education in Suriname**

**(SU-L1059)**

**Ex-ante Economic Analysis**

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1. Introduction
   1. Education is a fundamental element in the accumulation of human capital and, ultimately, on economic growth (Mankiw, Romer, and Weil, 1992). In summary, education allows individuals to acquire essential skills in order to obtain jobs, innovate, and make informed decisions.
   2. King (2011) states that economic development depends on the skills that individuals can acquire and not just the amount of years of education they accumulate in the entire education system. In concrete, King gives importance to “smart investments,” which comprehend: Early Childhood Development (ECD), interventions that enhanced the quality of learning, and equitable access by the elimination of critical barriers.
   3. Early childhood programs have proven effective in stimulating skills related to concentration and effort (Berlinski, Galiani and Gertler, 2006) and increase the likelihood of individuals not leaving the education system later (Attanasio and Vera-Hernandez, 2004).
   4. Curriculum reforms, meanwhile, are related to the development of cognitive skills (Liao and Bright,1991) and, in general, better performance in test scores (Bando, Naslund-Hadley & Gertler, 2018). While the expansion of educational infrastructure, in addition to increasing the supply of services and improving access, have a demonstrated impact on reducing absences and repetition rates (Chaudhury et al, 2006).
   5. Despite the efforts that have been made in Suriname to increase enrollment rates in primary education, there is still much to do in relation to improving the quality and equitable access. In this sense, the program “Consolidating Access to Quality: An Inclusive Education in Suriname” is focused on: 1) Increase access for vulnerable and excluded population, 2) Improve quality of education, and 3) Administrative reforms of the Suriname Education System.
   6. The present document seeks to ex - ante quantify the benefits and costs of the program aforementioned - based on a set of assumptions from the relevant literature - and estimate the NPV, the B/C ratio, and the Internal Rate of Return of the Investment.
2. Program overview
   1. The program is framed in the institutional strategy 2010-2022 (AB-3008), CRF (GN-2727-6), and with the Strategy on Social Policy for Equity and Productivity (GN-2588-4). The program is a continued support from the IDB to the Government of Suriname in matter of educational reform.
   2. The main objective of the program is to improve the quality of education in Suriname. This general objective will be pursued by achieving the following specific objectives: (i) to increase the quality of teaching practices and content in lower secondary, and early childhood education services for children with low school readiness to learn and non-native Dutch speakers; and (iii) to improve access to adequate school infrastructure for children in remote and semi-urban areas in four priority districts (Wanica, Sipaliwini, Marowijne, and Coronie).
   3. The summarized project components are:

Component 1. Improved quality of lower secondary and early childhood education (US$12.7 million).

Target 1.1: Improve quality of education in VOJ (lower secondary education) through a redesign of the curriculum for grades 9, 10, 11.

Target 1.II: Improve ECD capacities for children in remote areas, early learners, children with disabilities and non-native Dutch speakers.

Component 2. Access to adequate school infrastructure (US$10.1 million).

Target 2.1: Increase the supply and quality of educative infrastructure by constructing two new schools in Wanica and renovating 10 public schools in Sipaliwini, Marowijne, Coroni

Component 3. Management and monitoring of the education sector (US$5.2 million).

Target 3.1: Improve the capacity of the MOESC to monitor the quality of the education services in the country by implementing a new education management and information system (EMIS); renewal of technological infrastructure and training; and a new regulatory framework between the MOESC and denomination schools.

Component 4. Program administration (US$1.6 million) and contingencies (US$0.4 million). This includes the administrative costs of the execution of the program through a Program Management Unit, the midterm and final evaluations and the audit.

1. Expected impacts and literature review
   1. For each of the aforementioned components, the benefits will be quantified and valued, based on a set of assumptions from the relevant literature, according to the following framework of expected impacts:

* Impacts over the aggregate stream of future salary income due to:

Increase in access to educational services.

Increase in the number of students achieving each educational level

Reduction in the overage rates

Productivity increase due to ECD programs and curriculum reform.

* Fiscal savings due to:

Reduction of the repetition rates

Improvement in management and information system of the ministry

Improvements in monitoring of non-state school

1. **Impacts over the aggregate stream of future salary income**
   1. Impacts to future salary due to improved education performance has been widely supported by specialized literature. Whether through increasing access to educational services or success rates, better educational outcomes are associated with higher lifetime income. In Latin America, Carson (2002) finds improved returns to education to those who finish higher education versus those who do not.
   2. Additionally, increasing cognitive abilities in school aged children have been shown to improve job productivity. Acosta, Muller y Sarzosa (2017) find that increasing children’s cognitive ability constitute an important predictor of wages and job quality. Their results suggest that an increase of one standard deviation in the scale of reading proficiency is associated with an increase hourly wages by 12.5 percent among Colombian population.
   3. Similar evidence has been found in countries other than those of Latin America. Evidence from the United States shows that a 0.1 standard deviation increase in cognitive performance results in annual incomes raise of 1.7%, 2.4% and 2.6% at ages 28, 38 and 48 (Lin, Lutter & Ruhm, 2016). In Canada, Green & Riddell (2009) find that a 1/2 of a standard deviation point increase in the average skill score has an impact equivalent to an extra year of schooling. They explain that, according to their estimates, increases in literacy, numeracy and problem-solving skills account for about 30% of the return to schooling in their sample.
   4. For this study, a theoretical rate of increase in lifetime earnings due to the impact of the program, in curriculum, ECD and infrastructure components, will be assumed. For that purpose, potential cognitive/productivity gains in individuals exposed to the program will be set as the average of parametrical benchmarks derived from the reviewed of relevant literature made for this study. In particular, a conservative scenario rate of gains on lifetime earnings of 30% will be used, equivalent to the impact found in the average study at 1 standard deviation impact on target, and well within the range observed in the studies. See Table 0.

Table 0: Benchmark lifetime earnings impacts



1. **Fiscal savings**
   1. In summary, whether through increased future salaries or fiscal savings, the expectation is that the project´s components will generate a positive impact. Next, the mechanisms through which each component is expected to impact education outcomes are detailed. It is important to point out that currently there is little literature available that addresses Surinam´s educational sector specifically. Hence, it is assumed that impact found elsewhere might replicate to Surinam´s context. Additionally, some of the estimates used to measure impact correspond to different educational levels. So it is also assumed this impact translates to the educational level of interest.
2. **Curriculum reform**
   1. The curriculum reform proposed in this project aims at redesigning the lower secondary education curriculum (grades 9, 10, 11) to improve quality by updating the contents of traditional subjects like math and language and introducing new technical skills such as coding and technology, as well as innovative hands-on activities to increase student motivation.
   2. Literature on the topic has found that learning this type of skills to be beneficial for school-aged children´s cognitive skills development. Liao and Bright (1991) show that children exposed to computer programming experiences scored significantly higher on several cognitive ability tests than student with no exposure. On an updated review of the literature, Liao (2000) confirms these finding of positive effects.
   3. More recently, Pardamean, Suparyanto & Evelyn (2015) find that their treatment group, exposed to an eight-week training course on Logo programming language, scored significantly higher on problem-solving skills tests than their control group. Scherer, Siddiq & Sanchez Viveros (2018) also show that learning to code has a “transfer-ability” on other cognitive skills (with an effect differing in magnitude depending on the skill).
   4. Finally, there´s evidence that link access to programming training to other types of skills development. Waxman, Lin and Michko (2003) find that access to computer programming training has an impact on affective and behavioral outcomes. Similarly, Pardamean & Evelin (2014) show that exposure to Logo programming training results in “significant differences in creativity, especially in flexibility and originality factors”.
   5. Concerning teaching methodologies, evidence from 10 field experiments conducted in Argentina, Belize, Paraguay and Peru, show that inquiry and problem based pedagogy has positive effects on students’ test scores (Bando, Naslund-Hadley & Gertler, 2018). According to the authors, these results are robust “across a wide set of geographic, socio-economic, and cultural, age/grade, and teacher background contexts.
3. **Pre-school and early childhood development programs**
   1. For pre-school and early childhood development programs, the project aims to benefit children whose needs are not met by the current education system. This includes children in remote areas, early learners, children with disabilities and non-native Dutch speakers.
   2. In general, improving early childhood education has been found to have a significant impact. Heckman (2006) and Berlinski, Galiani and Gertler (2006) find that early childhood interventions generate positive impact on skills such as concentration and effort in class. Similarly, Heckman and Masterov (2007) argue that those interventions directly determine future human capital formation, talent development and productivity.
   3. Moreover, attending pre-school has been found to improve performance at math and language in the future (Berlinksi, Galiani and Gertler, 2006; Cueto and Diaz, 1999; SERCE 2010;), to increase the probability of being in school later in life (Attanasio and Vera-Hernandez, 2004), and to be associated with higher cognitive skills and income (Maluccio et al, 2006; Hoddinott and Bassett, 2008; Chetty et al, 2011; Heckman and Karapakula, 2019).
   4. Finally, early childhood development programs have been found to generate cost savings for schools and States (Chase et al., 2009; Chase and Diaz, 2011). For schools, Chase et al. (2009) and Chase and Diaz (2011) find savings due to reduced spending on special education, reduced repetition rates and school dropout. Similarly, for the State and society, their results suggest cost savings through public costs reduction related to child welfare, public assistance, crime and imprisonment, and the benefits related to increased education and income.
4. **Bi-lingual education reform**
   1. Within sub-component 1.2, the project aims at increasing access and quality education for non-native Dutch speakers by providing learning materials and teacher training on the subject. Such interventions have been proven to provide positive impacts on disadvantaged populations particularly in Latin America.
   2. In rural Guatemala, Engle and Chesterfield (1996) find increased test scores among children exposed to bilingual education (preschool through fourth grade). Equally important, their results provide evidence of no costs to be paid in terms of the national language of receiving bilingual education. On the same program, Patrinos and Velez (1996) estimate other positive impacts specifically on fiscal savings through reduction of repetition rates equivalent to the cost of providing primary education to approximately 100,000 students annually. They also find gains in individual earnings due to exposure to bilingual education.
   3. In Bolivia, Chiswik et al (2000) find similar results regarding bilingual education among indigenous populations. They explain that, among women, indigenous-only speakers earn 25% less than bilingual speakers and that, in general, lack of proficiency in Spanish gets penalized in the labor market. They conclude that bilingual programs may have large positive effects on indigenous peoples.
5. **Education infrastructure expansion and renovation interventions**
   1. Component 2 aims at conducting infrastructure expansion and renovations at priority districts to improve access to education and learning conditions. In this respect, several authors have found evidence of this types of interventions impacting positively over educational outcomes in several parts of the world. Schady and Paxson (1999) show that a one-standard deviation increase in infrastructure expenditure results on an increase in school attendance rates of 0.141 points among Peruvian schools. In Argentina, Berlinksi and Galiani (2005, as cited by Vegas and Santibanez, 2010) get a 7.5 percentage points increase in the probability of attendance in pre-primary school after a school expansion program. Moreover, Chaudhury et al (2006) and Alcaldia de Bogotá (2018) provide evidence of decreasing absence, repetition, and attrition rates among several developing countries with infrastructure improvements in primary and primary and secondary schools respectively.
   2. Evidence from the United States also suggests a positive relationship between the state of school infrastructure and children, teachers and school management performance (Buckley, Schneider & Shang, 2005; Lewis, 2000; Stevenson, 2001).
6. **Management and monitoring of the education sector enhancing programs**
   1. Finally, Component 3 of the project provides funding for improving management and monitoring capabilities across the education sector. On this respect, Grosskpof et al (2001) find that improvements in school monitoring is associated with increased school management efficiency, defined both in terms of resource allocation (allocative efficiency) and resource quantity choices (technical efficiency). Additionally, Blimpo and Evans (2011) evaluate the impact of management and training grants for randomly assigned schools in Gambia. After four years, treatment schools displayed 21% of reduced school absenteeism and 23% of teacher absenteeism. McEwan’s (2015) evidence point to positive impact of management improvements on learning outcomes. He observes the largest effects for treatments that incorporate instructional materials, computers or instructional technology, and teacher training.
   2. Concerning the implementation of MIS in schools, Zain, Atan and Idrus (2004) investigating management practices in Malasya find positive changes in schools’ administrations due to the use of ICTs. These changes include better accessibility to information, more efficient administration, and a higher utilization of school resources. Similarly, Visscher & Wild (1997) and Pegler (1992) conclude that “school management information systems increase effectiveness and efficiency by saving time and facilitating development of alternative solutions for sophisticated problems” (as cited by Shah, 2014).
7. Methodology and assumptions
   1. The analysis considers three project viability measures: a) The Benefits-to-Costs ratio (1) and (1.1), b) the net present value of the project, and c) the Internal Rate of Return (IRR).

* 1. For the present analysis, we use a discount rate () equal to 12%, which is a standard value for IDB investment projects. t is the maximum number of periods in which the project generates positive and negative cash flows. Once the costs and benefits have been taken at present value, they can be presented as a ratio (1) and as a difference. The internal Rate of Return (IRR) is obtained when the net present value formula (2) equals zero. A Benefits-to-Costs ratio greater one and an Internal Rate of Return greater than the discount rate (IRR > ) means that the project is profitable.
  2. The components of the program, as a whole, are focused on improving the quality of lower secondary, ECD capacities, and administrative capacities at the national level. It also foresees targeted impacts in some districts and vulnerable populations.
  3. The Intervention has direct effects on quantifiable outcomes and non-quantifiable effects. This Analysis seeks to ex - ante quantify the intervention by estimating future aggregate benefits and determine the economic profitability of the program.
  4. The information used on the Suriname education system comes from two primary sources: 1) Administrative data of the Ministry of Education, and 2) The Survey of Living Conditions (SLC), which covers a nationally representative sample of the Suriname population and measures all main aspects of living conditions, education and labor indicators of the population at the national level and also at sub-regional Paramaribo, Coastal and Interior domains
  5. The analysis considers two scenarios for each component and sub-components: the baseline (without the program) and with-the-program scenario. We estimate the present value of future salaries for both of them discounted at a 12 % rate. The effect is the difference between baseline and with-the-program scenario.
  6. The starting point is a model for the baseline scenario that takes the number of individuals currently enrolled in the public education system, reported by the SLC. Then we estimate the individuals who leave the education system given the dropout rates (Table 1). The earnings are calculated depending on the average salary by educational level, the current average overage, and the working life, estimated based on a retirement age of 65 years old. The analysis also takes into account an activity rate and an unemployment rate by educational level (table 2).

**Table 1: Surinam Education System Dropout rates**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Pre - primary** | | **Primary** | | | | | | **Lower - Secondary** | | | | **Upper - Secondary** | | | **Tertiary** | | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| **Total Suriname** | 8% | 7% | 9% | 9% | 8% | 8% | 9% | 22% | 16% | 17% | 19% | 34% | 28% | 36% | 58% | 40 % | 40 % | 40 % | 40 % |
| Paramaribo | 8% | 9% | 13% | 14% | 12% | 14% | 10% | 24% | 20% | 19% | 21% | 34% | 30% | 36% | 60% |  |  |  |  |
| Wanica | 9% | 5% | 8% | 7% | 7% | 5% | 7% | 21% | 8% | 12% | 12% | 33% | 13% | 15% | 49% |  |  |  |  |
| Para | 2% | 4% | 8% | 9% | 8% | 9% | 8% | 23% | 13% | 22% | 14% | 30% |  |  |  |  |  |  |  |
| Commewijne | 5% | 3% | 6% | 5% | 5% | 4% | 7% | 12% | 10% | 10% | 13% | 32% |  |  |  |  |  |  |  |
| Saramacca | 4% | 2% | 4% | 4% | 5% | 4% | 6% | 14% | 4% | 9% | 11% | 37% |  |  |  |  |  |  |  |
| Nickerie | 3% | 3% | 4% | 4% | 4% | 5% | 7% | 19% | 9% | 12% | 16% | 35% | 20% | 37% | 42% |  |  |  |  |
| Coronie | 0% | 2% | 4% | 4% | 12% | 4% | 5% | 7% | 5% | 11% | 29% | 35% |  |  |  |  |  |  |  |
| Marowijne | 7% | 7% | 7% | 6% | 6% | 8% | 12% | 26% | 14% | 11% | 20% | 47% |  |  |  |  |  |  |  |
| Brokopondo | 8% | 7% | 14% | 17% | 10% | 11% | 14% | 29% | 1% | 16% | 3% | 29% | 20% | 88% | 0% |  |  |  |  |
| Sipaliwini | 6% | 13% | 11% | 12% | 13% | 10% | 16% | 39% | 23% | 21% | 20% |  |  |  |  |  |  |  |  |

Source: MOESC, 2018

**Table 2: job market assumption**

|  |  |  |
| --- | --- | --- |
| Educational level | Activity rate | Unemployment rate |
| None | 29.5% | 8.8% |
| Primary | 48.3% | 6.3% |
| VOJ | 65.2% | 6.7% |
| VOS | 78.3% | 5.8% |
| Tertiary | 76.0% | 2.2% |

Source: own calculations, SLC,2017

* 1. In general, this economic analysis assumes that the program reduces current dropout rates and reduce overage rates (table 3). Besides, it considers that there are productivity gains associated with cognitive improvements of exposed individuals. In this sense, in the scenario with the program, there is a greater number of individuals that reach a higher educational level, and increase in their working life in years and, consequently, the stream of labor earnings (table 4). Additionally, for the components of the program that assume an increase in the enrollment, the effect takes into account the new students entering the system.

**Table 3: Working life and overage**



Source: own calculations, SLC,2017

**Table 4: average income by educational level**

|  |  |  |
| --- | --- | --- |
| **Educational Level** | **Avg. gross Income (main job) - last month (SRD)** | **Annual (SRD)** |
| None education | 1086.499 | 13037.988 |
| Primary | 1356.578 | 16278.936 |
| VOJ | 1830.606 | 21967.272 |
| VOS | 2700.703 | 32408.436 |
| Tertiary | 4297.929 | 51575.148 |
| Masters/PhD | 8838.377 | 106060.524 |

* 1. In fiscal terms, the program generates savings by reducing repetition rates. In addition, due to monitoring systems, technological and administrative improvements, the program produces small but system-wide efficiency gains, which translate into a reduction in the maintenance costs of the education system. The program also generates financial burden costs from the IDB loan, which are part of the associated costs to execute the program. Also, recurrent costs are considered for managing components 1.1 and 1.2.

1. **Assumptions about impacts over the aggregate stream of future salary income due to curriculum reform.**
   1. Using the number of individuals who report studying from the first grade of pre-primary to the last year of tertiary education and the prevailing dropout rates, the model estimates the number of individuals leaving the system and not returning. As the calculation is carried out for grades but is expressed by level, it is assumed that individuals who drop out of a grade belonging to a level, have the previous educational level.
   2. Component 1 foresees a curricular reform in grades 9-11 corresponding to lower secondary, whose population is 26371 individuals nationwide. Under the assumption that curriculum reforms improve motivation and have a proven impact on school performance, we assume a decline –within the parameters that literature indicates- in dropout rate of 3 pp for the conservative scenario, 4 pp for the middle and 4.5 pp for the optimistic scenario.
   3. The difference between the dropout rate without the program and with the program for each grade and level, is the number of individuals that stayed in the system. In this sense, more people complete higher levels of education in relation to the situation without the program.
   4. The analysis assumes that the productivity gains increase –within the parameters that literature indicates- expected earnings throughout the working life: 30% for the conservative scenario, 35% for the middle scenario, and 50% for the optimistic scenario.
   5. It is also considered a cascading effect that impacts subsequent levels as if it were the same cohort that received the program from lower secondary.
2. **Assumptions about impacts over the aggregate stream of future salary due to ECD programs** 
   1. Based on the specialized literature, it is argued that early education programs have an impact primarily on retention, school attendance, cognitive skills, and productivity. The salary premiums and reductions in dropout rates are equivalent to those described in component 1.
   2. Component 1.2 aims to ensure inclusive access to education to vulnerable populations with particular needs. Two main groups were used as the target population: 1) Individuals attending school who report having disabilities and/or live in remote places (12347) and 2) Early learners (children currently attending grades 1 - 4).
   3. The estimation was carried out separately, assuming that component 1.2 is divided into the groups above.
   4. The proportion of individuals in the first group was calculated for each grade of the educational system, from pre-primary to tertiary. Then the number of individuals leaving the system and not returning for each grade was estimated using Wanica dropout rates as a "remote area" proxy. Similarly, the decline in dropout rates and the productivity gain of component 1 were assumed for the entire education system, but only for the target population. While, to measure the impact on the second group, the whole population of the education system was taken, and it was assumed that the decline in dropouts and the gain in productivity have a cascading effect after affecting grades 1-4.

The discounted salaries of both groups are compared with their respective base scenario (without salary premium and without decline in dropout and overage)

1. **Assumptions about impacts over the aggregate stream of future salary income due to new/renovated school infrastructure.** 
   1. Component 2 was divided as follows: benefits generated by the increase in enrollment and benefits from improvements in infrastructure. Evidence suggests that such programs have significant impacts in reducing absenteeism and repetition rates. Also, they are related to developments in the effectiveness of the education system.
   2. Specifically, component 2 aims at the construction of two schools in Wanica and the renovation of another ten schools distributed in three districts (Sipaliwini, Marowijne, Coronie). However, improvements also include expansion of educational coverage by the incorporation of new classrooms that amount to approximately 600 students. While in Wanica, the average size of a school was estimated at 400 students, which would be equivalent to a total of 800 students.
   3. It is assumed that the 1400 new students were out of the system and others migrated from overpopulated educational institutions.
   4. The target populations (1400 individuals) are distributed in the educational system from pre-primary to the last grade of upper secondary using the national enrollment by grade/national enrollment ratio. The dropout rates that apply are those corresponding to the target districts. Unlike program 1, discounted salaries are not subtracted from a baseline scenario because it is assumed that educational coverage is extended and, therefore, added to the future population of employees.
   5. The benefits of infrastructure improvements are estimated in the same way as in component 1. However, the average size of the ten schools in the three districts is considered to be 400. This is equivalent to a target population of 4000 students. These are distributed in the educational system (pre-primary to upper secondary) using the national enrollment by grade/national enrollment ratio. The dropout rates that apply are an average of the three districts. Discounted wages are compared with their particular base scenario (without productivity gains and the decrease in dropout).
2. **Assumptions about impacts on fiscal savings due to lower repetition rates due to ECD programs.**
   1. Component 1.2 generates fiscal savings because there is a demonstrated impact of early education programs in reducing repetition rates.
   2. For the calculation of savings, the cost of the education system per student (US $ 1162.1) and current repetition rates per grade are available. Literature indicates a 22% reduction in repetition rates per grade.
   3. The cost per student is multiplied by the difference between the number of repeat students with the program and without the program. This procedure is performed for a time horizon of 13 years (primary - upper secondary) and the flows are discounted.
3. **Assumptions about impacts on monitoring systems strengthening of the MOESC on system-wide efficiency results.**
   1. The analysis assumes that component 3 generates efficiency gains throughout the education system. In particular, the literature indicates that administrative reforms generate technical efficiency and allocative efficiency.
   2. Greater efficiency translates into lower system costs. In this sense, a 1% decrease in unit cost per student is assumed and discounted to a time horizon of 15 years (pre-primary - upper secondary).
4. **Assumption about recurrent costs due to increased enrollment and implementation of new ECD and Lower Secondary Programs**
   1. The analysis takes into account that due to an increase in the enrollment of 1400 students, it results in higher costs over time for the education system. The cost per student is multiplied by the new students and the flows are discounted with a time horizon of 15 years (pre-primary - upper secondary).
   2. The programs of component 1 and 1.2 are also considered to have recurrent costs. They are calculated as a 2% increase in the cost per student for these target populations, and the flows with a time horizon of 15 years (pre-primary – upper secondary) are discounted.
5. Economic Benefits and Sensitivity Analysis
   1. The analysis presents three alternatives (Conservative, Middle, or Optimistic), subject to a variation of dropout rates and the salary premiums associated with productivity gains. The benefits are calculated as the net present value the aggregate stream of future salary
   2. income of the beneficiary of each component. The fiscal savings due to reduced repetition rates and the efficiency gains obtained are also factored in the stream of future earnings.
   3. On the other hand, the costs have a recurring counterpart that represents the fiscal expenses associated with the maintenance of some components and the increase in enrollment.
   4. The program's investment costs are US$ 30 million at 25 years, with a grace period equivalent to the execution time of the project plus two years. Discounted investment costs at 12% with a LIBOR +1 interest rate are US $ 6.7 million.
   5. The analysis considers 1) a decline in dropout rate of 3 pp for the conservative scenario, 4 pp for the middle and 4.5 pp for the optimistic scenario, and 1) Productivity gains increase the expected earnings throughout the working life for children exposed to ECD programs and the new lower education curriculum: 30% for the conservative scenario, 35% for the middle scenario, and 50% for the optimistic scenario.

**Table 5:** Benefits Conservative Scenario

|  |  |
| --- | --- |
| Component 1.1 | $ 12,212,167.06 |
| Component 1.2 | $ 19,958,449.19 |
| Component 2 | $ 1,900,214.74 |
| Saving in recurrent costs by reduction of repetition rates | $ 1,720,558.14 |
| Component 3: Savings due to efficiency gains | $ 5,763,876.91 |
| Total | $ 41,555,266.05 |

**Table 6:** Benefits from Middle Scenario

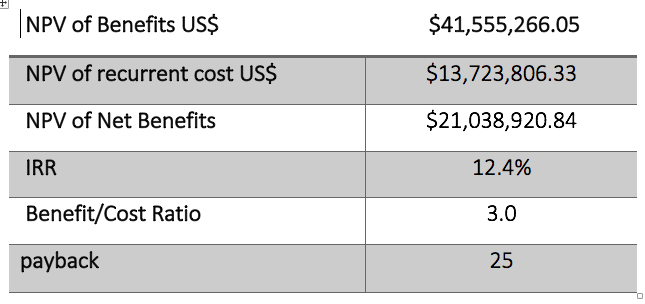
|  |  |
| --- | --- |
| Component 1.1 | $ 17,475,350.89 |
| Component 1.2 | $ 26,414,870.95 |
| Component 2 | $ 2,242,297.56 |
| Saving in recurrent costs by reduction of repetition rates | $ 1,720,558.14 |
| Component 3: Savings due to efficiency gains | $ 5,763,876.91 |
| Total | $ 53,616,954.46 |

**Table 7:** Benefits from Optimistic Scenario

|  |  |
| --- | --- |
| Component 1.1 | $ 24,119,831.59 |
| Component 1.2 | $ 36,454,171.96 |
| Component 2 | $ 2,472,456.15 |
| Saving in recurrent costs by reduction of repetition rates | $ 1,720,558.14 |
| Component 3: Savings due to efficiency gains | $ 5,763,876.91 |
| Total | $ 70,530,894.74 |

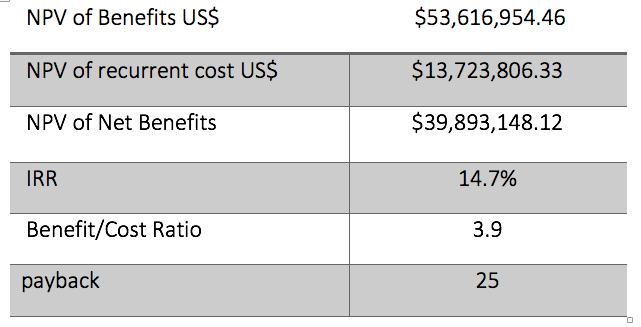
1. Economic returns
   1. The NPV of the program, at a discount rate of 12%, is positive, with a net benefit value of US$ 21.03 million, confirming that the program produced positive economic benefits. The internal rate of return is 12.4% and the benefit to cost ratio is 3.0 (table 8).

**Table 8:** Economic returns, Conservative Scenario



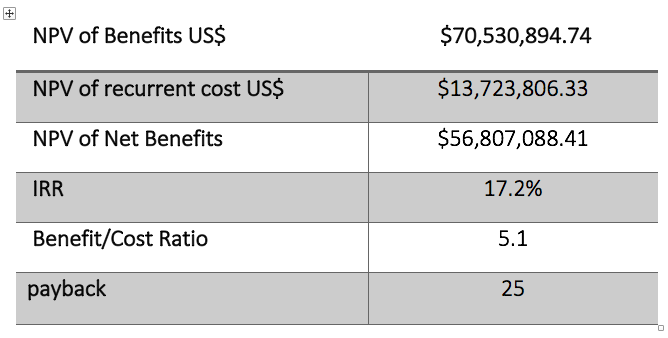
* 1. The NPV of the program, at a discount rate of 12%, is positive, with a net benefit value of US$39.89 million, confirming that the program produced positive economic benefits. The internal rate of return is 14.7% and the benefit to cost ratio is 3.9 (table 9).

**Table 9:** Economic returns, Middle Scenario



* 1. The NPV of the program, at a discount rate of 12%, is positive, with a net benefit value of US$56.80 million, confirming that the program produced positive economic benefits. The internal rate of return is 17.2% and the benefit to cost ratio is 5.1 (Table 10).

**Table 9:** Economic returns, Optimistic Scenario



1. Conclusions
   1. The ex-ante cost-benefit analysis of the SU-L1059 program, which intends to improve quality, relevance and accessibility of the Surinamese education system, indicates that, under a discount rate of 12 percent, the value of the expected benefits exceeds in a ratio 3:1 the costs of the program, thus the overall economic impact of the entire program will be positive.
   2. The expected impacts arises from the simulation of a moderate reduction in the dropout rates, a small reduction in the average overage of the system, and standard productivity gains as a result of cognitive improvement after the new curriculum and ECD programs are in place, all of which leads to a stream of higher salaries sufficient to overcome the costs.
   3. This analysis also considered that program will have small impacts on efficiency of the system and reduction of repetition rates, creating fiscal savings. Lastly, a modest expansion in enrollment due to the new school infrastructure is assumed. Recurrent and financial costs are also factored in to account for new program/related fiscal expenditures.
   4. An important element to note is that component 1, particularly the curricular reform and the improvements in ECD capacities, have the greatest impacts on benefits, accounting for 77% of the estimated benefits for the conservative scenario. Component II, on improving access to education in the interior regions, accounts for 5 percent of total benefits, and Component III, on improving monitoring capacities of the MOESC, accounts for 14 percent of total benefits.
   5. The sensitivity concludes that the program has low risk of not achieving economic and social positive returns. Under conservative assumptions, the investments of the program will lead to an estimated overall NPV of net benefits of US$ 21,0 million, the amount of NPV of net benefits increases to US$ 39,8 and to US$ 56,8 million under the middle and optimistic scenario, respectively. The overall conclusion is that the SU-L1059 program is economic and socially profitable for Suriname.
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1. Annex

**Table 10:** Summary of the effects of educational interventions in the literature review

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Attendance | Drop-out | Promotion/Repetition | Test scores | Income | Fiscal savings | Efficiency |
| i | **Liao & Bright (1991)** | **Meta-analysis** |  |  |  |  | 0.41 s.d. |  |  |  |
| **Liao (2000)** | **Meta-analysis** |  |  |  |  | 0.76 s.d. |  |  |  |
| **Waxman, Lin & Michko (2003)** | **Meta-analysis** |  |  |  |  | 0.448 s.d. |  |  |  |
| **Pardamean & Evelyn (2014)** | **Indonesia** |  |  |  |  | + |  |  |  |
| **PardameanSuparyanto & Evelyn (2015)** | **Indonesia** |  |  |  |  | + |  |  |  |
| **Green & Riddell (2009)** | **Canada** | **1%** |  |  |  |  | 0.2%-0.36%/1 |  |  |
| **Lin, Lutter & Ruhm (2016)** | **USA** | **1 s.d.** |  |  |  |  | 22.3%/1 |  |  |
| **Acosta, Muller y Sarzosa (2017)** | **Colombia** | **1 s.d.** |  |  |  |  | 12.5%/1 |  |  |
| ii | **Berlinksi, Galiani and Gertler (2006)** | **Argentina** | **1 year** |  |  |  | 8% |  |  |  |
| **Cueto and Diaz (1999)** | **Peru** |  |  |  |  | 22%-25% |  |  |  |
| **Walker and others (2000)** | **Jamaica** |  |  |  |  | + |  |  |  |
| **Walker and others (2005)** | **Jamaica** |  |  |  |  | 0.4-06 s.d. |  |  |  |
| **Maluccio and others (2006)** | **Guatemala** |  |  |  |  | 9%-14% |  |  |  |
| **SERCE (2010)** | **Latam/ Caribbean** |  |  |  |  | + |  |  |  |
| **Anderson, Shinn y St. Charles (2002)** | **USA** |  |  |  | -21% |  |  |  |  |
| **Chetty et al (2011)** | **USA** | **1 s.d./2** |  |  |  |  | 9.6% |  |  |
| **Heckman and Karapakula (2019)** | **USA** |  |  |  |  |  | 15.0% |  |  |
| **Hoddinott and Bassett (2008)** | **Guatemala** |  |  |  |  |  | 46.0% |  |  |
| **Chase et al. (2009)** | **USA** |  |  | -17% |  |  |  | + |  |
| **Chase and Diaz (2012)** | **USA** |  |  |  |  |  |  | + |  |
| iii | **Engle and Chesterfield (1996)** | **Guatemala** |  |  |  |  | + |  |  |  |
| **Patrinos and Velez (1996)** | **Guatemala** |  |  | -3% | -22% |  |  | $US 8 mm/3 |  |
| **Townsend and Newman (1985)** | **Guatemala** |  |  |  | 9% |  |  |  |  |
| **Morren**  **(1988)** | **Guatemala** |  |  |  |  | + |  |  |  |
| **Carvajal and Morris (1990)** | **Guatemala** |  |  | -6%  -16% |  |  |  |  |  |
| **Chiswick, Patrinos and Hurst (2000)** | **Bolivia** |  |  |  |  |  | 33.33% |  |  |
| **Francis y Hamel (1992)** | **Mexico** |  |  |  |  | + |  |  |  |
| **López and Jung (2003)** | **Peru** |  |  |  |  | + |  |  |  |
| iv | **Schady & Paxson (1999)** | **Peru** | **1 s.d.** | 0.141 s.d. |  |  |  |  |  |  |
| **Chaudhury, Hammer, Kremer, Muralidharan & Rogers (2006)** | **Developing countries** | **1 s.d.** | 2.7%/4 |  |  |  |  |  |  |
| **Colegios en Concesión en Bogotá (2018)** | **Colombia** | **1%** |  | -0.12% | -0.12% |  |  |  |  |
| **Bullock (2007)** | **USA** |  |  |  | 2.2%-3.9% |  |  |  |  |
| **Lewis (2000)** | **USA** |  |  |  |  | 10-15% |  |  |  |
| **Stevenson (2001)** | **USA** | **1%** |  |  |  | 1.10% |  |  |  |
| **SERCE 2010** | **Latam/ Caribbean** |  |  |  |  | + |  |  |  |
| **Berlinksi and Galiani (2005)** | **Argentina** |  | 7.50% |  |  |  |  |  |  |
| v | **McEwan (2015)** | **Developing countries** |  |  |  |  | 0.04-0.06 s.d. |  |  |  |
| **Grosskopf, Hayes, Taylor & Weber (2001)** | **USA** | **1%** |  |  |  |  |  |  | 0.5%-1% |
| **SERCE 2010** | **Latam/ Caribbean** |  |  |  |  | + |  |  |  |
| **Blimpo & Evans (2011)** | **Gambia** |  | 21% and 23%/4 |  |  |  |  |  |  |
| 1. Assuming a 1% or 1 s.d. increase in cognitive skills test scores 2. An increase of 1 s.d. in the quality of the classroom 3. Expressed in 2018 dollars, equivalent to 5 MM at 1996 prices 4. Teachers attendance | | | | | | | | | | |