ECONOMIC ANALYSIS[1]

A. Macroeconomic and Sector Context

1. Cambodia's economy grew at an average of 7.1% from 2011 to 2016 and is expected to continue on this trajectory.[2] Significant increases in foreign direct investment contributed to the country's rapid economic growth, especially during 2011–2012, when foreign direct investment increased by 77%.[3] This enabled Cambodia to diversify its economy to include high value-adding industries such as automotive parts and electronics. The expansion of the industrial and services sectors and the diversification of the economy resulted in increased demand for labor and different types of skills required of various industries, reflecting Cambodia's skill-based occupational transition.

2. The situation requires the establishment of a clear education policy framework, an effective institutional framework for delivering education services at all levels, and an effective education system that can provide school graduates and leavers with the desired competencies. Improving the education sector and prioritizing the development of the country's human resources is imperative to sustaining the current positive economic growth and remaining economically competitive. This is especially important, as about 300,000 persons enter the labor force annually, of which only 57% may be able to find employment because of their inability to meet the skills requirements required.[4]

3. The government recognizes the need to mitigate this problem and is currently implementing policy reforms for improving the country's education. However, the government requires further assistance in this regard.

B. Rationale for Investing in Upper Secondary Education

4. As Cambodia's working age population (aged 25–54) grows, the demand for education will increase. At the same time, as the expanding economy further modernizes, industries and services will demand higher skilled labor. These structural changes will generate greater demand for better quality education. The challenge for Cambodia's secondary education system is to generate graduates (and leavers) who are technically skilled and have the capacity to critically analyze and solve problems based on scientific knowledge and logic. The role of the government in meeting this challenge is to improve its governance and management of the education sector, and to establish clear and achievable policy reforms for facilitating improvements in the country's education system. This is especially so for improving the quality of teachers in upper secondary schools (USSs and labor market relevance of upper secondary education (USE), as well as strengthening capacity for planning, management, and delivery of USE.

C. The Program

5. Aligned with Cambodia's Education Strategic Plan, 2014–2018,[5] the proposed Second Upper Secondary Education Sector Development Program will address policy and strategy

[1] Further details are presented in Detailed Economic Analysis (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).
[2] Asian Development Bank (ADB) estimates.
[3] Government of the United States, Department of State. 2013 Investment Climate Statement: Cambodia.
[4] ADB. 2014. *Country Partnership Strategy: Cambodia, 2014–2018*. Manila. University of Denver, Pardee Center for International Futures. International Futures forecasting system for Cambodia (accessed February 2018).
[5] Government of Cambodia; Ministry of Youth, Education and Sport (MOEYS). 2014. *Education Strategic Plan, 2014–2018*. Phnom Penh.

concerns that constrain the performance of the education sector. The impact of the program is the development of high-quality human resources. The outcome is improved effectiveness of the USE system. The policy reforms will be applied nationwide, while the project will cover selected areas. The program aims to increase the USE gross enrolment rate from 25.1% in base school year (SY) 2016/17 to 31.8% by SY2024/25. This target will be achieved through three interrelated outputs that are intended to (i) improve the quality of teachers in USSs; (ii) improve the quality and labor market relevance of USE; and (iii) strengthen institutional capacity for planning, management, and delivery of education. The interventions proposed are envisioned to equip entrants to the labor force with better technical, cognitive, and behavioral skills. The overall program is estimated to cost $53.5 million, funded by (i) a project investment loan of $35.0 million, (ii) a policy-based loan of $15.0 million, and (iii) counterpart funding from the government of $3.5 million.

D. Cost–Benefit Analysis and Sensitivity Analysis

1. Assumptions Applied in the Economic Analysis[6]

6. Key assumptions under the "with-program" and "without-program" scenarios for projecting the number of students completing USE are provided in Table 1.

Table 1: Assumptions for Projecting the Number of Upper Secondary Education Students

Item	Without Program[a]	With Program[b]	Increment
Number of grade 10 students	108,038	136,877	28,839
Number of grade 11 students	90,304	114,409	24,105
Number of grade 12 students	81,067	102,706	21,639
USE gross enrollment rate (%)	25.1	31.8	6.7
USE dropout rate (%)	19.4	15.0	(4.4)
Promotion rate for grade 10 to grade 11 (%)	85.8	90.7	4.9
Promotion rate for grade 11 to grade 12 (%)	91.7	97.0	5.3
Grade 12 completion rate (%)	46.1	60.0	13.9
Employment rate of USE students[c] (%)		71.0	

( ) = negative; MOEYS = Ministry of Education, Youth and Sport; SY = school year; USE = upper secondary education.

[a] "Without program" is the baseline SY2016/17. Data obtained from the MoEYS EMIS.

[b] "With program" lists the program targets by SY2024/25 as set by the MoEYS.

[c] Rate of USE student graduates who finish USE requirements and decide to seek work immediately after passing grade 12. Government of Cambodia, Ministry of Planning, National Institute of Statistics. 2010. *Cambodia Socio-Economic Survey, 2009.* Phnom Penh.

Source: Asian Development Bank.

7. All economic benefits and costs are in constant 2018 prices. Economic benefits, such as future earnings of USE graduates, are estimated using the world price numeraire method and expressed in economic terms by adjusting the financial values by a shadow wage rate factor (SWRF) of 0.75[7] and a standard conversion factor (SCF) of 0.90.[8] The program's economic life is 25 years, for which the economic internal rate of return (EIRR) is calculated based on a discount rate of 9%.[9] Average annual future financial earnings of workers with USE credentials ($838 per worker per year) are based on the net present value (at a 9% discount rate) of the sum of the current minimum wage of $1,836 per worker per year, which is projected over 20 years of employment and

[6] The economic analysis is carried out in accordance with ADB. 2017. *Guidelines for the Economic Analysis of Projects*. Manila.

[7] ADB. Regional: Second Greater Mekong Subregion Corridor Towns Development Project.

[8] ADB. Cambodia: Uplands Irrigation and Water Resources Management Sector Project.

[9] A lower discount rate of 6–9% may be applied as the minimum required EIRR for social sector projects. Application of a lower social discount rate to these projects can be justified as they often have many unquantifiable benefits.

then annualized.[10] Average annual future financial earnings of workers with no USE credentials are based on the net present value (at a 9% discount rate) of the sum of the current minimum wage of an unskilled worker of $1,312 per worker per year, which is projected over a 20–year period and then annualized to arrive at a financial value of $599 per worker per year; the economic value is estimated at $404 per worker per year (footnote 10). The total capital investment cost (excluding price contingencies, interest charges, fees, and taxes) is spread over the 5-year duration of program implementation and expressed in economic terms. Incremental program-related operation and maintenance costs, including equipment replacement that occurs every 5 years, are at 3.0% of total capital cost.[11] Average annual recurrent cost of USSs, in 2018 values, is based on the estimated recurrent cost of MoEYS. The economic opportunity cost of USE students is estimated at $443 per worker per year, or about $1,328 for the 3 years of USE that each student completes.[12] The direct cost of USE students refers to the cost of sending one USE student to school each year over the 3-year USE period. The direct cost per year is estimated at $195 per year per student, expressed in 2018 economic values.

2. Quantification of Benefits and Costs

8. **Benefits from improved future income-generating capacity of upper secondary education graduates.** Improved quality of secondary education is expected to bring about significant economic benefits in terms of increased enrollment rates, reduced dropout rates, increased graduation rates, and improved income-generating capacity among USE students who have completed all USE requirements and decide to work immediately after passing grade 12. The number of total USE graduates during SY 2022/23–2043/44 is estimated at 408,587, 71% of which (about 290,096 graduates) are expected to be employed. The economic benefits from income generated by employed USE graduates is estimated based on the economic value of earnings of a person who has completed USE (about $566 per worker per year). This value is then multiplied by the number of USE students who have gained employment during a particular year and projected over 2022–2043. The incremental economic benefits derived from annual income generated by USE students are projected to increase from $2.41 million in 2022 to $116.51 million in 2043. Total incremental economic benefits from improved income-generating capacity of USE graduates over the period are estimated at about $1,282.90 million.

9. **Benefits from improved management of upper secondary education subsector and schools.** Training will be provided to strengthen the capacity of education sector administrators and school managers in policy making, planning, and management, leading to improved efficiency in school operations and delivery of education and instructional services in schools. Training in these areas will improve learning outcomes, reduce repetition and dropout rates, and improve promotion and completion rates. As a consequence, the program will improve cost-effectiveness by increasing capacity utilization of secondary schools, thereby decreasing the unit cost of financing secondary education students. The economic benefits from improved efficiency in secondary schools are estimated at $2.12 million in 2020 and $29.56 million in 2024, remaining at

[10] Trading Economics. Cambodia Minimum Wages, 2012–2018. The economic value is determined by adjusting $838 per worker per year by a SCF of 0.9 and a SWRF of 0.75 to arrive at $566 per worker per year.

[11] As prescribed by staff of the Department of Monitoring and Evaluation, MoEYS. This is the suggested lifespan of equipment, as discussed with MoEYS Department of Monitoring and Evaluation.

[12] The financial opportunity cost of a child worker is estimated at about KR437,300 per child worker per month—as obtained from Trading Economics (footnote 10)—or about $109 per child worker per month (at KR4,000 to $1.00). This is the minimum wage for low-skill menial jobs. This value is adjusted by 50% to provide for playtime and other non-income-generating activities common to children to estimate the financial opportunity cost of a child worker of about $656 per child worker per year ($1,968 for 3 years of USE). The economic opportunity cost of a child worker is calculated by adjusting this value by a SCF of 0.90 and a SWRF of 0.75 to arrive at a value of $443 per child worker per year, or $1,328 over the 3-year USE curriculum.

this level until 2043. The total accumulated economic benefits because of improved efficiency are forecast to be about $644.10 million for 2020–2043.

10. **Estimation of costs.** Local cost components, such as non-traded and labor cost components, were converted into economic values using a SCF of 0.9 and a SWRF of 0.75. Foreign cost components are mainly traded components, and their financial value is assumed to be equal to their respective economic values. The total financial capital investment cost is estimated at $53.50 million, from which all price contingencies of about $1.17 million, taxes of $2.04 million, and interest charges of $0.65 million are excluded.[13] The resulting financial value of about $49.63 million serves as the basis for the economic investment cost of about $40.08 million. The incremental recurrent cost of USSs, based on 2018 MoEYS estimates, is expressed in 2018 economic values and projected over 2020–2043. Estimates of the incremental opportunity cost of USE students are based on average annual wages that the students would have earned in jobs while attending USE, while the incremental direct cost of USE students refers to the cost of sending one USE student to school each year during the 3-year USE period. The direct cost annually is estimated at $195 per student per year, expressed in 2018 economic values.

3. Results of the Economic Analysis

11. The calculated EIRR is about 14.4%, indicating that the program is economically viable, as its value is above the economic opportunity cost of investment of 9% (Table 2).

12. Sensitivity analysis indicates that the EIRR is sensitive to changes in costs and enrollment, as the sensitivity indicator values of these variables are significantly greater than 1. The results of the sensitivity analysis are in Table 3.

Table 2: Results of Sensitivity Analysis

	Change Variable	Recalculated EIRR (%)	Switching Value (%)	Sensitivity Indicator
1	Costs increase by 10%	12.0	26	1.64
2	Upper secondary student enrollment decreases by 10%	12.1	24	1.56
3	Costs increase by 10% and enrollment decreases by 10%	10.0	13	3.03
4	Benefits from improved efficiency short by 10%	12.5	33	1.30
5	Benefits delayed by 1 year	12.1		
	Base EIRR =	**14.4%**		
	Base ENPV @ 9% =	**$71.3 million**		

EIRR = economic internal rate of return, ENPV = economic net present value.
Source: Asian Development Bank

1. Program Impact Assessment

13. Expressing the economic benefit streams (projected over the life of the program) into economic net present value terms at a discount rate of 9%, the program impact assessment[14] indicates total economic benefits of $505.89 million including (i) $293.61 million generated from improved income-generating capacity of employed USE graduates and (ii) $212.28 million from improved efficiency in management of the USE subsector. Estimates of the medium-term program and project investment cost streams, as well as the additional long-term cost stream that the government is expected to incur to sustain the program, were also expressed in economic net present value terms. The medium- and long-term cost of the program is estimated at $439.93 million. Program net benefits are therefore about $65.96 million.

[13] Obtained from detailed cost tables.
[14] Program Impact Assessment (accessible from list of linked documents in Appendix 2 of the report and recommendation of the President).

Table 3: Economic Internal Rate of Return Calculation

	Cost						Benefits			
Year	Investment (1)	Operation and Maintenance (2)	Recurrent Cost of Secondary Education Schools (3)	Direct Cost (4)	Opportunity Cost of USE Students (5)	Total Cost (6) ($ million)	Benefits from Income of Employed USE Graduates (8)	Economic Benefits from Improved Management (9)	Total Benefits (10)	Net Benefits (11) = (10) – (6)
2019	4.81	…	…	…	…	4.81	…	…	…	(4.81)
2020	12.02	0.14	2.12	…	…	14.29	…	2.12	2.12	(12.17)
2021	14.03	0.50	7.72	…	…	22.25	…	7.72	7.72	(14.53)
2022	5.61	0.93	16.33	13.09	11.24	47.20	2.41	18.64	21.05	(26.14)
2023	3.61	1.09	16.33	13.09	16.79	50.91	6.02	25.46	31.48	(19.43)
2024	…	1.20	16.33	13.09	22.93	53.56	10.94	28.60	39.54	(14.01)
2025	…	1.20	16.33	13.09	25.88	56.50	16.50	29.56	46.05	(10.45)
2026	…	2.05	16.33	13.09	25.88	57.35	22.05	29.56	51.61	(5.75)
2027	…	1.20	16.33	13.09	25.88	56.50	27.61	29.56	57.16	0.66
2028	…	1.20	16.33	13.09	25.88	56.50	33.17	29.56	62.72	6.22
2029	…	1.20	16.33	13.09	25.88	56.50	38.72	29.56	68.28	11.77
2030	…	1.20	16.33	13.09	25.88	56.50	44.28	29.56	73.83	17.33
2031	…	2.05	16.33	13.09	25.88	57.35	49.83	29.56	79.39	22.04
2032	…	1.20	16.33	13.09	25.88	56.50	55.39	29.56	84.94	28.44
2033	…	1.20	16.33	13.09	25.88	56.50	60.95	29.56	90.50	34.00
2034	…	1.20	16.33	13.09	25.88	56.50	66.50	29.56	96.06	39.55
2035	…	1.20	16.33	13.09	25.88	56.50	72.06	29.56	101.61	45.11
2036	…	2.05	16.33	13.09	25.88	57.35	77.61	29.56	107.17	49.82
2037	…	1.20	16.33	13.09	25.88	56.50	83.17	29.56	112.73	56.22
2038	…	1.20	16.33	13.09	25.88	56.50	88.73	29.56	118.28	61.78
2039	…	1.20	16.33	13.09	25.88	56.50	94.28	29.56	123.84	67.33
2040	…	1.20	16.33	13.09	25.88	56.50	99.84	29.56	129.39	72.89
2041	…	2.05	16.33	13.09	25.88	57.35	105.39	29.56	134.95	77.60
2042	…	1.20	16.33	13.09	25.88	56.50	110.95	29.56	140.51	84.00
2043	…	1.20	16.33	13.09	25.88	56.50	116.51	29.56	146.06	89.56
									EIRR =	14.4%
								Economic net present value @9% =		71.3
									Benefit–cost ratio =	1.2

BCR = benefit–cost ratio, EIRR = economic internal rate of return, ENPV = economic net present value, USE = upper secondary education.
Source: Asian Development Bank