ADB

Technical Assistance Report

Project Number: 51123-001
Knowledge and Support Technical Assistance (KSTA)
September 2017

Mongolia: Strengthening Systems for Promoting Science, Technology, and Innovation

Asian Development Bank

CURRENCY EQUIVALENTS
(as of 31 July 2017)

Currency unit	–	togrog (MNT)
MNT1.00	=	$.0004
$1.00	=	MNT2,439.50

ABBREVIATIONS

ADB	–	Asian Development Bank
ICT	–	information and communication technology
IPR	–	intellectual property rights
MECSS	–	Ministry of Education, Culture, Science and Sports
R&D	–	research and development
STI	–	science, technology, and innovation
TA	–	technical assistance

NOTE

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

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KNOWLEDGE AND SUPPORT TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data

Project Number: 51123-001

Project Name	Strengthening Systems for Promoting Science, Technology, and Innovation	**Department /Division**	EARD/EASS
Nature of Activity	Research and Development	**Executing Agency**	Ministry of Education, Culture, Science & Sports
Modality	Regular		
Country	Mongolia		

2. Sector

	Sector	Subsector(s)	ADB Financing ($ million)
✓	Education	Tertiary	0.25
	Industry and trade	Industry and trade sector development	0.10
	Information and communication technology	ICT industries and ICT-enabled services	0.15
	Public sector management	Economic affairs management	0.10
		Total	**0.60**

3. Strategic Agenda

Strategic Agenda	Subcomponents
Inclusive economic growth (IEG)	Pillar 1: Economic opportunities, including jobs, created and expanded

Climate Change Information

Climate Change impact on the Project	Low

4. Drivers of Change

Drivers of Change	Components
Governance and capacity development (GCD)	Client relations, network, and partnership development to partnership driver of change
	Institutional development
	Institutional systems and political economy
Knowledge solutions (KNS)	Application and use of new knowledge solutions in key operational areas
	Knowledge sharing activities
Private sector development (PSD)	Conducive policy and institutional environment

Gender Equity and Mainstreaming

No gender elements (NGE)	✓

5. Poverty and SDG Targeting

Geographic Targeting	No
Household Targeting	No
SDG Targeting	Yes
SDG Goals	SDG4, SDG8, SDG9

Location Impact

Nation-wide	High

6. Risk Categorization

Low

7. Safeguard Categorization

Safeguard Policy Statement does not apply

8. Financing

Modality and Sources	Amount ($ million)
ADB	**0.60**
Knowledge and Support technical assistance: Technical Assistance Special Fund	0.60
Cofinancing	**0.00**
None	0.00
Counterpart	**0.00**
None	0.00
Total	**0.60**

I. INTRODUCTION

1. The proposed knowledge and support technical assistance (TA) will support improvements in legal and policy frameworks, and data infrastructure for promoting knowledge and technology transfer, and commercialization of research and development (R&D) in Mongolia through research, policy advice, and capacity development. The Government of Mongolia requested TA from the Asian Development Bank (ADB) to strengthen systems for promoting science, technology, and innovation (STI) in accordance with the Action Program of the Government of Mongolia for 2016–2020.[1] During the missions conducted in February and June 2017, ADB and the government reached agreement on the objectives, scope, implementation arrangements, cost, and consulting service requirements.[2] The TA is included in ADB's country operations business plan for Mongolia, 2017–2019.[3]

II. ISSUES

2. Chronic underinvestment has impeded the growth of Mongolia's STI since the early 1990s after the country transitioned from a centrally planned to a market-based economy. In 2015, gross domestic expenditure on R&D expressed as a percentage of the gross domestic product was 0.16%, lower than in 1990 (1.0%). This compares unfavorably with the Organisation for Economic Co-operation and Development countries (1.0%–4.2% of gross domestic product).[4] The number of R&D personnel (2,515 in 2015) has also been in gradual decline since the mid-1990s (3,102 in 1995).[5] The main cause of stagnation is that STI in Mongolia has not been well integrated with other related sectors.[6] Its contribution to the economy, in particular the diversification of the economy, and standards of living, through knowledge and technology transfer and commercialization of R&D, has been insignificant, which has led to years of neglect. In 2015, only 34 patents were granted (33 in Mongolia and 1 abroad), while merely 29 prototypes and 45 copyright certificates were issued.[7] Moreover, the State Policy on Science and Technology, approved in 1998, has already become outdated. Against this background, the Action Program specifies actions to revitalize STI by improving legal and policy frameworks, financing mechanisms, and research and data infrastructure.[8]

3. The national innovation system in Mongolia is characterized by weak knowledge dissemination, limited technology transfer, and infrequent commercialization of R&D that stem from various factors. First, institutional arrangements for STI are fragmented. Although the Ministry of Education, Culture, Science and Sports (MECSS) is responsible for formulating and implementing STI policies and directly supervising some of the 59 research institutions and 21 research-based universities (footnote 5), about one-third (20) of public and private research institutions are supervised by other ministries, while 10 are under the Mongolian Academy of Sciences. The responsibility for funding R&D is divided between MECSS and the Science and

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[1] Government of Mongolia. 2016. *Action Program for 2016–2020.* Ulaanbaatar.
[2] The TA first appeared in the business opportunities section of ADB's website on 1 August 2017.
[3] ADB. 2017. *Country Operations Business Plan: Mongolia, 2017–2019*. Manila.
[4] UNESCO Institute for Statistics. http://data.uis.unesco.org/
[5] Government of Mongolia, Ministry of Education, Culture, Science and Sports (MECSS). 2015. *Statistical Year Book: Education and Science (2015–2016 Academic Year, 2015 Fiscal Year)*. Ulaanbaatar.
[6] Government of Mongolia. 2007. *Science and Technology Master Plan of Mongolia, 2007–2020*. Ulaanbaatar. The master plan specifies five goals and a number of actions to develop STI.
[7] The total number of patent grants in other lower middle-income countries is much higher than in Mongolia, e.g., 2,207 in the Philippines, 184 in Uzbekistan, and 1,182 in Viet Nam in 2013 (World Intellectual Property Organization. 2014. *World Intellectual Property Indicators.* Geneva).
[8] Major laws governing STI include the Law on Science and Technology, 2006; Law on Intellectual Property, 2006; Law on Innovation, 2012; and Government Resolution on Core Technology, 2015.

Technology Foundation. Second, related to the fragmented institutional arrangements, data, information, and knowledge generated by R&D are not readily available and no comprehensive repository, database, and platform is in place through which quality information on R&D projects and researchers can be accessed. Third, incentives of R&D institutions and professionals are not well aligned, especially with those of firms with weak in-house R&D capacity. Fourth, funds and facilities for R&D, in particular for developing prototypes and demonstration projects, have been insufficient to interest private investors in the commercialization of R&D.

4. Intellectual property-based knowledge and technology transfer (patents and licenses) has not been functioning adequately in Mongolia. The number of patents sold in the market has been limited partly by the uncertainty of their value. The underlying issue is that the method and standards for intellectual property rights (IPR) valuation have not been well established, and that quality assurance mechanisms in granting IPR are not in place to ensure their quality and validity. In the case of public R&D, which accounts for more than 90% of the total R&D in Mongolia, the ownership of IPR is not always clear, which poses challenges to forming joint ventures in commercializing public R&D. Similarly, other mechanisms for knowledge and technology transfer, such as technology transfer offices and technology licensing offices, are still in the early stages of development.

5. The extremely low level of investment in STI has resulted in obsolete research and data infrastructure in Mongolia, which fall short of international comparators. Quality R&D is highly contingent on technological development, and requires sophisticated research and data infrastructure that need to be constantly upgraded and renewed, and adequately operated and maintained. This implies that not only initial investments in research and data infrastructure are needed but also continuous investment, as well as daily operations and maintenance performed by skilled personnel. As of August 2017, MECSS is drafting a renewed State Policy on Science and Technology, and an STI human resources development plan, 2017–2027. These plans need to be accompanied by an STI investment plan that identifies and prioritizes investments in research and data infrastructure for STI over the long term.

III. THE TECHNICAL ASSISTANCE

A. Impact and Outcome

6. The TA is aligned with the following impact: STI revitalized (footnote 1). The TA will have the following outcome: systems for promoting STI strengthened.[9]

B. Outputs, Methods, and Activities

7. **Output 1: Study of science, technology, and innovation systems and assessment of data infrastructure completed.** The TA will support the study of (i) various institutions, organizations, and actors in STI (e.g., MECSS and other relevant ministries, the Science and Technology Foundation, the Academy of Science, research institutes, universities, the General Agency for Intellectual Property and State Registration, science parks, incubators, banks and venture capitalists, and firms); and their capacity (knowledge, skills, resources, and performance) for R&D, collaboration with other institutions, knowledge and technology transfer, and commercialization; and (ii) the functioning of the IPR market in Mongolia. The TA will also assess data infrastructure for STI, including legal frameworks for the creation and usage of data; information and communication technology (ICT) infrastructure and services; the number and

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

status of data scientists; and the general level of data literacy, computing, and statistical skills. In addition, the TA will support a review of policies and programs to promote knowledge and technology transfer and commercialization; the role of government in promoting knowledge and technology transfer and commercialization; legal frameworks for open science and IPR; and different funding and business models for online repositories, databases, and marketplace platforms for STI in emerging and advanced economies. Findings and recommendations of the study, assessment, and review will be presented and discussed at workshops with participants from institutions, organizations, and professionals involved in R&D, knowledge and technology transfer, and commercialization (e.g., research institutes, universities, large, small, and medium-sized enterprises); intellectual property and data professionals; civil society organizations; as well as resource persons from national, regional, and international organizations active in STI.

8. **Output 2: Online platform for science, technology, and innovation developed.** Based on findings and recommendations of the data infrastructure assessment (output 1), the TA will support consultations with institutions, organizations, and professionals involved in R&D, knowledge and technology transfer, and commercialization on the scope of the online platform for STI. This will include functions, users, operators, funding, and business models to increase knowledge and technology transfer and commercialization. Once the scope of the online platform for STI is defined, the TA will assist the preparation of functional and system requirements and specifications, and the development of an online platform for STI. The TA will also support training for platform operators and users.

9. **Output 3: Improved legal and policy frameworks for intellectual property rights prepared.** Based on findings and recommendations of the in-depth study and review (output 1), and consultations with institutions and professionals involved in R&D, the TA will support the identification of gaps and areas for improvement in the legal and policy frameworks for IPR and the subsequent drafting of amendments to the frameworks with a view to increasing knowledge and technology transfer and commercialization of R&D. Draft amendments will be presented and discussed at public consultation workshops, and feedback from the workshops will be incorporated into the draft amendments.

10. **Output 4: Science, technology, and innovation investment plan developed.** The TA will support the development of an STI investment plan that takes into account findings and recommendations of the in-depth study, assessment, and review (output 1); and feedback received through consultations with various institutions, organizations, and actors in STI. The plan will identify and prioritize investments not only in research infrastructure but also in ICT platforms, libraries, and information archives. It will also consider continuous upgrading and renewal of research and ICT infrastructure, operation and maintenance, and development of skilled professionals to use, operate, and maintain research and ICT infrastructure. The plan will indicate different funding sources and arrangements (public, private, public–private partnerships, and international cooperation) for developing research and ICT infrastructure for STI. The draft STI investment plan will be presented and discussed at STI stakeholder consultation workshops.

11. The key risk to the achievement of the outcome is changes in government leadership, which may adversely affect the institutional arrangements for STI. Frequent management and staff turnover at MECSS, on the other hand, may slow down TA implementation, which is considered the major risk to the development of the three outputs.

C. Cost and Financing

12. The TA is estimated to cost $650,000, of which $600,000 will be financed on a grant basis by ADB's Technical Assistance Special Fund (TASF 6). The key expenditure items are listed in Appendix 2. The government will provide counterpart support in the form of counterpart staff, data, information, relevant documents, and other in-kind contributions. MECSS will ensure that adequate ICT infrastructure (e.g., servers, storage, and operating systems) is provided for the development of the online platform for STI.

D. Implementation Arrangements

13. ADB will administer the TA. ADB will select, supervise, and evaluate consultants during implementation of the TA. MECSS will be the executing and implementing agency, and will be responsible for providing guidance and support to consultants engaged under the TA and involving all relevant institutions during TA implementation, including other relevant ministries, the Science and Technology Foundation, the Academy of Science, research institutes, universities, and the Intellectual Property Agency. A project steering committee, chaired by the state secretary of MECSS, and comprising the directors of MECSS and representatives from relevant institutions, will be established to review implementation progress and provide guidance on a quarterly basis. The TA will be implemented from September 2017 to December 2019. The TA resources will be disbursed following the *Technical Assistance Disbursement Handbook* (2010, as amended from time to time). ADB will engage consulting firms and all TA-financed goods will be procured in accordance with ADB's Procurement Policy (2017, as amended from time to time) and the associated project administration instructions and TA staff instructions. Equipment purchased will be turned over to MECSS upon TA completion.

Implementation Arrangements

Aspects	Arrangements		
Indicative implementation period	September 2017–December 2019		
Executing and implementing agency	MECSS		
Consultants	To be selected and engaged by ADB		
	Quality- and cost-based selection	77 person-months	$576,200
Procurement[a]	To be procured by consultants		
	Shopping	1 contract	$10,000
Disbursement	The TA resources will be disbursed following ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time).		
Asset turnover or disposal arrangement upon TA completion	Equipment purchased will be turned over to MECSS upon TA completion.		

ADB = Asian Development Bank; MECSS = Ministry of Education, Culture, Science and Sports; TA = technical assistance.
[a] Procurement Plan (accessible from the list of linked documents in Appendix 3).
Source: Asian Development Bank.

14. **Consulting services.** ADB will engage a consulting firm (international, 11 person-months; national, 21 person-months) to provide expertise in conducting an in-depth study of STI systems and data infrastructure assessment in Mongolia; performing a review of STI policy, institutional and legal frameworks, and data infrastructure in emerging and advanced economies; drafting amendments to laws and policies on IPR; and developing an STI investment plan. ADB will also engage a national consulting firm (45 person-months) to develop an online platform for STI. The

firm will procure equipment to carry out the assignment. The consulting firms will be selected using the quality- and cost-based selection method with a quality–cost ratio of 90:10, and simplified technical proposals. Output-based, lump-sum contracts with a provision for fixed out-of-pocket expenditures will be considered for the consulting firms.[10]

15. The TA will be monitored and evaluated based on the implementation of activities and satisfactory delivery of outputs following the agreed timeline and budget. To support monitoring and evaluation, the consultants will submit an inception report, a midterm report, a draft final report, and a final report to ADB and MECSS. The main mechanism to monitor and assess the TA will be review missions jointly conducted by ADB and MECSS.

IV. THE PRESIDENT'S DECISION

16. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of $600,000 on a grant basis to the Government of Mongolia for the Strengthening Systems for Promoting Science, Technology, and Innovation, and hereby reports this action to the Board.

[10] Terms of Reference for Consultants (accessible from the list of linked documents in Appendix 3).

DESIGN AND MONITORING FRAMEWORK

Impact the TA is Aligned with Science, technology, and innovation revitalized (Action Program for 2016–2020)[a]			
Results Chain	**Performance Indicators with Targets and Baselines**	**Data Sources and Reporting**	**Risks**
Outcome Systems for promoting STI strengthened	By the end of 2020 a. Number of registered users for the STI online platform reached 1,000 (2017 baseline: 0) b. Amendments to legal and policy frameworks for IPR adopted (2017 baseline: not adopted) c. STI investment plan adopted (2017 baseline: not adopted)	a. User registration records generated by the platform b. Adopted amendments to laws and policy documents c. Adopted STI investment plan	Changes in government leadership adversely affect the institutional arrangements for STI.
Outputs 1. Study of STI systems and assessment of data infrastructure completed	By mid-2018 1a. In-depth study of STI-related institutions and their capacity, and functioning of IPR market in Mongolia conducted and discussed at workshops (2017 baseline: not conducted) 1b. Assessment of data infrastructure for STI conducted and discussed at workshops (2017 baseline: not conducted) 1c. Review of policies, institutional arrangements, legal frameworks, and data infrastructure for STI in emerging and advanced economies conducted and discussed at workshops (2017 baseline: not conducted)	1a–c. TA consultant's reports and workshop materials	Frequent management and staff turnover at MECSS slows down TA implementation.
2. Online platform for STI developed	2a. Scope of the online platform for STI defined by the end of 2018 (2017 baseline: not defined) 2b. Online platform for STI tested, piloted, and operating by the end of 2019 (2017 baseline: not developed)	2a. TA consultant's reports and workshop materials 2b. TA consultant's reports, platform operated, and web portal accessed online	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
3. Improved legal and policy frameworks for IPR prepared	3a. Amendments to legal and policy frameworks for IPR drafted and discussed at workshops by the end of 2019 (2017 baseline: not drafted)	3a. TA consultant's reports, draft amendments, and workshop materials	
4. STI investment plan developed	4a. Draft STI investment plan discussed at workshops and finalized by the end of 2019 (2017 baseline: not developed)	4a. TA consultant's reports, workshop materials, draft and finalized STI investment plan	

Key Activities with Milestones

1. Study of science, technology, and innovation systems and assessment of data infrastructure completed

1.1 Develop detailed work plans and methodologies to conduct in-depth study of STI systems, data infrastructure assessment, and review of STI policies, institutional arrangements, legal frameworks, and data infrastructure in emerging and advanced economies; carry out the study, assessment, and review; and monitor progress (Q4 2017–Q3 2018)

1.2 Identify and invite resource persons, and organize workshops to present and discuss findings and recommendations of the study, assessment, and review (Q3–Q4 2018)

2. Online platform for science, technology, and innovation developed

2.1 Hold consultations with institutions and professionals involved in R&D on the scope of the online platform for STI (Q4 2018)

2.2 Prepare functional and system requirements and specifications for the online platform for STI, and develop the platform (Q1–Q3 2019)

2.3 Test and pilot the online platform for STI, prepare the operator and user manuals, and train the operators and users (Q4 2019)

3. Improved legal and policy frameworks for intellectual property rights prepared

3.1 Hold consultations with institutions and professionals involved in R&D, and identify gaps to fill and areas to improve in the legal and policy frameworks for IPR (Q4 2018)

3.2 Draft amendments to laws and policies on IPR (Q1–Q2 2019)

3.3 Organize public consultation workshops on draft amendments to laws and policies on IPR, and incorporate workshop feedback into draft amendments (Q2–Q3 2019)

4. Science, technology, and innovation investment plan developed

4.1 Draft an STI investment plan based on findings and recommendations of the in-depth study, assessment, and review; hold consultations with various STI-related institutions forming part of the STI system on the draft STI investment plan; and incorporate their feedback into the draft STI investment plan (Q4 2018–Q2 2019)

4.2 Organize STI stakeholder consultation workshops on the draft STI investment plan and incorporate workshop feedback into the draft STI investment plan (Q3–Q4 2019)

Inputs

ADB: $600,000

Note: The government will provide counterpart support in the form of counterpart staff, data, information, relevant documents, and other in-kind contributions.

Assumptions for Partner Financing

Not applicable

ADB = Asian Development Bank; IPR = intellectual property rights; MECSS = Ministry of Education, Culture, Science and Sports; Q = quarter; R&D = research and development; STI = science, technology, and innovation; TA = technical assistance.

[a] Government of Mongolia. 2016. *Action Program for 2016–2020.* Ulaanbaatar.

Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN
($'000)

Item	Amount
Asian Development Bank[a]	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	230.4
ii. National consultants	169.8
b. Out-of-pocket expenditures	
i. International and local travel	30.0
ii. Office space rental and related facilities	16.0
iii. Equipment[b]	10.0
iv. Surveys	20.0
v. Training, seminars, and conferences[c]	50.0
vi. Reports and communications	40.0
vii. Miscellaneous administration and support costs	20.0
2. Contingencies	13.8
Total	**600.0**

Note: The technical assistance (TA) is estimated to cost $650,000, of which contributions from the Asian Development Bank are presented in the table above. The government will provide counterpart support in the form of counterpart staff, data, information, relevant documents, and other in-kind contributions. The value of government contribution is estimated to account for 7.7% of the total TA cost.

[a] Financed by the Asian Development Bank's Technical Assistance Special Fund (TASF 6).

[b] Procurement Plan (accessible from the list of linked documents in Appendix 3). Equipment purchased will be turned over to the Ministry of Education, Culture, Science and Sports upon TA completion.

[c] At least five workshops, including inception, interim, and final workshops, with about 50 participants, will be organized in Ulaanbaatar. Includes interpretation and translation costs.

Source: Asian Development Bank estimates.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/LinkedDocs/?id=51123-001-TAReport

1. Terms of Reference for Consultants
2. Procurement Plan