Report and Recommendation of the President to the Board of Directors

INTERNAL

Project Number: 55134-001
October 2022

Proposed Loan
Kingdom of Cambodia: Science and Technology Project in Upper Secondary Education

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 23 September 2022)

Currency unit	–	riel/s (KR)
KR1.00	=	$0.000242
$1.00	=	KR4,127

ABBREVIATIONS

ADB	–	Asian Development Bank
COVID-19	–	coronavirus disease
CPD	–	continuous professional development
CSTC	–	Cambodia Science and Technology Center
ICT	–	information and communication technology
ITC	–	Institute of Technology of Cambodia
MOEYS	–	Ministry of Education, Youth and Sport
MSS	–	minimum service standards
NGS	–	new-generation school
NIE	–	National Institute of Education
PAM	–	project administration manual
PMU	–	project management unit
SBM	–	school-based management
SRS	–	secondary resource school
STEM	–	science, technology, engineering, and mathematics
SY	–	school year
USE	–	upper secondary education
USS	–	upper secondary school

NOTES

(i) The school year (SY) in Cambodia begins in November and ends in August, e.g., SY2022 denotes the school year which began in November 2021 and ends in August 2022.

(ii) In this report, "$" refers to United States dollars.

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PROJECT AT A GLANCE

1. Basic Data **Project Number:** 55134-001

Project Name	Science and Technology Project in Upper Secondary Education
Country	Cambodia
Borrower	Kingdom of Cambodia
Country Economic Indicators	https://www.adb.org/Documents/LinkedDocs/ ?id=55134-001-CEI
Portfolio at a Glance	https://www.adb.org/Documents/LinkedDocs/ ?id=55134-001-PortAtaGlance
Department/Division	SERD/SEHS
Executing Agency	Ministry of Education, Youth and Sport

2. Sector

	Subsector(s)	ADB Financing ($ million)
✓ **Education**	Secondary	70.000
	Total	**70.000**

3. Operational Priorities

- ✓ OP1: Addressing remaining poverty and reducing inequalities
- ✓ OP2: Accelerating progress in gender equality
- ✓ OP3: Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability
- ✓ OP6: Strengthening governance and institutional capacity

Climate Change Information

GHG reductions (tons per annum)	830
Climate Change impact on the Project	Medium

ADB Financing

Adaptation ($ million)	1.530
Mitigation ($ million)	0.960

Cofinancing

Adaptation ($ million)	0.000
Mitigation ($ million)	0.000

Sustainable Development Goals

SDG 1.2
SDG 4.1, 4.4, 4.c
SDG 5.1
SDG 10.2
SDG 12.8
SDG 13.a

Gender Equity and Mainstreaming

Gender Equity (GEN) ✓

Poverty Targeting

General Intervention on Poverty ✓

4. Risk Categorization: Low

5. Safeguard Categorization **Environment:** B **Involuntary Resettlement:** C **Indigenous Peoples:** B

6. Financing

Modality and Sources	Amount ($ million)
ADB	**70.000**
Sovereign Project (Concessional Loan): Ordinary capital resources	70.000
Cofinancing	**0.000**
None	0.000
Counterpart	**8.240**
Government	8.240
Total	**78.240**

Currency of ADB Financing: US Dollar

Source: Asian Development Bank

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the Kingdom of Cambodia for the Science and Technology Project in Upper Secondary Education.

2. The proposed project is part of the Asian Development Bank (ADB)'s strategically sequenced support to harness the transformational potential of upper secondary education (USE) in Cambodia. The project will build on the first two USE programs by deepening reforms in science, technology, engineering, and mathematics (STEM) education[1] and address the increasing demand for high-quality human resources to boost Cambodia's rapidly evolving economy. It will improve upper secondary STEM education by (i) providing high-quality teaching–learning environments in a wide range of upper secondary schools (USSs) nationwide, (ii) increasing the skills of USE STEM teachers and strengthening STEM education delivery, and (iii) strengthening institutional capacity for planning, management, and delivery of USE.

II. THE PROJECT

A. Rationale

3. Cambodia's rapid economic expansion during 2011–2019 with average gross domestic product growth of 7.6% per year was driven by its shift from an agrarian economy to a broad-based, industrial, and technology-oriented one with increased private sector investment. This increased the demand for high-quality human resources, especially in the STEM field, widely seen as the key driver of innovations that improve productivity and foster sustainable growth. However, Cambodia's education system is unable to keep up with such demand, and skills gaps remain significant. Cambodia also needs to upgrade its traditional STEM education by integrating important 21st-century skills, knowledge, and competencies. This includes improving student proficiency in critical thinking, problem solving, creativity, and collaboration, which are required to sustain an inclusive knowledge-based economy.

4. **Coronavirus disease impact on education sector.** Cambodia's economy contracted by 3.1% in 2020 because of coronavirus disease (COVID-19) pandemic impacts.[2] Many households lost income, impeding their ability to send their children to school during the pandemic and increasing the risk of children dropping out. Despite efforts to continue education remotely during periodic school closures, the Ministry of Education, Youth and Sport (MoEYS) and key partners need to intensify efforts to recover learning loss and ensure that learning disparities are not exacerbated for already disadvantaged students.

5. **Low access to quality upper secondary education facilities.** Government schools provide USE through secondary resource schools (SRSs), SRS network schools, general and technical high schools, new generation schools (NGSs), and general USSs.[3] The government has

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[1] ADB. Cambodia: Upper Secondary Education Sector Development Program; and ADB. Cambodia: Second Upper Secondary Education Sector Development Program.

[2] Government of Cambodia, National Institute of Statistics, Ministry of Planning. 2021. National Accounts 2020. Phnom Penh.

[3] In total, there are 554 government schools that provide USE: (i) 50 SRSs, which have secondary resource centers equipped with science and computer laboratories, libraries, and meeting rooms; (ii) 101 SRS network schools, which are located close to SRSs and may use the secondary resource center facilities; (iii) 12 general and technical high schools, which provide vocational courses in addition to the standard general education curriculum; (iv) six NGSs which have greater autonomy than other schools and are governed by strict performance accountability linked to high investment; and (v) 385 general USSs that do not fall into the other categories.

implemented various measures, such as student scholarships and constructing more USSs and classrooms, to address low USE participation, especially in disadvantaged areas. The overall USE gross enrollment rate thus increased from 25.1% in SY2015 to 36.6% in SY2021 while in disadvantaged provinces, it increased from below 20% to 34.1% for the same period.[4] However, many USSs still lack the necessary facilities and learning resources, including science laboratories and STEM and information and communication technology (ICT) equipment, to effectively teach the curriculum, especially for the science stream subjects. This has affected the students' overall participation in USE and their choice of USE streams.[5] The number of science stream students in grade 12 declined to 35,394 (60% female) in 2021 from 63,830 (32% female) in 2016, while the number of grade 12 social science stream students increased to 63,328 (52% female) from 15,497 (34% female) during the same period. An ADB situation analysis on educational technology in Cambodia noted that ICT classes are only taught in grades 11 and 12 and delivered only where ICT teachers and computer laboratories are available.[6] As of 2019, only about 17% of USS students had ICT classes. Many USS graduates will not be equipped with the much-needed digital skills to prepare them for the digital economy. The absence of minimum service standards (MSS) for inputs (e.g., teachers and classrooms) and outputs (e.g., participation and completion) has also precluded effective budget planning by the MoEYS to improve equitable access to USE.

6. **Low quality of science, technology, engineering, and mathematics teaching and learning.** An ADB study on Cambodia's STEM[7] education identified key challenges , including (i) shortage of teachers specializing in physics, chemistry, mathematics, biology, and ICT; (ii) limited capacity of teachers to make STEM learning more connected and relevant for students; and (iii) insufficient pedagogical content knowledge[8] and use of innovative teaching strategies. Some teachers do not maximize the use of science laboratories and equipment installed in the secondary resource schools (SRSs) because of inadequate preservice training on theory and practice in science. Technology-enabled learning and teaching are often not integrated into STEM classes. Given these challenges and gaps, only 61.6% of students (63.6% female) passed the national grade 12 science stream exam in school year (SY) 2021. The low rates of success and fewer students enrolling in the science stream are creating a substantial STEM skills gap.

7. **Widening gender gap**. The gender gap among USE students is both significant and increasing, with girls consistently outperforming boys in participation (52.7% urban and 55.3% rural for females compared to 47.3% urban and 44.7% rural for males, in SY2022), national examinations, and science stream enrolment (para. 5). During SY2014–SY2021, USE female enrollment grew by an average of 2.6% per year in urban areas and 7.8% in rural areas, compared to a 0.1% increase in urban areas and a 2.9% increase in rural areas for males. Secondary promotion rates for females tend to be higher than for males, with boys leaving school early more often than girls in grades 7–12.[9] On the other hand, women continue to be underrepresented in

[4] Government of Cambodia, Ministry of Education, Youth and Sport (MoEYS). 2022. *Public Education Statistics and Indicators 2021-22*. Phnom Penh.

[5] The MoEYS system requires grade 10 students to choose either the science or social science stream for grades 11 and 12. The science stream focuses on physics, chemistry, biology, earth and environmental science, and mathematics; the social science stream focuses on Khmer literature, history, geography, and moral studies.

[6] ADB. 2021. *Cambodia EdTech Country Situation Analysis.* Consultant's report. Manila (TA 9315-REG); and ADB. 2022. *STEM and Education Technology in Bangladesh, Cambodia, the Kyrgyz Republic, and Uzbekistan. A Synthesis Report*. Manila.

[7] ADB. 2021. *ADB Report on STEM education in Cambodia.* Consultant's report. Manila (TA 9315-REG).

[8] A type of knowledge wherein the teacher packages everything she or he knows and understands (e.g., about the subject matter, effective pedagogical methods, the learner, and context) to help students learn and learn well.

[9] Various analyses point out possible explanations for boys' underperformance in USE, including (i) more poor boys start attending school at a late age and boys from poor families leave school to work as they have more employment

USS teaching (32%), including in STEM subjects and in leadership posts (women comprise 7% of school directors, 7% of directors general, and 8% of directors of USSs).[10] MoEYS needs to intensify efforts to address boys' underperformance, appointment of female teachers, and visibility for women in leadership roles to maximize Cambodia's human capital potential.

8. **Weak capacity to manage, deliver, and monitor quality improvements.** Only few school directors practice active educational leadership, promote effective instruction, support continuous professional development of their teachers, or serve as instructional leaders for teaching and learning improvement. Most school directors function more as administrative managers supervising school facilities. School directors and personnel do not engage with and empower their communities, stakeholders, and partners to take more active responsibility in supporting school improvement and contributing to students' learning.[11] MoEYS staff at the national, subnational, and school levels have limited capacity to accurately track progress in terms of key results or quality improvements or effectively monitor policy and project implementation in a timely way. The MoEYS' existing data collection and analysis systems do not match the demands of its rapidly evolving education system which require accurate, timely, and reliable data and information to inform planning, resource allocation, and evidence-based policy- and decision-making.

9. **Government strategy.** The government's Rectangular Strategy Phase IV prioritizes the development of a quality, equitable, and inclusive education system, focusing on science and technology.[12] The MoEYS, with ADB technical assistance,[13] developed the Cambodia Secondary Education Blueprint 2030, which lays out the government's long-term secondary education priorities (footnote 11). It identifies eight key priorities to improve secondary education, including improving student access; strengthening secondary school leadership and management; aligning curriculum and instruction with 21st century quality education; integrating digital education; improving secondary teacher education; and improving secondary and post-secondary linkages.[14] The government and its development partners meet regularly to discuss strategies and programs that will comprehensively address the learning needs, gaps, and issues at different education levels. The government also mobilizes support and additional resources to help learners learn the critical competencies they will need as they progress to the next level.

10. **Lessons learned.** The project draws on lessons from ADB's broad portfolio in secondary education, particularly from the two USE sector development programs in Cambodia (footnote 1), including the need to (i) build capacity of implementing units on results-based monitoring, project implementation, and coordination to ensure achievement of quality outcomes; (ii) provide a strong fiscal framework underpinned by a well-defined long-term reform roadmap to advance sector reforms; (iii) assign responsibility to the executing agency's regular staff to coordinate the implementation of the project components to institutionalize innovations and best practices, and mainstream policies and programs; and (iv) assess schools for their readiness and commitment to take on higher investments.

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opportunities by the time they reach USE, (ii) boys who struggle with their studies leave school early in greater numbers than girls, and (iii) teaching methodologies are inappropriate and school environments, unsupportive.

[10] United Nations. 2019. *Draft Report: Cambodia Gender Assessment, Chapter on Education and Public Behavioural Change. Phnom Penh* (prepared for the Project to Support Leading the Way to Gender Equality under the Ministry of Women's Affairs).

[11] Government of Cambodia, MoEYS. 2021. *Cambodia Secondary Education Blueprint 2030.* Phnom Penh.

[12] Government of Cambodia, National Assembly. 2018. *Rectangular Strategy Phase IV.* Phnom Penh.

[13] ADB. 2016. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to Cambodia for Upper Secondary Education Sector Development Program.* Attached Technical Assistance Report (accessible from the list of linked documents in Appendix 2). Manila.

[14] The two other key priorities include strengthening technical secondary education outcomes and institutionalizing a comprehensive teacher policy.

11. **Strategic fit.** The sequenced support of the Upper Secondary Education Sector Development Program and the Second Upper Secondary Education Sector Development Program (footnote 1) have positioned the Cambodia USE system well for an investment project with a scope that solidifies and ensures the effective implementation of previous program policy components. The project loan modality enables supporting the MoEYS to achieve ambitious goals with key activities that strongly focus on promoting STEM. These include upgrading USS facilities; providing STEM and education technology equipment; and capacity building of STEM teachers, National Institute of Education (NIE)[15] lecturers, school directors, and technical and education specialists. The project is aligned with ADB's country partnership strategy for Cambodia, 2019–2023 which emphasizes strengthening human capital development and lifelong learning as key pillars.[16] It will also contribute to ADB's Strategy 2030 operational priorities of addressing remaining poverty and reducing inequalities, by introducing MSS for USE nationwide and improving USE graduates' productivity and lifetime earnings; accelerating progress in gender equality (para. 34); tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability (para. 26); and strengthening governance and institutional capacity (paras. 17–18).[17]

B. Project Description

12. The project is aligned with the following impact: high-quality human resources for a knowledge-based society developed (footnote 11). The project will have the following outcome: effectiveness of USE improved.[18]

13. **Output 1: Equitable access to standards-based upper secondary education expanded.** This output will expand access to standards-based USE for boys and girls by putting in place standards for quality education for all USSs, upgrading of facilities, and providing essential education technology and STEM equipment. This output will specifically develop and implement (i) MSS for secondary education,[19] (ii) a 5-year secondary education medium-term expenditure framework[20] that integrates the MSS and is aligned with the Cambodia Secondary Education Blueprint 2030, and (iii) an action plan to encourage upper secondary students to take labor-market-driven technical and vocational training courses that are recognized and stipulated in the Cambodia Qualifications Framework.

14. The project will (i) upgrade facilities of 14 upper secondary network schools and 103 general USSs, with gender-responsive, socially inclusive, and climate-adaptive design considerations, by converting three classrooms in each of these schools into two science classrooms and one library with equipment, teaching materials, books, furnishing, and requisite education technology resources; (ii) install multipurpose life skills and project-based classrooms in 25 SRSs; (iii) provide STEM equipment and innovative digital technology to 50 SRSs, 101 SRS network schools, four general technical high schools, and 103 general USSs; and (iv) upgrade water and sanitation facilities in 18 SRSs and 50 SRS network schools, including providing

[15] The NIE is a higher education institution under the MoEYS responsible for training secondary teachers, school directors, and other education administration officials.

[16] ADB. 2019. *Country Partnership Strategy: Cambodia, 2019–2023—Inclusive Pathways to a Competitive Economy*. Manila.

[17] ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific*. Manila.

[18] The design and monitoring framework is in Appendix 1.

[19] MSS for inputs (e.g., school infrastructure and equipment, teaching and learning resources, and teachers) and outputs (e.g., enrolment, dropout, and completion rates) that are closely correlated with learning outcomes will help reduce geographic inequality across Cambodia.

[20] The medium-term expenditure framework (MTEF), to be developed by MoEYS, will systematically link the budget with the government's medium-term plans in secondary education. It will factor in the resource requirements to meet the diverse needs of learners, teachers and improve enrolment, completion, and learning outcomes.

separate toilets for girls and boys. Modeling exemplary STEM teaching and learning practices, the project will upgrade facilities and provide consulting support to enable selected SRSs to become accredited as new-generation schools (NGSs) (footnote 3).

15. **Output 2: Quality of science, technology, engineering, and mathematics teaching and learning strengthened.** This output aims to promote quality STEM education by increasing the skills of teachers and strengthening STEM education delivery through a comprehensive approach. Output 2 will (i) develop and facilitate continuous professional development (CPD) for 775 in-service STEM teachers (including at least 40% women) and 25 NIE STEM master lecturers (including at least 80% of available female NIE STEM lecturers) on effective and innovative teaching strategies, integrating digital education in USS STEM teaching and improving pedagogical content knowledge; (ii) develop and pilot a STEM school-level framework to guide all types of schools in systematically improving STEM teaching and learning; (iii) implement competency-based STEM assessment for USSs; (iv) strengthen education technology in four general technical high schools; and (v) establish and make operational the Cambodia Science and Technology Center (CSTC). Gender equality and social inclusion content and pedagogy in STEM courses will be conducted as part of the CPD for teachers and NIE lecturers to promote boys' school participation and completion.

16. The CSTC, to be managed by the Institute of Technology of Cambodia (ITC), will be open to the public and promote STEM in an innovative, hands-on way. It will be a hybrid center with a physical presence in the Phnom Penh ITC campus and a robust digital program for access by schools and communities nationwide. Connected with regional and global STEM communities, CSTC will provide a STEM ecosystem hub for teacher education institutions and higher education institutions for research and teaching and connect industry and secondary schools.

17. **Output 3: Institutional capacity for planning, management and delivery of education strengthened.** This output addresses the key role of school leaders and education staff in STEM education delivery and learning outcomes. Output 3 will facilitate annual CPD of 155 target USS directors (at least 80% of available female school directors) on school leadership and management, instructional supervision, partnership building, resource mobilization, and stakeholder engagement. Contributing to the CPD and enhancing implementation of the STEM curriculum, the project will support the establishment of USS partnerships with tertiary and polytechnic education and training institutions, private schools, industry, and business. USSs will also establish partnerships with nongovernment organizations and the private sector to enhance student learning and career preparation including site visits, work experience programs, internships, and immersion programs. The project will provide school grants to support these activities and enable a more in-depth and hands-on learning experience in a workplace environment. The project will support MoEYS' aim to enable and empower all schools, their communities, and stakeholders to take more active responsibility for improving the learning of students through school-based management (SBM).[21] It will support schools in implementing SBM through the development of an objective assessment tool to rigorously measure progress in meeting the MoEYS SBM effectiveness standards.

18. Output 3 will also strengthen system-wide analysis and planning functions through capacity development and integration of OpenEMIS software with the national education management information system.[22] OpenEMIS will provide for real-time data collection at the school level, enabling school leaders to use the data to improve school management. It will also

[21] SBM is an approach that decentralizes decision-making to the schools to empower school directors and community stakeholders to assume more active responsibility and accountability for improving student learning.

[22] OpenEMIS is an open source and customizable suite of cloud-based integrated software that supports data collection, management, and analysis. The software comprehensively covers school to national level education sector needs while supporting evidence- based decision-making at each level.

facilitate access to analysis at the district, provincial, and national level. The project will train 50 education specialists, teachers, provincial and district office education staff, and school directors on project implementation, gender-based analysis, and results-based monitoring and evaluation. These trainings will be provided to at least 40% of available female education specialists and staff to encourage female leadership in STEM education and at higher management levels of MoEYS. To promote the use of local education research, the project will support the publishing of five research papers on Cambodia's STEM education. At least one of the research papers will focus on gender-responsive and socially inclusive aspects of STEM pedagogy.

C. Value Added by ADB

19. The project will expand model high-quality USSs and catalyze innovations in upper secondary STEM education by leveraging USE policy reforms and project initiatives, such as the STEM education policy and revised USE STEM curriculum, both established under the two earlier ADB education sector development programs (footnote 1). With its sequenced support to USE, ADB plays a strategic role among development partners in education in Cambodia.[23] The project's focused support on USE complements and builds synergy with other initiatives by the government and development partners at different education levels, for a holistic and comprehensive response to the issues, challenges, and constraints in the education sector of Cambodia.

20. The project's innovative approaches include operationalizing the CSTC and piloting the school-level STEM framework. The CSTC aims to increase the number of students pursuing the sciences to meet the economy's needs. It will extend beyond the traditional schooling system and educate the public to encourage students and their families to become more engaged in STEM. The school-level STEM framework will adopt a holistic and systematic approach to improve USS STEM programs through key reform areas, including school governance, curriculum, instruction, teacher capacity, extracurricular activities, and community outreach. This pilot has the potential to be scaled up beyond the project schools and replicated across Cambodia.

D. Summary Cost Estimates and Financing Plan

21. The project is estimated to cost $78.24 million (Table 1). Detailed cost estimates by expenditure category and by financier are included in the project administration manual (PAM).[24] The major expenditure items are civil works, goods, consulting and nonconsulting services, capacity development, and recurrent costs.

Table 1: Summary Cost Estimates

($ million)

Item	Amount[a]
A. Base Cost[b]	
1. Equitable access to standards-based upper secondary education expanded	42.01
2. Quality of science, technology, engineering, and mathematics teaching and learning strengthened	17.66
3. Institutional capacity for planning, management and delivery of education strengthened	7.95
Subtotal (A)	**67.62**
B. Contingencies[c]	**8.67**
C. Financial Charges During Implementation[d]	**1.95**
Total (A+B+C)[e]	**78.24**

[23] Education development partners in Cambodia include the ADB, European Union, Japan International Cooperation Agency, Korea International Cooperation Agency, People's Republic of China, Swedish International Development Cooperation Agency, UNICEF, UNESCO, and the World Bank.

[24] Project Administration Manual (accessible from the list of linked documents in Appendix 2).

[a] Includes taxes and duties of $4.07 million to be financed by the Asian Development Bank. Such amount does not represent an excessive share of the project cost. The government will finance taxes and duties of $1.10 million through exemption.
[b] In 2022 prices as of July 2022.
[c] Includes physical and price contingencies and a provision for exchange rate fluctuations.
[d] Includes interest and other charges on all sources of financing.
[e] The total amount excludes government in-kind contributions of $1.25 million comprising tax exemptions ($1.10 million) and office space for consultants ($0.15 million).
Source: Asian Development Bank estimates.

22. The government has requested a concessional loan of $70 million from ADB's ordinary capital resources to help finance the project. The loan will have a 32-year term, including a grace period of 8 years; an interest rate of 1.0% per year during the grace period and 1.5% per year thereafter; and such other terms and conditions set forth in the draft loan agreement.

23. The summary financing plan is in Table 2. ADB will finance the expenditures in relation to civil works, goods, consulting and nonconsulting services, capacity development, and recurrent costs, including taxes for these expenditures (except for taxes for consulting services and vehicles). The government will provide counterpart funding of $8.24 million from its central budget which will cover salary supplements for project staff, operating costs for schools undergoing the NGS accreditation process, and financing charges. It will also provide in-kind contribution of $1.25 million in the form of staff, office accommodation and facilities, and tax exemptions for consulting services and vehicles.

Table 2: Summary Financing Plan

Source	Amount ($ million)	Share of Total (%)
Asian Development Bank		
Ordinary capital resources (concessional loan)	70.00	89.5
Government of Cambodia	8.24	10.5
Total	**78.24**	**100.0**

Source: Asian Development Bank estimates.

24. Climate mitigation is estimated to cost $0.96 million and climate adaptation is estimated to cost $1.53 million. ADB will finance 100% of mitigation costs and 100% of adaptation costs.[25] The project will directly contribute to priority climate actions of the Government of Cambodia as defined in its Nationally Determined Contribution, including developing resilient infrastructure of school buildings in response to climate change and upgrading curriculum delivery and training methodologies to include climate change subjects.[26]

E. Implementation Arrangements

25. The executing agency of the project will be the MoEYS, while the implementing agencies will be ITC, NIE, and the Directorate General of Education under the MoEYS. A project management unit (PMU) at the MoEYS and project implementation units will be established. An education sector working group, composed of the MoEYS and development partners (footnote 23) will continue to serve as the main platform for regular dialogue and coordination to ensure

[25] Climate Change Assessment (accessible from the list of linked documents in Appendix 2). Climate financing was estimated using a proportional approach for a percentage of civil works and equipment costs for the CSTC and the schools to be upgraded; costs for voltage stabilizers and electricity system upgrades; water, sanitation, and hygiene facilities; and a STEM social media campaign.
[26] Government of Cambodia. 2020. *Cambodia's Updated Nationally Determined Contribution*. Phnom Penh.

complementarity of interventions and support. Implementation arrangements are summarized in Table 3 and described in detail in the PAM (footnote 24).

Table 3: Implementation Arrangements

Aspects	Arrangements		
Implementation period	November 2022–December 2028		
Estimated completion date	31 December 2028		
Estimated loan closing date	30 June 2029		
Management			
(i) Oversight body	Project Steering Committee Co-chairs: Minister, MoEYS; and permanent secretary of state, MEF Member: Secretary of state and under-secretary of state, MoEYS; representatives from MEF (General Department of International Cooperation and Debt Management, and General Department of Budget); representatives from General Department of Administration and Finance, MoEYS; Secretariat: deputy director general for policy and planning and chair of the NIE Reform Committee		
(ii) Executing agency	MoEYS		
(iii) Key implementing agencies	ITC, NIE, DGE		
(iv) Implementation unit	Project management unit under MoEYS and Project Implementation Units at ITC, NIE, and DGE; 195 staff		
Procurement	OCB for Works (internationally advertised)	1 contract	$9,200,000
	OCB for Works (nationally advertised)	6 contracts	$11,729,610
	RFQ for Works	2 contracts	$237,600
	OCB for Goods (internationally advertised)	9 contracts	$11,511,650
	OCB for Goods (nationally advertised)	9 contracts	$4,132,300
	RFQ for Goods	10 contracts	$795,590
	NCS RFQ	2 contracts	$185,700
	NCS OCB (nationally advertised)	3 contracts	$1,360,946
Consulting services	OCB-QCBS	4 contracts	$7,127,420
	OCB-CQS	3 contracts	$831,015
	ICS-REOI	21 contracts	$2,415,000
Retroactive financing and/or advance contracting	No retroactive financing. Advance contracting for some consulting services, works, and goods will be undertaken.		
Disbursement	Disbursement of the loan proceeds will follow ADB's *Loan Disbursement Handbook* (2017, as amended from time to time) and detailed arrangements agreed between the government and ADB.		

ADB = Asian Development Bank; CQS = consultants' qualification selection; DGE = Directorate General of Education; ICS = individual consultant selection; ITC = Institute of Technology of Cambodia; MEF = Ministry of Economy and Finance; MoEYS = Ministry of Education, Youth and Sport; NCS = nonconsulting services; NIE = National Institute of Education; OCB = open competitive bidding; QCBS = quality- and cost-based selection; REOI = request for expression of interest; RFQ = request for quotation; STEM = science, technology, engineering, and mathematics.
Source: Asian Development Bank.

III. DUE DILIGENCE

A. Technical

26. The project will enhance climate resilience through carefully designed interventions incorporating a range of climate change adaptation features. Construction of the CSTC will utilize climate-smart design principles, including energy efficiency and water conservation measures, rooftop greening, smart façade shading, and natural ventilation. These green design features will be highlighted for educational purposes to increase environmental and climate change

awareness. Upgrading of school classrooms will adhere to low-carbon, climate-resilient design principles, with close attention to reducing education technology energy consumption.

27. The project considered the current scarcity and low appropriate use of education technology to select the most appropriate technologies for the Cambodian context. In addition to its capability to directly improve teaching and learning, each device was selected against the following criteria to be viable in remote locations and throughout the project life: robustness, low energy consumption, low maintenance, and low cost. Voltage stabilizers will be installed in schools to protect against irregular electricity surges and extend the life of all types of education technology provided.

B. Economic and Financial Viability

28. The major long-term economic benefits of the project include improved productivity and higher lifetime earnings of USE graduates. The project's estimated net present value (using a 6% discount rate) is $924 million, and the estimated economic internal rate of return is 31%. The project is considered both economically and financially sustainable. Sensitivity analysis indicates that the economic internal rate of return is robust under adverse conditions. Fiscal impact analysis confirms that the government will have sufficient resources for operation and maintenance of project outputs.[27]

C. Sustainability

29. Project interventions will improve sustainability through (i) the development and implementation of the Medium-Term Expenditure Framework for secondary education, with multiyear budget estimates to finance the secondary education reforms and priorities indicated in the Cambodia Secondary Education Blueprint 2030, including many of the activities included in the project; (ii) the low-cost STEM and education technology equipment provided to schools having lower energy consumption, longer operating life, and high availability of local maintenance; (iii) expansion and strengthening of SBM, which empowers schools and their communities to take more active responsibility for improving the learning of students; and (iv) establishment of partnerships with industry, business, tertiary education institutions, and private schools on key areas such as CPD and joint delivery. The Ministry of Economy and Finance will continue to fund the operating budgets for schools that become accredited as NGSs. After project closing, the CSTC will be managed by the ITC, which generates sufficient private funding, mainly from student tuition fees, in addition to receiving funds from the government and donors.

D. Governance

30. **Financial management**. The assessed premitigation financial management risk is *substantial* because of (i) delayed withdrawal applications and payment to contractors in previous projects; (ii) stretched human resources in the MoEYS Department of Finance and limited PMU finance unit staff experience in the government's standard operating procedures on financial management for externally financed projects and programs; (iii) limited capacity of Internal Audit Department staff; and (iv) manual financial reporting by implementing units. To mitigate these risks, the MoEYS, ITC, NIE, and Directorate General of Education will implement a detailed action plan to directly address these deficiencies. The financial management assessment concluded that with the action plan, the MoEYS will have adequate capacity to establish sufficient internal

[27] Financial Analysis and Economic Analysis (accessible from the list of linked documents in Appendix 2).

control, accounting, and auditing procedures to administer advance account and statement of expenditures procedures. No significant integrity risks were identified.

31. **Procurement**. A strategic procurement planning exercise was conducted to ensure that fit-for-purpose procurement approaches are developed to achieve value for money and the project's development objectives. Overall, a sizable portion of all procurement is targeted at the local marketplace in line with the priorities of the executing and implementing agencies. Where indicated through strategic planning, options analysis, and risk assessment and mitigation, the more complex activities, such as the feasibility study and design and construction of the CSTC, will be procured through the international market. Contract packaging of similar enhancements for the various educational institutions is bundled into single tenders for economy and efficiency, while reducing the administrative burden of multiple smaller tenders on the project's implementing agencies.

32. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and the MoEYS. The specific policy requirements and supplementary measures are described in the PAM (footnote 24).

E. Poverty, Social, and Gender

33. Many female and male secondary education graduates are not fully equipped with 21st-century skills; STEM knowledge; and competencies for subsequent education, training, and work. The transition rate from lower secondary education to USE is lower for boys than girls because of poverty, inadequate learning environment and teaching methods, the pull of work, and negative peer influence. Despite the gender parity index shift in favor of girls, from 1:1.00 in SY2016 to 1:1.24 in SY2020, specific barriers remain for girls to enroll and remain in school at the secondary and tertiary levels, including poverty, negative parental attitudes, disability, child marriage, and early pregnancy. Fewer women are employed than men, including as teachers and school directors. Women comprise only 27% of wage employment in the formal sector, and more commonly work in low-paid jobs. The project will positively impact beneficiaries by increasing access, including for poor and disadvantaged households, to high-quality public USSs. Graduates of project USSs will be better prepared to continue higher education and training in STEM, leading to higher lifetime earnings. Female teachers and school leaders will be prioritized for CPD and other career advancement opportunities.

34. The project is categorized as having a *gender equity* theme. The poverty, social, and gender analysis and gender action plan link to the following key gender objectives: (i) ensuring inclusion of gender-responsive features in the upgrading of school facilities, (ii) enhancing the capacity of equitably targeted female and male STEM teachers with education technology to integrate innovative teaching strategies into STEM teaching, (iii) integrating gender equality and social inclusion principles in the teaching practices of target USSs, and (iv) conducting public awareness campaigns on the importance of having both boys and girls in STEM education.[28]

F. Safeguards

35. In compliance with ADB's Safeguard Policy Statement (2009), the project's safeguard categories are as follows.[29]

[28] Summary Poverty Reduction and Social Strategy and Gender Action Plan (accessible from the list of linked documents in Appendix 2).
[29] ADB. Safeguard Categories.

36. **Environment (category B).** The project activities, including the renovation of classrooms in existing schools and the construction of the CSTC, are not anticipated to cause significant adverse environmental impacts. Minor environmental impacts, primarily noise, vibration, and dust emissions, as well as construction waste generation, may, however, result in localized pollution and injuries to workers and nearby communities if pollution and safety risks are not adequately mitigated. These can be prevented or mitigated with good construction management practices. The initial environmental examination report, including the environmental management plan prepared for the project, will guide environment and safety risk management during minor civil works.[30] The PMU and project implementation units are responsible for ensuring compliance with the environmental management plan and will recruit qualified environment safeguard specialists to supervise and report on its implementation. MoEYS will establish a gender-inclusive, project-specific grievance redress mechanism to receive, record, and resolve community concerns on project-related impacts, with attention to vulnerable people.

37. **Involuntary resettlement (category C).** ADB's due diligence confirmed that the project will not entail land acquisition and involuntary resettlement issues. Construction of the CSTC will be done within the ITC campus, and the renovation and upgrading of classrooms will be done within existing school grounds, which are all state-owned properties. A desk review confirmed that the land used for project school campuses and the ITC is unencumbered. All civil works will not restrict access to lands or people's livelihoods. Site screening of other schools not included in the sample used for the due diligence report will be done during project implementation to assess the involuntary resettlement impact. The updated due diligence report will be approved by ADB and disclosed on the project's website before commencement of relevant civil works. If involuntary resettlement issues are identified during implementation, specific mitigation measures will be prepared in accordance with applicable government laws and regulations on involuntary resettlement safeguards and ADB's Safeguard Policy Statement (2009).

38. **Indigenous peoples (category B).** Project activities are expected to have only positive impacts on indigenous students and teachers, particularly in terms of increased access to quality education, improved capacity of teachers, and improved learning outcomes in the project areas. There will be clear benefits for indigenous students' participation in education as well as post-education employment prospects. The poverty and social impact assessment determined that project activities will not adversely affect the indigenous people's identity, dignity, human rights, livelihood systems, and cultural uniqueness. The project will address the vulnerability of indigenous peoples in the northeastern provinces by improving their educational outcomes, and in the long-term increase their income-earning capacity and reduce poverty. The project design and the indigenous peoples plan include measures to ensure that the needs of indigenous students, teachers, and school administrators for advancing STEM teaching and learning are met and that their cultures are respected.

G. Summary of Risk Assessment and Risk Management Plan

39. Significant risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[31]

[30] Initial Environmental Examination (accessible from the list of linked documents in Appendix 2).
[31] Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigation Measures
Shifting resources and funds away from the project to support social and economic recovery after the coronavirus disease pandemic.	Continuously engage with the MEF to ensure sufficient and timely availability of counterpart funds.
Inadequate number of qualified teachers.	Expand implementation of policies and programs that support teacher promotion, continuous professional development, and incentives for qualified candidates to enter teaching profession.
Insufficient funds available to fund operation and maintenance costs of the project investments.	MEF to (i) approve and fund the medium-term expenditure framework for secondary education, and (ii) procure cost-saving education technology equipment; and (iii) continue to support the annual operating budgets for schools that become accredited as new-generation schools.
MoEYS, DGE, and project finance staff handling multiple commitments do not have sufficient time for the project and enough experience in implementing ADB projects, resulting in low disbursement and delayed implementation.	Designate dedicated staff to the project management unit, including a project finance officer who will work at least 50% of the time on the project; recruit a national finance consultant to set up accounting systems and train finance staff in line with ADB guidelines and government regulations.
No internal audit is conducted for the project or, if conducted, is not of sufficient quality because of lack of capacity.	Nominate and train internal audit staff on internal audit guidelines and government regulations.

ADB = Asian Development Bank; DGE = Directorate General of Education; MEF = Ministry of Economy and Finance; MoEYS = Ministry of Education, Youth and Sport; PIU = Project Implementation Unit; PMU = Project Management Unit.
Source: Asian Development Bank.

IV. ASSURANCES

40. The government has assured ADB that implementation of the project shall conform to all applicable ADB requirements, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, financial management, and disbursement as described in detail in the PAM (footnote 24) and loan documents.

41. The government and the MoEYS have agreed with ADB on certain covenants for the project, which are set forth in the draft loan agreement.

V. RECOMMENDATION

42. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan of $70,000,000 to the Kingdom of Cambodia for the Science and Technology Project in Upper Secondary Education, from ADB's ordinary capital resources, in concessional terms, with an interest charge at the rate of 1.0% per year during the grace period and 1.5% per year thereafter; for a term of 32 years, including a grace period of 8 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan agreement presented to the Board.

Masatsugu Asakawa
President

11 October 2022

DESIGN AND MONITORING FRAMEWORK

Impact the Project is Aligned with
High-quality human resources for a knowledge-based society developed (Cambodia Secondary Education Blueprint 2030)[a]

Results Chain	**Performance Indicators**	**Data Sources and Reporting Mechanism**	**Risks and Critical Assumptions**
Outcome Effectiveness of USE improved	By 2029: a. At least 1.5 percentage point increase in the proportion of female and male USE science stream students in 50 SRSs passing grade 12 national exam (SY2022 baseline: TBD[b] [sex-disaggregated]) (OP 1.1; OP 2.2.1) b. At least 2% increase in the proportion of SRSs meeting MSS for outputs[c] (SY2023 baseline: TBD)[d] (OP 1.1; OP 6.2.1) c. At least three SRSs accredited as new-generation schools with at least 1,400 girls and at least 1,400 boys enrolled (SY2022 baseline: 0) (OP 1.1; OP 2.2.1; OP 6.2)	a. MoEYS EMIS and MoEYS annual education congress reports b.–c. MoEYS EMIS reports	R: Government may prioritize allocation of resources for social and economic recovery during and after the coronavirus disease pandemic, shifting resources and funds away from the project.
Outputs 1. Equitable access to standards-based USE expanded	By 2028: 1a. 117 USSs upgraded with standardized SRS facilities, with gender-responsive, socially inclusive, and climate-adaptive design features[e] (SY2022 baseline: 0) (OP 1.1; OP 3.2.5; OP 6.2.1) 1b. STEM and education technology equipment provided to 258 USSs (SY2022 baseline: 0) (OP 1.1; OP 6.2.1) 1c. 5-year secondary education medium-term expenditure framework, including multiyear budget estimates and aligned with Cambodia's Secondary Education Blueprint 2030, developed and implemented (2022 baseline: NA) (OP 6.2; OP 6.2.1) 1d. Action plan to harmonize pathways for upper secondary students to the education and	1a.–b. MoEYS quarterly project reports 1c. MoEYS medium-term expenditure framework document and quarterly project reports 1d. MoEYS quarterly project reports	

Results Chain	Performance Indicators	Data Sources and Reporting Mechanism	Risks and Critical Assumptions
	technical training programs and certifications based on the Cambodia Qualifications Framework developed and implemented (2022 baseline: NA) (OP 1.1; OP 6.2)		
2. Quality of STEM teaching and learning strengthened	2a. 775 USE STEM teachers (at least 40% women) from 50 SRSs, 101 SRS network schools, and four general technical high schools report overall increased pedagogical content knowledge, understanding of innovative teaching strategies, and integration of technology into STEM teaching, and are engaged in professional learning communities (SY2022 baseline: 0) (OP 1.1.1; OP 2.1.1)	2a. MoEYS quarterly project reports, review mission reports, pre- and post- training surveys	R: An adequate number of qualified teachers is not available for recruitment because of increased demand from higher-paying employers
	2b. 25 NIE STEM lecturers (including at least 80% of available female NIE STEM lecturers) report overall increased knowledge and understanding of effective and innovative teaching strategies, integration of technology into STEM teaching, and increased pedagogical content knowledge (SY2022 baseline: 0) (OP 1.1.1; OP 2.1.1)	2b. MoEYS quarterly project reports, review mission reports	
	2c. CSTC established, fully equipped, staffed, and operational with gender-responsive, climate-smart features and socially inclusive aspects[f] (SY2022 baseline: 0) (OP 1.1; OP 2.1.4; OP 3.2.5)	2c. MoEYS quarterly project reports, CSTC reports	
	2d. STEM school-level model action plans for effective teaching and learning, and competency-based student assessment piloted in 30 target USSs (SY2022 baseline: 0) (OP 1.1; OP 6.2)	2d. MoEYS quarterly project reports	
3. Institutional capacity for planning, management, and delivery of	3a. 155 school directors (including at least 80% of available female school directors) report overall increased knowledge of understanding of instructional	3a. MoEYS quarterly project reports, pre- and post- training surveys	R: Low take-up of partnerships between USSs and industry, business, tertiary education,

Results Chain	Performance Indicators	Data Sources and Reporting Mechanism	Risks and Critical Assumptions
education strengthened[g]	leadership, partnership building, resource mobilization, and stakeholder engagement (SY2022 baseline: 0) (OP 1.1.1; OP 2.3.1; OP 6.1)		and training institutions
	3b. At least three new USS partnerships on teacher and school director CPD and STEM curriculum implementation established and implemented with tertiary and polytechnic education and training institutions, nongovernment organizations, international schools, and industry and business (SY2022 baseline: 0) (OP 6.2)	3b.–3c. MoEYS quarterly project reports	
	3c. At least 50% of SRSs operationalize partnerships for joint delivery programs for USS students with gender-responsive professional safety guidelines[h] (SY2022 baseline: TBD) (OP 1.1; OP 6.2)		
	3d. At least 50 technical and education specialists, teachers, provincial and district office education staff, and school directors (at least 40% female) report improved capacity on project implementation, gender-based analysis, and results-based monitoring and evaluation (SY2022 baseline: 0) (OP 1.1.1; OP 2.1.1; OP 6.1.1)	3d. MoEYS quarterly project reports, pre- and post- training surveys	

Key Activities with Milestones

1. Equitable access to standards-based USE expanded

1.1 Develop USE MSS (Q4 2023).
1.2 Provide target USSs with enhanced STEM equipment and innovative digital technology (Q2 2027).
1.3 Develop a 5-year secondary education medium-term expenditure framework (Q4 2023).
1.4 Upgrade network schools and regular USSs with science classrooms, libraries, and WASH facilities (Q4 2027).
1.5 Harmonize education and technical training programs and certifications based on the Cambodia Qualifications Framework (Q4 2024).

2. Quality of STEM teaching and learning strengthened

2.1 Adopt STEM school-level framework in target schools (Q4 2026).
2.2 Conduct feasibility study of CSTC (Q4 2023).
2.3 Complete construction of CSTC (Q4 2027).
2.4 Deliver educational technology and STEM pedagogy CPD to NIE STEM lecturers and USS STEM teachers (Q4 2027).

3. Institutional capacity for planning, management and delivery of education strengthened

3.1 Develop SBM assessment and scoring tool (Q2 2023).

Key Activities with Milestones

3.2 Install and implement OpenEMIS (Q3 2026).
3.3 Deliver school director CPD (Q4 2027).
3.4 Establish partnerships between secondary and post-secondary institutions and industries to enhance student learning and career preparation (Q4 2027).
3.5 Train technical and education staff in monitoring policy implementation, gender analysis, and results-based monitoring and evaluation (Q4 2027).
3.6 Conduct and disseminate research studies on STEM education delivery with gender-sensitive and socially inclusive aspects (Q4 2027).

Project Management Activities

Start advance action for consultants' recruitment.
Establish project management unit.
Recruit project management unit consultants.
Establish baselines and targets (sex-disaggregated). [b, d, g]
Conduct inception mission within 2 months of loan effectiveness, midterm review mission in 2025, final review mission in 2028, and project completion review in 2029.

Inputs

Asian Development Bank: $70.00 million (concessional loan)
Government of Cambodia: $8.24 million

CPD = continuous professional development; CSTC = Cambodia Science and Technology Center; EMIS = education management information system; MoEYS = Ministry of Education, Youth and Sport; MSS = minimum service standards, NA = not applicable, NIE = National Institute of Education; OP = operational priority; Q = quarter; R = risk; SBM = school-based management; SRS = secondary resource school; STEM = science, technology, engineering, and mathematics; SY = school year; TBD = to be determined; USE = upper secondary education; USS = upper secondary school; WASH = water, sanitation, and hygiene.

[a] Government of Cambodia, MoEYS. 2021. *Cambodia Secondary Education Blueprint 2030.* Phnom Penh.
[b] The baseline is to be determined in December 2022 once the SY2022 grade 12 assessment data is available.
[c] Completion, dropout, and enrollment rates will be used for output standards.
[d] The baseline will be determined in May 2023 after the MSS and targets for outputs are developed and an assessment of the USSs meeting the MSS for outputs are completed.
[e] Facilities, infrastructure, and teaching and learning spaces to be provided under the project will integrate gender-responsive and socially inclusive design features, which respond to the unique and/or special needs of male and female learners and teachers, including provision of separate female and male toilets and safe and potable water, menstrual hygiene facilities, and safety features such as adequate lighting and safely locking toilet doors.
[f] Gender-responsive features of the CSTC include gender-fair content, images, and language in interactive materials; and showcasing modules on equal gender roles in STEM.
[g] An additional indicator on the minimum percentage of SRSs meeting the SBM effectiveness standards, together with a SY2024 baseline, will be added to the design and monitoring framework at midterm review or earlier, once the SBM activities to develop the assessment tools and to set the baseline have been completed.
[h] The gender-responsive professional safety guidelines will include a code of conduct to prevent sexual harassment and gender-based violence.

Contribution to Strategy 2030 Operational Priorities

Expected values and methodological details for all OP indicators to which this operation will contribute results are detailed in Contribution to Strategy 2030 Operational Priorities (accessible from the list of linked documents in Appendix 2).
Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/RRPs/?id=55134-001-3

1. Loan Agreement
2. Sector Assessment (Summary): Education (Secondary)
3. Project Administration Manual
4. Financial Analysis
5. Economic Analysis
6. Summary Poverty Reduction and Social Strategy
7. Risk Assessment and Risk Management Plan
8. Contribution to Strategy 2030 Operational Priorities
9. Climate Change Assessment
10. Gender Action Plan
11. Initial Environmental Examination
12. Indigenous Peoples Plan

Supplementary Documents

13. Resettlement Due Diligence Report
14. Financial Management Assessment
15. Strategic Procurement Plan