

FULL ECONOMIC ANALYSIS

A. Macroeconomic Context

1. Mongolia's economy has grown rapidly with a twofold increase in gross domestic product (GDP) per capita during 2001–2012. The driving force behind the rapid economic growth has been the mining sector, which remained the largest contributor to GDP in 2012, although the economy has become more diversified as the mining sector's share of GDP has declined. Nevertheless, those sectors (including mining) that increased their share of GDP have contributed little to employment generation, as shown in Table 1.

Table 1: Share of Gross Domestic Product and Employment by Sector, 2001–2012

Sector	Share of Gross Domestic Product and Employment	2001–2012 (%)			
		2001	2006	2011	2012
Agriculture, forestry, and fishing	Share of GDP	24.9	19.5	12.3	14.8
	Share of Employment	48.3	41.6	33.0	35.0
Mining and quarrying	Share of GDP	9.0	30.0	21.0	18.6
	Share of Employment	2.4	2.6	4.3	4.4
Manufacturing	Share of GDP	8.1	5.5	6.0	6.2
	Share of Employment	6.7	6.1	6.3	6.1
Construction	Share of GDP	2.0	2.1	1.6	1.6
	Share of Employment	2.5	3.5	5.0	5.6
Whole-sale and retail trade; repair of motor vehicles and motorcycles	Share of GDP	26.7	14.1	9.2	9.3
	Share of Employment	10.8	12.9	14.7	12.4
Transportation and storage	Share of GDP	13.0	9.9	7.1	6.5
	Share of Employment	4.2	7.7	7.3	5.3
Real estate activities	Share of GDP	1.0	6.8	6.9	6.3
	Share of Employment	0.8	1.8	0	0.1
Public administration and defense; compulsory social security	Share of GDP	4.3	3.2	3.3	4.3
	Share of Employment	4.9	5.7	5.4	6.0
Education	Share of GDP	4.5	3.3	4.0	4.7
	Share of Employment	6.6	6.7	8.2	8.2

GDP = gross domestic product.

Sources: National Statistical Office. Statistical Yearbooks 2000–2012, and Labor Force Surveys 2000–2012.

2. The contribution to GDP and share of employment of each of the economy's three priority sectors (agriculture, construction, and road and transportation) declined during 2001–2012. One constraint to growth in these areas is the shortage of skilled workers. For example, in 2013, construction employed the largest number of foreign workers (21.6%) of all sectors, followed by mining (18.3%), and the transportation and storage sector (13.4%). Agriculture, conversely, fails to attract skilled workers in part because the average salary is the lowest of all sectors. In 2012, the average monthly salary in the agriculture sector was MNT244.500, substantially lower than the national average of MNT557.600.

3. Despite the shortage of skilled workers, unemployment has remained relatively high; the national average unemployment rate peaked at 11.6% in 2009, following the 2008 financial crisis, and has since declined modestly, reaching 8.2% in 2012, with a significantly higher rate (17.0%) for youths aged 20-24. This indicates a gap between the supply and demand for skills in the labor market.

B. Economic Rationale for Investing in Technical and Vocational Education and Training

4. The skills mismatch in the labor market results in part from the technical and vocational education and training (TVET) system, which is largely unresponsive to the labor market.

Although TVET is considered in the Government Platform 2012–2016 as a measure to promote employment, especially for youth and those over 40 years of age who have difficulty finding employment, in 2012 only 55.6% of TVET graduates found employment within 6 months of graduation.¹ The low graduate employment rate can be explained by several factors, including (i) the lack of linkages between TVET and employers and industries; (ii) inadequate training equipment and facilities; (iii) limited technical and vocational skills and experience of teachers; and (iv) the poor public image of TVET.

5. The National Council on Vocational Education and Training and four sector subcouncils were established in 2009 as institutions for engaging employers, and industry and professional associations in TVET policy development. However, they lack a budget, staff, and operational plans, and have yet to be functional. Despite the introduction of competency-based training, no competency standard has been approved by the National Council on Vocational Education and Training or its sector subcouncils and is widely recognized by the concerned employers, and industry and professional associations. Unless supported under projects funded by development partners, most TVET programs and courses operate with training equipment and facilities that are out of date or no longer in use, and require repairs. Moreover, 84% of teachers who teach technical and vocational subjects have no or less than 4 years of industry experience in the subjects they teach. Although monthly stipends provided for TVET students under 24 years old make TVET affordable, it mostly remains a secondary option to most students and parents.

6. In SY2012/13,² there were 75 formal TVET providers, of which 49 were public. The government is the largest financier in the TVET sector— it enables public TVET providers to offer tuition-free TVET, with mostly free dormitories and teaching-learning materials, and subsidizes private TVET providers. The government also provides monthly stipends for TVET students under 24 years old. However, the total public expenditures on TVET are estimated to be less than 1% of GDP, which is significantly lower than spending on education, which amounted to 6% of GDP in 2013. About 90% of public spending on TVET is for recurrent expenditures, most of which are spent on salaries and benefits. Therefore, insufficient funds are spent on investment, and operation and maintenance of training equipment to make the TVET system more responsive to the labor market demands. Private contributions to TVET financing have been largely limited to large enterprises with foreign investments, which hire foreign workers. Small- and medium-sized enterprises are unlikely to invest in TVET, because most lack funds and strategic human resource functions.

7. To reduce unemployment of youths and adults older than 40 years of age, address skilled worker shortages in priority sectors, and promote greater involvement by employers and industries in TVET with private financing, the government needs to improve the quality and relevance of TVET programs and courses, and their public image.

C. Distributional Analysis

8. The project will directly benefit (i) TVET students in the three priority sectors (agriculture, construction, and road and transportation) by improving the quality and relevance of programs and courses; and (ii) junior secondary students by providing career guidance. Subsidies and stipends (para. 6) mean the cost of public TVET for households is lower than for

¹ Government of Mongolia. 2012. *Government Platform 2012–2016*. Ulaanbaatar.

² The school year begins on 1 September and ends on 1 June.

public senior secondary education or higher education, making it an affordable option, particularly for poor and disadvantaged groups.

9. Although the employment rate of TVET graduates is relatively low, it still exceeds that of higher education. Moreover, the proportion of the total unemployed that had completed senior secondary education as their highest level of education attainment was 10.0%, junior secondary education 8.6%, tertiary education 6.8%, and TVET 6.1% in 2012. That shows that TVET graduates tend to obtain slightly more stable employment or self-employment than graduates from general secondary or higher education.

10. By type of occupation, TVET students are likely to take jobs as professionals (23.1%), service, shop, and market sale workers (20.6%), skilled agricultural and fishery workers (13.8%), and craft and related trade workers (9.1%), as shown in Table 2. The project will increase the number of TVET graduates in 15 key occupations of the three priority sectors that are in high demand in the labor market (classified as technicians and associate professionals, plant and machine operators and assemblers, craft and related trade workers, and skilled agricultural and fishery workers).

Table 2: Distribution of Workers by Occupation and Level of Education Attainment (2012)

Occupation	Total employed	Junior secondary	Senior secondary	TVET	Tertiary, Bachelor
	1,056,441 (100.0%)	232,410 (100.0%)	283,657 (100.0%)	68,154 (100.0%)	253,580 (100.0%)
Legislators, senior officials, and managers of governmental and nongovernmental organizations ^a	58,429 (5.5%)	635 (0.3%)	5,762 (2.0%)	4,357 (6.4%)	39,403 (3.7%)
Professionals ^b	161,560 (15.3%)	586 (0.3%)	8,564 (3.0%)	15,771 (23.1%)	119,299 (47.0%)
Technicians and associate professionals ^c	37,069 (3.5%)	1,350 (0.6%)	5,596 (2.0%)	5,635 (8.3%)	20,648 (8.1%)
Plant and machine operators and assemblers ^d	78,240 (7.4%)	12,208 (0.5%)	42,310 (14.9%)	4,329 (6.4%)	7,759 (3.1%)
Craft and related trade workers ^e	93,241 (8.8%)	17,539 (7.5%)	43,191 (15.2%)	6,203 (9.1%)	7,729 (3.0%)
Skilled agricultural and fishery workers ^f	362,750 (34.3%)	156,600 (67.4%)	69,533 (24.5%)	9,428 (13.8%)	7,816 (0.3%)
Service, shop, and market sale workers ^g	162,105 (15.3%)	22,324 (9.6%)	71,832 (25.3%)	14,046 (20.6%)	31,490 (0.1%)
Clerks ^h	27,064 (2.6%)	647 (0.3%)	6,269 (2.2%)	2,971 (4.4%)	13,880 (5.5%)
Elementary occupations ⁱ	70,734 (6.7%)	20,424 (8.8%)	29,172 (10.3%)	4,674 (6.9%)	3,097 (1.2%)

^a Include hotel and restaurant managers, corporate managers, legislators and senior officials, and general managers.

^b Include physical, math and engineering science professionals, life science and health professionals, teaching professionals and other professionals.

^c Include teaching associate professionals, life science and health associate professionals, physical, math and engineering science associate professionals, and other associate professionals.

^d Include machine operators and assemblers, drivers and mobile-plant operators, stationary-plant and related operators.

^e Include metals, machinery and related trades workers, extraction and building trades workers, precision, handicraft, printing and related trades workers, other craft and related trade workers.

^f Include market-oriented skilled agricultural and fishery workers.

^g Include other salespersons not classified elsewhere, personal and protective services workers, models, salespersons and demonstrators.

^h Include office clerks and customer service clerks.

ⁱ Include labourers in mining, construction, manufacturing and transport, sales and elementary service occupations, agriculture, fishery and related labourers.

Source: National Statistical Office of Mongolia. *Labor Force Survey 2012*.

11. The monthly average salaries for these types of occupations in 2012 were MNT596,800 for technicians and associate professionals, MNT589,600 for plant and machine operators and assemblers, MNT491,300 for craft and related trade workers, and MNT360,800 for skilled agricultural and fishery workers, as indicated in Table 3.

Table 3: Monthly Average Wages and Salaries by Occupation, 2009–2012

(MNT '000)

Occupation	2009	2010	2011	2012
Legislators, senior officials, and managers of governmental and nongovernmental organizations	475.5	538.7	712.4	897.5
Professionals	363.5	389.8	483.2	670.1
Technicians and associate professionals	314.3	363.2	430.7	596.8
Plant and machine operators and assemblers	329.3	394.8	542.6	589.6
Craft and related trade workers	261.7	314.3	386.8	491.3
Skilled agricultural and fishery workers	230.6	344.9	355.1	360.8
Service, shop, and market sale workers	240.9	272.8	323.4	446.9
Clerks	251.4	288.1	307.0	415.9
Elementary occupations	212.8	253.6	324.7	371.1
National Average	300.5	341.5	424.2	557.6

Source: National Statistical Office of Mongolia. *Labor Force Surveys, 2009-2012*.

D. Cost-Benefit and Sensitivity Analysis

12. The economic analysis was conducted over the 25-year loan period. Project implementation is expected to commence in May 2015 and finish in May 2019. Economic benefits and costs are expressed in United States dollars.

13. **Economic benefit assumptions.** Economic internal rates of return were derived for the project by analyzing the most important quantifiable economic gains, that is, increased chance of employment and increased income from enhanced skills. The economic analysis was based on the following assumptions:

- (i) The number of graduates from long-term TVET programs (2.5–3 years) by the end of the project in 2019 is 3,500.³
- (ii) The number of graduates from short-term TVET courses (less than 1 year) is 4,000 annually from 2016 onwards.⁴

³ There were 18,865 students in 25 pre-selected TVET providers in SY2012/13. Assuming that each provider currently offers on average 10 programs, of which, at the maximum, 3 programs per provider will be supported under the project, the total number of graduates who will benefit from the project would be 5,560. As the number of students fluctuates over the years and by program, the target of 3,500 graduates was conservatively assumed.

⁴ There were 15,419 students in short-term courses in SY2012/13. Assuming that each provider currently offers on average 10 courses, of which at the maximum 3 courses per provider will be supported under the project, the total number of graduates who will benefit from the project would be 4,626. Given the short-term nature, student enrollment could be better controlled. The target, therefore, was determined at 4,000 graduates per year.

- (iii) The number of graduates from long- and short-term TVET programs and courses was adjusted according to the National Statistical Office's projection of population, based on the ratios of TVET graduates to population in 2016 and 2019.

Table 4: Projected Number of TVET Graduates

Year	Graduates from long-term programs	Graduates from short-term courses
2016		4,000
2017		4,024
2018		4,049
2019	3,500	4,073
2020	3,438	4,098
2021	3,670	4,094
2022	3,902	4,089
2023	4,133	4,085
2024	4,365	4,081
2025	4,596	4,077
2026	4,635	4,100
2027	4,673	4,124
2028	4,711	4,148
2029	4,750	4,171
2030	4,788	4,195
2031	4,785	4,199
2032	4,783	4,204
2033	4,780	4,209
2034	4,778	4,213
2035	4,776	4,218
2036	4,722	4,243
2037	4,668	4,268
2038	4,614	4,292
2039	4,560	4,317

- (iv) The number of TVET graduates by sector and by occupation was estimated based on the distribution of 15 key occupations to be supported under the project among the three priority sectors.⁵
- (v) The employment rate of TVET graduates in the three priority sectors will increase from 55.6% in 2012 to 60.0% by 2020.⁶
- (vi) Earnings of TVET graduates will increase at an annual rate of 2.9%.⁷
- (vii) Incremental earnings of employed TVET graduates by sector and occupation were estimated as follows:
- (a) **Agriculture.** The average monthly salaries without the project are MNT244,500, based on those in the agriculture sector in 2012. With

⁵ The number of key occupations by priority sector to be supported under the project was set as follows: (i) six occupations in the agriculture sector (40%), at the following levels: technician (2), craft worker (1), and skilled agriculture worker (3); (ii) five occupations in the construction sector (33%) at the following levels: plant and machine operator (1), and craft worker (4); and (iii) four occupations in the road and transportation sector (27%) at the following levels: technician (1), plant and machine operator (1), and craft worker (2).

⁶ Labor Research Institute. 2013. Research on Employment of Graduates shows an increase in the employment rate during 2010–2012 of 2.7% points. Although the employment rate varies among programs and courses, program- and course- disaggregated employment rates are not available. Therefore, a 4.4% points increase by 2020 in the employment rate in the three priority sectors was assumed on conservative grounds.

⁷ Based on the National Statistical Office's average real wage index during 2010–2012.

project, the average monthly salaries will increase to MNT358,080 for TVET graduates employed as technicians, MNT294,780 for those employed as craft workers, and MNT288,640 for those employed as skilled agricultural workers.⁸

- (b) **Construction.** The average monthly salaries without project are MNT371,100 based on those for elementary occupations in 2012. With project, the average monthly salaries will increase to MNT442,200 for TVET graduates employed as plant and machine operators, and MNT368,475 for those employed as craft workers.⁹
- (c) **Road and transportation.** The average monthly salaries without project are MNT371,100 based on those for elementary occupations in 2012. With project, the average monthly salaries will increase to MNT447,600 for TVET graduates employed as technicians, MNT442,200 for TVET graduates employed as plant and machine operators, and MNT368,475 for those employed as craft workers.¹⁰

14. Table 5 presents a summary of benefits for TVET graduates.

Table 5: Summary of Benefits

Sector and Occupation	Graduates from Long-term programs (2019)	Graduates from Short-term courses (2016)	Monthly salaries without project (MNT)	Monthly salaries with project (MNT)
Agriculture	1,400	1,600	244,000	312,599
Technicians and associate professionals	462	528	244,000	358,080
Craft and related trade workers	238	272	244,000	294,780
Agricultural and fishery skilled workers	700	800	244,000	288,640
Construction	1,155	1,320	371,100	383,220
Plant and machine operators and assemblers	231	264	371,100	442,200
Craft and related trade workers	924	1,056	371,100	368,475
Road and transportation	945	1,080	371,100	406,688
Technicians and associate professionals	236	270	371,100	447,600
Plant and machine operators and assemblers	236	270	371,100	442,200
Craft and related trade workers	473	540	371,100	368,475

TVET = technical and vocational education and training.

Source: Asian Development Bank estimates.

⁸ For TVET graduates employed as technicians and craft workers, the average monthly salaries with project were estimated as 60% of those for technicians and craft workers in 2012. For TVET graduates employed as skilled agricultural workers, the average monthly salaries with project were estimated at 80% of those for skilled agricultural workers in 2012. The estimation was based on National Statistical Office of Mongolia. *Labor Force Surveys, 2009–2012*.

⁹ The average monthly salaries with project were estimated at 75% of those for plant and machine operators and craft workers in 2012. The estimation was based on National Statistical Office of Mongolia. *Labor Force Surveys, 2009–2012*.

¹⁰ The average monthly salaries with project were estimated at 75% of those for technicians, plant and machine operators, and craft workers in 2012. The estimation was based on National Statistical Office of Mongolia. *Labor Force Surveys, 2009–2012*.

15. **Economic cost assumptions.** Economic costs were calculated based on the estimates of annual project costs. Base costs plus physical contingencies of imported equipment, printing and materials were converted to economic prices by applying a shadow exchange rate factor of 1.02 for imported goods, while a shadow wage rate factor of 1 for skilled labor and that of 0.7 for unskilled labor were applied to base costs and physical contingencies of workshops, training, and consulting services.¹¹ The opportunity cost of students attending TVET was not included as project cost in the economic analysis as it is considered to be minimal.¹² The financial costs of the project are \$28.59 million which was adjusted for distortions in market prices and the exclusion of price contingencies and taxes. The cost in economic prices is \$25.97 million. The base case scenario used the following assumptions: discount rate of 12.0%, constant prices, and 25-year loan period.

16. **Economic internal rate of return.** The economic net present value for the project was \$16.61 million and the economic internal rate of return was 22.76%. Recurrent costs of \$0.1 million per year for operation and maintenance of equipment and staff salaries and other allowances were considered. A summary of benefits and costs by year is shown in Table 6.

Table 6: Summary of Costs and Benefits by Year
(\$)

Year	Costs in Economic Prices	Recurrent cost	Benefits	Net Benefits
1	(1,555,156)			(1,553,111)
2	(10,590,542)		2,746,393	(7,140,534)
3	(12,976,395)		2,372,539	(10,586,917)
4	(661,522)		2,490,177	1,829,003
5	(185,544)		5,046,908	4,861,493
6		(100,000)	4,846,245	4,746,245
7		(100,000)	5,161,424	5,061,424
8		(100,000)	5,462,863	5,362,863
9		(100,000)	5,758,165	5,658,165
10		(100,000)	6,087,182	5,987,182
11		(100,000)	6,430,440	6,330,440
12		(100,000)	6,643,135	6,543,135
13		(100,000)	6,884,117	6,784,117
14		(100,000)	7,128,675	7,028,675
15		(100,000)	7,386,590	7,286,590
16		(100,000)	7,653,470	7,553,470
17		(100,000)	7,872,310	7,772,310
18		(100,000)	8,102,609	8,002,609
19		(100,000)	8,332,407	8,232,407
20		(100,000)	8,576,068	8,476,068

¹¹ Asian Development Bank estimates for the shadow exchange rate factor based on $1/((\text{merchandise exports (fob)} - \text{merchandise imports (cif)})/(\text{merchandise exports (fob)} - \text{merchandise imports (cif)} + \text{import duties} - \text{export duties}))$, where fob = free on board, and cif = cost, insurance, and freight. The shadow wage rate factor for skilled labor is based on Asian Development Bank estimates; the rates for unskilled labor were calculated for: ADB. 2004. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Technical Assistance Grant to Mongolia for the Regional Road Development Project*. Manila (Loan 2087-MON, for \$37.13 million, approved on 22 July 2004); ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Grant to Mongolia for the Regional Roads Development Project – Supplementary*. Manila (Grant 0199-MON, for \$16 million, approved on 30 March 2010).

¹² The opportunity cost of TVET was assumed to be minimal because (i) combined enrollment ratios for TVET and senior secondary education attain close to 90%; (ii) the unemployment rate for youths is high; and (iii) employment opportunities for junior secondary graduates are limited. In addition, TVET students under 24 years old receive monthly stipends of MNT75,000 from the government.

Year	Costs in Economic Prices	Recurrent cost	Benefits	Net Benefits
21		(100,000)	8,826,851	8,726,851
22		(100,000)	9,046,509	8,946,509
23		(100,000)	9,279,138	9,179,138
24		(100,000)	9,517,652	9,417,652
25		(100,000)	9,762,196	9,662,196

() = negative.

17. **Sensitivity analysis.** In addition to the base case scenario, four other scenarios were analyzed: (i) 15.0% decrease in benefits; (ii) 20.0% decrease in benefits; (iii) 10.0% increase in project costs; and (iv) 15.0% increase in project costs. Results are in Table 7.

Table 7: Sensitivity Analysis

Scenario	Incremental earning benefit with project (%)	Reduced total benefit of base case by (%)	Increased project costs by (%)	EIRR (%)	ENPV
Base Case	12.82	(...)		22.76	16,610,496
1	12.82	15		19.36	11,202,618
2	12.82	20		18.22	9,399,992
3	12.82		10	20.73	14,708,678
4	12.82		15	19.84	13,757,768

(...) = data not available, EIRR = economic internal rate of return, ENPV = economic net present value.

Source: Asian Development Bank estimates.