Summary of Terminal Evaluation Results

1. Outline of the Project

Country: Mongolia	**Project Title:** The Project for Epidemiological Studies on Animal Protozoan Diseases in Mongolia and Development of Effective Diagnostic Measures
Sector: Agriculture and Rural Development	**Cooperation Scheme:** Technical Cooperation Project （SATREPS）
Division in charge: Agricultural and Rural Development Group1, Rural Development Department	**Total Cost:** 270 Million Japanese Yen
Period of Cooperation (R/D): From June 2014 to May 2019 (five years)	**Partner Country's Implementation Organization:** Institute of Vetarinary Medicine (IVM)
	Supporting Organization in Japan: Obihiro University of Veterinary Medicine

1-1. Background of the Project

In Mongolia, agriculture is one of the most important sectors along with the mining industry, accounting for approximately 10.3% of GDP and employs about 29.8% of labor forces as of 2017 (World Bank). Livestock production is Mongolia's traditional livelihood, the main supply of food for the population, and the source of raw materials for livestock processing industries. The number of livestock has reached 66. 4 million in 2018, and are mainly maintained by nomadic people who seasonally migrate from pasture to pasture with mixed herds of sheep, goats, cattle, horses and camels.

In order to enhance the productivity and quality of livestock products, animal infectious diseases are the major issues to be addressed. In the "Mongolian National Livestock Program" resolved in the State Great Khural in May 2010, "raising of the veterinary service standard to international levels and protecting public health through securing Mongolian livestock health" is one of the five priority areas. Under the above priority area, the following specific objectives are set up:

- Early prevention measures, increased preparedness to combat against and prevent infectious animal diseases that are banned for international trade,
- Bringing the veterinary service structure to international standard; strengthen the capacity of veterinary services to the level that can fully meet consumers' demands and requirements, and,
- Bringing livestock medicine and veterinary tools to international standards.

Animal infectious diseases in Mongolia include more than 30 zoonotic emerging and re-emerging diseases such as protozoan diseases. The protozoan diseases significantly limit animal productivity. Prevalence of the diseases has been rapidly increasing in the last decade because of lack of established affordable diagnostics and preventive and treatment measures in the country.

In order to address these issues, Institute of Veterinary Medicine (IVM), Mongolian State University of Agriculture[1] and National Research Center for Protozoan Diseases (NRCPD), Obihiro University of Agriculture and Veterinary Medicine formulated a proposal of a collaborative research project which aims at the improvement of research and development capacities of IVM for early detection, prevention and control measures against animal protozoan diseases through conducting epidemiological studies and developing on-site diagnostics.

After the Detailed Design Formulation Survey in October 2013, the Government of Mongolia (GoM) and the Government of Japan (GoJ) mutually agreed and signed the Record of Discussions (R/D) on January 7th, 2014 and "The Project for Epidemiological Studies on Animal Protozoan Diseases in Mongolia and Development of Effective Diagnostic Measures (the Project)" was officially commenced in June 2014, with the cooperation period of five years.

1-2. Project Overview (PDM (version 2.0))

(1) Overall Goal: Prevention and control measures against animal protozoan diseases (trypanosomoses and piroplasmoses) are taken based on the guideline using on-site diagnostic kits.

[1] Mongolian University of Life Sciences since August 2014.

(2) Project Purpose: Research and development capacities of IVM for early detection, prevention and control measures against animal protozoan diseases (trypanosomosis and piroplasmosis) are improved through conducting epidemiological studies and developing on-site diagnostics in collaboration with NRCPD.

(3) Output

1. On-site diagnostics against animal protozoan diseases are developed.
2. Prevalence, distribution and damages of major animal protozoan diseases and the vector ticks in Mongolia are clarified.
3. Effective measures for the prevention and control of animal protozoan diseases in Mongolia are proposed based on detailed analyses of the results of epidemiological studies and the trial runs of the measures.

(4) Inputs

Japanese Side (as of the end of January 2019)

- Dispatch of Experts: Long-term Experts (3) (56.1 person-months), Short-term Experts (13) (21.67 person-months)
- Procurement of Equipment：Approximately 88.9 million yen (vehicles, immunochromatography test strip making system, cryostat, etc.).
- Local Cost Assistance: Approximately 66.7 million yen (employment of local staffs, travel allowance, accommodation, provision of construction materilas of large-animal experimental facility, etc.).

Mongolian Side

- Allocation of CPs**:** a total of 20 CPs have been assigned; 15 CPs are assigned as of the end of January 2019.
- Facility: Office space for Japanese Experts/Laboratories for study on protozoan diseases and vectors (*in vitro* cultivation laboratory, molecular biology laboratories, and pathology laboratory)/A vehicle and a driver for field sampling/Construction cost and land for large-animal facility/Construction cost and land for the new laboratory building.
- Project Running Cost: salary of CPs, per diem and travel cost for field sampling, utilities, internet fee, etc. The total amount for the fiscal year from 2014 to 2018 was approximately MNT 755.2 million (approximately 34.0million yen).

2. Mid-term Review Team

Japanese Side	**Mongolian Side**
(1) **Ms. Eriko TAMURA** (Leader), Senior Representative, JICA Mongolia Office (2) **Mr. Taketoshi WATANBE** (Evaluation Planning), Program Officer, Agricultural and Rural Development Group 1, Rural Development Department, JICA (3) **Yoko TAJIMA (**Cooperation Planning**),** Program Division, Eastern Hokkaido, JICA (4) **Dr. Kyoshi KITA (**Infectious Disease Control Research**),** Program Officer, SATREPS, AMED (5) **Dr. Yasushi SHINTANI** (Evaluation and Planning) Deputy Manager, Division of International Collaboration Department of International Affairs, AMED (6) **Dr. Hideaki HIGASHINO** (Evaluation Analysis), Senior Consultant, RECS International. Inc.	(1) **Dr. BOLDBAATAR Bazartseren** (Leader), Head, Laboratory of Virology, IVM (2) **Dr. NANSALMAA Myagmar** (Member), Head of Department of Infectious and Parasitic Disease Surveillance, State Central Veterinary Laboratory
Period of Evaluation: February 9-22, 2019	**Type of Evaluation:** Terminal Evaluation

3. Results of Evaluation

3-1. Project Performances

(1) Summary of Project Purpose Achievements

Project Purpose: *Research and development capacities of IVM for early detection, prevention and control measures against animal protozoan diseases (trypanosomosis and piroplasmosis) are improved through conducting epidemiological studies and developing on-site diagnostics in collaboration with NRCPD.*

Indicator 1: On-site diagnostic kits are developed by IVM and submitted to the state laboratory for quality control and certification of veterinary drug.

Indicator 1 is considered to have been achieved as an on-site diagnostic kit (ICT-kit for equine trypanosomosis) was approved by Pharmacopeia Committee.

In addition, four PCR and four ELISA diagnostics kits were produced by IVM and submitted to the State Laboratory for Quality Control and Certification of Veterinary Drug and approved[2].

	Diagnostic Kits	Date of Submission	Date of Approval by State Laboratory	Date of Approval by Pharmacopeia Committee
1	ICT *Trypanosoma equiperdum*	January 12, 2018	January 30, 2018	February 1, 2018
2	PCR *Trypanosomosis*	February 21, 2018	April 13, 2018	In the process of approval
3	PCR *Anaplasmosis*	February 21, 2018	April 13, 2018	
4	PCR *Babesia bovis*	February 21, 2018	April 13, 2018	
5	PCR *Babesia bigemina*	February 21, 2018	April 13, 2018	
6	ELISA *Trypanosoma equiperdum*	October 24, 2018	November 17. 2018	
7	ELISA *Babesia caballi*	October 24, 2018	November 17. 2018	
8	ELISA *Theileria equi*	October 24, 2018	November 17. 2018	
9	ELISA *Trypanosomosis*	October 24, 2018	November 17. 2018	

For trypanosomoses, as shown in the above table, an on-site kit for *Trypanosoma equiperdum* was developed by IVM and submitted to the State Laboratory and finally approved by Pharmacopeia Committee on February 1, 2018.

While, for piroplasmoses, on-site diagnostic kits for two types of major piroplasmoses were supposed to be developed by IVM based on the results of blood sample analyses. However, due to the following reasons, submission to the State Laboratory for approval of production was not made so far.

It is considered that there is no strong demand from local veterinary service units to use on-site diagnostics kits to identify infection of piroplasma as it is already known through the epidemiological studies by IVM that majority of livestock animals are infected with piroplasma, mediated by ticks, and piroplasmoses do not show acute symptoms (chronic).

In 2018, MOFALI and IVM provided veterinary laboratories in 21aimags (province) and Ulaanbaatar with 1,820 diagnostic kits. Many provincial veterinary laboratories expressed their interest of purchasing on-site diagnostic and ELISA diagnostic kits, as well.

Indicator 2: More than 10 international publications with citation index are coauthored by Mongolian and Japanese researchers.

Indicator 2 has been achieved. Papers and articles prepared by the Mongolian and Japanese researchers are as follows (ANNEX10):

1) Original Papers to International Scientific Journals
The Project researchers published a total of 82 papers from 2014 to 2018, out of which, Mongolian researchers published 30 papers to international journals with citation index together with Japanese

[2] Since August 2014, it is necessary to have approval of the pharmacopeia committee to manufacture and sell pharmaceutical products in Mongolia. PCR and ELISA kits are in the process of approval by the committee at the moment.

researchers.

2) Original Papers to Domestic Scientific Journals in Mongolia and Japan
A total of 25 are accepted by domestic journals (22 papers to Mongolian scientific journals by Mongolian researchers only, and 3 papers to Japanese scientific journals by Japanese researchers only).

3) Review Articles
Two articles to international and three articles to Japanese scientific journals (by Japanese researchers only)

4) Articles to Mongolian commercial journals
16 articles by Mongolian researchers only

(2) Summary of Output Achievements

Output 1: **On-site diagnostics against animal protozoan diseases are developed.**

Indicator 1-1: By 2016, the prepared on-site diagnostic kits will be used for the epidemiological studies in the field.	Achieved ・ For trypanosomoses, GM6-4r-ICT, an on-site diagnostic trial kit, was produced in NRCPD, Obihiro in August 2015. ・ The recombinant GM6-4r-ELISA and GM6-4r-ICT tests that were produced at NRCPD have been evaluated by using positive control sera and field samples in Mongolia. ・ On-site diagnostic kits that were produced at NRCPD have been repeatedly used for the epidemiological studies in the field all over Mongolia for trypanosomoses. ・ Devices essential for ICT diagnostic kits were installed into IVM, Mongolia in February 2016 and ICT sticks were produced at IVM from October, 2016. ・ Since October 2016, on-site diagnostic kits developed by IVM were used for epidemiological studies in 13 provinces in Mongolia.
Indicator 1-2: By 2018, the effectiveness of the on-site diagnostic kits developed by IVM will be verified by kappa value more than 0.5 in comparison with ELISA.	Achieved ・ Blood serum was collected from 50 heads of horses in a model farm in the suburb of Ulaanbaatar in March 2016. ・ The results of on-site diagnosis on these samples using ICT kit was compared with the results of ELISA and effectiveness of the on-site diagnostic kit developed by IVM was verified in September 2017. ・ The result: kappa value was 0.53 (more than 0.5) in comparison with ELISA. ・ Similarly, 1701 blood serum samples of horses collected from the 21 prefectures between July 2014 and December 2015 were diagnosed using on-site diagnostic kits and compared with ELISA in September 2017. The result shows kappa value: 0.58.

Output2: **Prevalence, distribution and damages of major animal protozoan diseases and the vector ticks in Mongolia are clarified.**

Indicator 2-1: Prevalence and distribution maps of 7 kinds of animal protozoan parasites and 3 kinds of vector ticks are prepared.	Achieved ・ A total of 11,446 animal blood samples and over 12,000 tick samples were collected by countrywide epidemiological surveillance. ・ Based on the analysis of the collected samples, the first issue of the disease prevalence/distribution maps was prepared in December 2016: 16 maps (nine protozoan parasites (disease) and seven ticks were prepared as follows: Disease: 1. *Trypanosoma equiperdum*, 2. *Theileria equi, 3. Trypanosoma evansi*, 4. *Babesia caballi*, 5. *Babesia bovis*, 6. *Babesia bigemina*, 7. *Toxoplasma gondi,* 8. *Neospora caninum*, and 9. *Anaplasma ovis*, Ticks: 1. *Dermacentor nuttalli*, *2. D.silvarum, 3. D, daghestanus,* 4. *Ixodes, 5. Haemaphysalis, 6. Hyalomma* and 7. *Rhipicephalus*

Indicator 2-2: Seminars on current status of damages due to major animal protozoan diseases and the vector ticks are conducted at least twice a year.	Achieved ・ On occasion of Regional Veterinarian Conferences, SATREPS Scientific Seminar was held six times in Mongolia (July 2015 in Dornogovi, and July and August 2016 in Bayan-Ulgii and Khentii, August 2017 in Govisumber, and July and August 2018 in Uvs and Sukhbaatar) and presentation was made on protozoan disease and prevention measures by the Project researchers. ・ The Project was planning to hold another seminar in Arkhangai during Rural Veterinarian Conference in June 2017, however, it was postponed due to the Presidential Election. In September, Rural Veterinarian Conference in Arkhangai was finally carried out, but it was overlapped with the SATREPS Scientific Meeting in Obihiro, and the Project members couldn't attend. ・ SATREPS Meeting was held 28 times at IVM when Japanese researchers stayed in Mongolia.
Output3: **Effective measures for the prevention and control of animal protozoan diseases in Mongolia are proposed based on detailed analyses of the results of epidemiological studies and the trial runs of the measures.**	
Indicator 3-1: Proposal of guideline for prevention and control measures for targeting protozoan diseases is prepared and submitted to MOFALI.	Achieved ・ Five guidelines were prepared and submitted to VABA (Veterinary and Animal Breeding Agency) on March 27, 2018 and as of January 2019, four of them are approved by GAVS (General Authority for Veterinary Services), MOFALI.
Indicator 3-2: By 2019, seminar(s) on proposal guideline for prevention and control measures for targeting protozoan diseases is (are) held.	・ Seminars are scheduled to be held in April 2019.

3-2 Summary of Evaluation based on Five Evaluation Criteria

Evaluation results based on 5 evaluation criteria are as follows:

(1) Relevance: High

・ The Project was evaluated as highly relevant with Mongolian development policy, Japan's aid policy and strategy, and the needs of Mongolian societies, at the time of Terminal Evaluation.

(2) Effectiveness: High

・ Effectiveness of the Project was also evaluated high. Capacity enhancement of IVM has been successfully executed through technical guidance by the researchers of NRCPD, participation in the trainings, as well as provision of necessary equipment for research works on protozoan diseases.
・ The Project researchers' intensive work on collection as well as analyses of nationwide blood sampling and development of prevalence maps of protozoan diseases and tick distribution is highly admired. Development of diagnostic kits by IVM is a remarkable achievement of the Project, too.
・ The Project researchers published a total of 82 papers from 2014 to 2018, out of which, Mongolian researchers published 30 papers to international journals with citation index together with Japanese researchers.

(3) Efficiency: High

・ Efficiency of the Project was evaluated high, too. As a whole, input by both the Japanese and Mongolian sides was appropriate. Most of the provided equipment by the Japanese side has been fully utilized to implement the Project activities and contributed to successful achievements of Output.

(4) Impact:

- Prospect of Overall Goal Achievement: The Evaluation Team had difficulty evaluating the prospect as qunatitaitve indicators were not set up yet. Therefore the Evaluation Team suggested to modify indicators of the Overall Goal as shown in 3-6. Recommendations.
- Other Impact: There will be a significant impact by the Project in the control of protozoan diseases in Mongolia. Animal protozoan diseases, such as trypanosomosis and piroplasmosis, are considered major constraints of the livestock industry in Mongolia. Development and dissemination of low cost on-site diagnostic kits and other developed diagnostic kits for protozoan diseases, together with visualization of epidemiological data of the protozoan diseases and ticks will help local veterinarians and researchers to draw up effective control measures of the diseases and ticks and bring about socio-economic impact (maximum JPY 10 billion) by reducing loss of livestock animals.

(5) Sustainability: Relatively High

Policy Aspect

- The current and future administration of Mongolia will maintain the policy to put priority on development of livestock industry by better management through prevention of animal infectious and endemic diseases.

Financial Aspect

- The Evaluation Team confirmed that budget of the Project has been allocated smoothly so far and will be allocated until the end of the Project cooperation period. In the interview to Mongolian governmental officials (MECSS and MOFALI), they recognize the successful achievements of the Project and made favorable response to the requests by the Evaluation Team to allocate the budget for IVM to continue current research activities that IVM had conducted under the Project even after the cooperation period. However there remains a slight concern of financial sustainability as the budget after 2020 has not been secured yet.

Technical and Management Aspects

- Provided equipment had been effectively used and properly maintained so far, and it is expected that Mongolian C/P will continue to effectively use and properly maintain the equipment.
- Purchase of reagents and consumables for the equipment in Mongolia posed difficulties against smooth operation of the research works at IVM in the first half of the Project cooperation period. However, opening of a new service agent in Ulaanbaatar mitigated the situation.
- Local veterinarians are highly cooperative to the Project activities. Hence, the Project outcomes could be sustainably utilized for development of livestock industry in Mongolia.
- According to NRCPD professors, the head of IVM (Project Director) will be nominated as a member of the steering committee of NRCPD, which raises the sustainability of the Project as academic exchange is considered to continue even after the completion of the Project cooperation period.

3-3. Factors promoting the production of effects

3-3-1. Factors pertaining to planning

- A relatively simple structur of the Project implementation, as well as limited number of implementing agencies.

3-3-2. Factors pertaining to implementation process

- All Mongolian CP scientists understood the aims of the Project, and have been actively participating in the Project activities. Appropriate laboratories and scientists were selected as CP (Basic knowledge and skills of CP scientists are at substantially high standard. Therefore, training courses and research progress seminar have been efficiently working).
- Countrywide local veterinarian's network has contributed to efficient data collection and distribution of the research outcomes.
- Organized management of the Project by both the Mongolian and Japanese sides to carry out the research works, including coordination among relevant Mongolian governmental organizations (e.g. MOFALI, MOESCS, etc.).
- Long history of collaborative research between IVM and Obihiro University of Agriculture and Veterinary Medicine that started in 1997 from a JICA technical cooperation project (Improvement of Technology on Diagnosis of Animal Infection Diseases in Mongolia (1997-2002))

3-4. Factors inhibiting the production of effects

3-4-1. Factors pertaining to planning

・None

3-4-2. Factors pertaining to the implementation process

- There has not been observed significant inhibiting factors so far. However, timely purchase of reagents and consumables has been and an issue to be addressed by the Mongolian side to smoothly implement the research activities of protozoan diseases. Establishment of a service agent in Ulaanbaatar has mitigated the situation.

3-5. Conclusion

- Based on the Evaluation results, the Evaluation Team concluded that the Project be terminated as scheduled at the end of May 2019, as the Project Purpose is fully achieved at the time of Terminal Evaluation.

3-6. Recommendations

The following recommendations were made by the Joint Terminal Evaluation Team

3-6-1. Necessary measures to be taken by GAVS and IVM

(1) Revision of PDM

(1) -1 Amendment of the Overall Goal for adding unexpected useful output

- In addition to an on-site diagnostic kit (ICT-kit for equine trypanosomoses), were produced by IVM, and then these kits were utilized for control measures for targeting protozoan diseases. Therefore, the Overall Goal should be revised as follows:

Original:	Prevention and control measures against animal protozoan diseases (trypanosomoses and piroplasmoses) are taken based on the guideline using on-site diagnostic kits.
Amendment:	Prevention and control measures against animal protozoan diseases (trypanosomoses and piroplasmoses) are taken based on the guideline using an on-site diagnostic kit and ELISA diagnostics kits.

(1) -2 Amendment of Overall Goal Indicators

Indicators of Overall Goal should be amended as follows:

1) Indicator 1

Original:	xx % of clinical veterinarians use on-site diagnostic kits.
Amendment:	On-site diagnostic kit is distributed to 40% of veterinary service units in Mongolia.

- A total of 1,820 on-site diagnostic kits were produced in 2018, about 9.1% of total service units (91 units) received them in 2018. In addition, it is planned that 4,200 on- site diagnostic kits will be produced and distributed in 2019.
- The Evaluation Team recommends that GAVS and IVM distribute the on-site diagnostic kit to 80 more veterinary service units countrywide per year, in addition to the previous year, and that finally about 40% of veterinary service units receive them in Mongolia.
- Veterinarian service units are divided into four regions in Mongolia: South (Govi), North (Central), East and West. Based on the discussion with GAVS and IVM, it seems feasible to increase 20 veterinary service units to receive on-site diagnostic kits in each region per year. If 80 more service units receive the kits per year, there will be an increase of 320 service units in 2022. Including the 91 veterinary units in 2018, a total of service units to receive on-site diagnostic kits will be more than 400 (about 40% of veterinary service units).

2) Indicator 2

Original:	xx sets of on-site diagnostic kits are sold per year.
Amendment:	Three ELISA diagnostics kits* are distributed to all provincial veterinary laboratories. * Three ELISA diagnostics kits: for *Trypanosoma equiperdum*, *Babesia caballi* and *Theileria equi*

- Only three provincial veterinary laboratories received all the three ELISA diagnostics kits in 2018. In 2019, IVM is planning to produce and distribute 4,224 for *Trypanosoma equiperdum,* 4,200 for *Theileria equi,* and 1,440 for *Babesia caballi*, and only ten provincial veterinary laboratories are supposed to receive all the three ELISA diagnostic kits. The remaining provinces will not receive all the three kits mainly due to capacity limitation of laboratory staff.
- The Evaluation Team recommends that GAVS and IVM distribute all the three ELISA diagnostics kits to all provincial veterinary laboratories for confirming prevalence and distribution situation of trypanosomoses and piroplasmoses by conducting capacity enhancement trainings of laboratory staffs on how to use ELISA kits.

3) Indicator 3

Original:	Guideline proposed by the Project is reflected in the official strategy for prevention and control of animal diseases by MOFALI.
Amendment:	Contents of guidelines are revised by IVM to reflect the current status of animal protozoan diseases.

- Four guidelines were already approved by MOFALI. The Evaluation Team recommends that IVM revise contents of guidelines to be more practical in accordance with the situation changed/updated based on the study and research works conducted by IVM.

(2) Support of establishment of provincial action plan

- According to "Article 21. Measurement for combating against parasitic diseases" of "Law on Animal Health" provincial veterinary department/unit shall conduct epidemiological research and monitoring activities on the parasitic disease.
- Therefore, the Evaluation Team recommends that GAVS and IVM encourage provincial veterinary department/laboratories to utilize guidelines, on-site and ELISA diagnostics kits developed by IVM through seminar and brochure as well as other tools such as internet, telephone, social media and so on. (According to the law, two veterinarians will be assigned in each soum in 2019, and the Team recommends that veterinarians at soum level use guidelines also)

(3) Securing budget after completion of the Project

GAVS should secure the necessary budget;

- to manufacture and disseminate on-site diagnostic kits and ELISA diagnostics kits developed by IVM
- to establish the training course for veterinarians by IVM, based on guidelines
- to strengthen capacity of utilization of on-site diagnostic kits and ELISA diagnostics kits
- to support above mentioned action plan to be established by provincial veterinary department/laboratories

3-6-2. Necessary measures to be taken by MECSS

MECSS should secure the necessary budget for the followings:

- to properly maintain and utilize equipment by IVM provided under the Project
- to continue self-effort for improving research and development capacities by IVM

3-6-3. Necessary measures to be taken by SCVL

Maintaining records of demand and distribution of on-site diagnostic kit and ELISA diagnostics kits

- SCVL keep demand records of on-site diagnostic kit and three ELISA diagnostics kits from each province as well as distribution record to and status of utilization in each province.

3-6-4. Necessary measures to be taken by NRCPD

Utilization of the research network developed through the implementation of the Project

・ A collaborative research network was formulated through the Project implementation. NRCPD is recommended to give technical guidance and assistance to the Mongolia side as necessity rises to ensure the sustainability of the Project.

3-7. Lessons Learned

(1) Credible relationship between implementing organizations and long-term personnel development

The key for the success of the Project is the trust nurtured by long-term relationships built between NRCPD (Japan) and IVM (Mongolia). Since 1997, two organizations implemented a 5-year JICA technical cooperation project, and since then, they have kept their cooperation through exchanging students and professors. More than 20 years, strong credibility has been established by Japanese and Mongolian students who studied and carried out research together. Today, these students have taken important positions in their respective institutions and also play important roles (leaders and sub-leaders) in the Project.

The strong credibility, especially between Japanese and Mongolian project leaders and sub-leaders, good and smooth communication has been maintained. Consequently, no conflict emerged about research policies and directions, and a strong sense of ownership by Mongolian researchers has matured. As their Professors have done, both leaders and sub-leaders have cooperated to build capacities for young Mongolian and Japanese researchers, and young researchers returned their appreciation to leaders as their dedicated and hard works.

(2) Combination of the trainings in Japan and actual practices in Mongolia

In the Project, technical trainings in Japan were conducted intensively throughout the Project period. A total of 50 researchers were trained so far and learned in Japan advanced technologies necessary to implement the research activities of the Project. When they come back to Mongolia, they strengthened their capacities by applying their knowledge learned in Japan to their practical research works under the Project. Combination of the trainings in Japan and actual practices in Mongolia contributed to smooth and efficient operation of the research activities in Mongolia during the entire cooperation period.