

Ex-Post Project Evaluation 2012: Package II-1 (China)

September 2013

JAPAN INTERNATIONAL COOPERATION AGENCY

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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2010, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2009. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

September 2013
Masato Watanabe
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

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People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan

Gansu Higher Education Project

External Evaluator: Takako Haraguchi, International Development Associates

0. Summary

This project aimed to improve teaching and research at eight major universities in Gansu Province through the development of their facilities and equipment as well as providing training for teachers. Relevance of the project was evaluated to be high, as it was in line with (i) the higher education policies of China and Gansu Province, (ii) development needs for quantitative and qualitative enhancement of the universities, and (iii) Japan's assistance policies. Effectiveness/impact was also high, based on the observations that the project satisfied such needs, improved education activities by enabling more experiments, and improved research activities through outcomes achieved from advanced equipment and training, and thereby contributed to the promotion of the key industries as well as production of teachers for rural areas. Efficiency of the project was evaluated to be fair on the whole: although the project cost was within the plan, the project period significantly exceeded the planned period due to delays in the determination of training host universities in Japan, delays in procurement of some equipment, as well as external factors such as severe acute respiratory syndrome (SARS). Sustainability was evaluated to be high, with no problem observed in institutional, technical and financial aspects, and due to the good status of operation and maintenance of the facilities and equipment developed by the project.

In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Location



Equipment procured funded by ODA loan in the building constructed using local funds under this project (Lanzhou University of Finance and Economics)

1.1 Background¹

In China, together with the remarkable economic development, several development issues have arisen such as narrowing internal disparity between coastal and inland areas, reducing poverty, preparing for joining in the World Trade Organization (WTO) and handling global issues. To deal with these issues, the Chinese government put a high priority on development of human resources that were essential for the accelerated efforts towards developing a market economy and narrowing economic gaps under the policy to strengthen reform and promote openness. Accordingly, the government set out a target to increase the higher education enrollment ratio to 15% as well as adopting a policy to strengthen higher education institutions (HEIs) in inland areas.

Gansu Province (total population of 25,570,000 persons in 2000; total area of approx. 454,000 km², facing Ocher Plateau, Mongolian Plateau and Tibetan Plateau) achieved high economic growth with an average annual gross domestic product (GDP) increase rate of 9.2% in the years 1996-2000, during the 9th 5-year Plan. However, per capita GDP (3,836 yuan in 2000) still remained at 54% of the national average (7,078 yuan). Aiming towards promotion of a market economy and further economic development in the 10th 5-year Plan in Gansu Province, the provincial government planned to increase the number of students in higher education to around 210,000 persons and the enrollment ratio to 10% by 2005. However, in order to achieve such targets, existing constraints in the “hardware” aspects (such as school facilities and equipment), “software” aspects (teachers) as well as financial aspects of HEIs (totaling 18 institutions in 2000) had to be addressed.

1.2 Project Outline

The objective of this project was to quantitatively and qualitatively enhance higher education at eight major universities in Gansu Province (Lanzhou University of Technology (LUT), Lanzhou Jiaotong (traffic) University (LZJTU), Northwest Normal University (NWNLU), Lanzhou University of Finance and Economics (LUFEB), Lanzhou University (LZU), Gansu Agricultural University (GAU), Gansu College of Traditional Chinese Medicine (GCTCM), Tianshui Normal University (TSNC))² by developing educational infrastructures such as buildings and equipment (improvement of the hardware aspects) and teachers’ training (strengthening of the software aspects), thereby contributing to the market-oriented economic

¹ This project is one of the Higher Education Projects funded by Japanese ODA loans targeted to universities in 22 provinces, municipalities or autonomous regions in inland China.

² The names of the universities are those as of today. The following universities had different names at the time of the ex-ante evaluation of this project:

- Lanzhou University of Technology: formerly known as Lanzhou Institute of Technology (renamed in 2003)
- Lanzhou Jiaotong University: formerly known as Lanzhou Railway University (renamed and expanded in 2003)
- Lanzhou University: merged with Lanzhou Medical School (target school of this project) in 2004.

reform in Gansu Province and reduction of disparity with coastal areas³.

Loan Approved Amount/ Disbursed Amount	4,665 million yen / 4,280 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2002 / March 2002
Terms and Conditions	Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: Bilateral tied
Borrower / Executing Agency	The government of People's Republic of China / Gansu Provincial People's Government (Education Bureau)
Final Disbursement Date	July, 2009
Main Contractor (Over 1 billion yen)	None
Main Consultant (Over 100 million yen)	None
Feasibility Studies, etc.	<ul style="list-style-type: none"> - "Feasibility Study Report: Talent Training Program of Higher Education in Gansu Province with the Loan from Japan", Engineering Consulting Center of Gansu Province, 2001. - "Special Assistance for Project Implementation (SAPI) for Higher Education Project in China", Japan International Cooperation Agency (JICA), 2003, 2004 and 2005. - "The Supervision Survey Report on JICA Loaned Higher Education Project", JICA, 2010.

2. Outline of the Evaluation Study

2.1 External Evaluator

Takako Haraguchi (International Development Associates Ltd.)

2.2 Duration of Evaluation Study

Duration of the Study: August 2012 – September 2013

Duration of the Field Study: March 17 – April 10, 2013 and May 26 – June 3, 2013⁴

³ At the time of the ex-ante evaluation, the direct targeted outcome of the project was "to improve quantitatively and qualitatively higher education in Gansu Province", and the indirect targeted outcome (impact) was "to contribute to the market-oriented economic reform in China and reduction of disparity". However, since the targeted universities were only part of the HEIs in the province, the target area was lowered by one level for this ex-post evaluation.

⁴ The field study period included the periods for ex-post evaluation of the Chongqing Higher Education Project and the Sichuan Higher Education Project.

3. Results of the Evaluation (Overall Rating: A⁵)

3.1 Relevance (Rating: ③⁶)

3.1.1 Relevance to the Development Plan of China

The objective of this project is consistent with the five-year plans for economic and social development and the five-year plans for the education sector at both the national and provincial levels, as well as other education-related development strategies and the Western Development Project, which all aim at quantitative and qualitative development of higher education both at the times of ex-ante and ex-post evaluations of this project (Table 1).

Table 1: Main objectives of development plans related to this project

	At the time of ex-ante evaluation	At the time of ex-post evaluation
National level development plan	<u>The 10th 5-year Plan for National Economic and Social Development (2001–2005):</u> To increase higher education enrollment ratio to around 15% by 2005.	<u>The 12th 5-year Plan for National Economic and Social Development (2011-2015):</u> To emphasize higher education for promoting industrial advances (quantitative targets include 87% of junior secondary graduates to go on to senior secondary school)
National level education sector plan	<u>The 10th National 5-year Plan for Education (2001-2005):</u> To increase student enrollment in HEIs to 16,000,000 by 2005; to develop human resources that have high skills in high technology, biotechnologies, manufacturing technologies etc. that are necessary for industrial structural adjustment; to strengthen support to HEIs that are relatively at a high level; to strengthen support to fostering of teachers.	<u>The 12th National 5-year Plan for Education (2011-2015) and National Mid- and Long-term Reform and Development Plan for Education Sector” (2010–2020):</u> To increase higher education enrollment ratio from 26.5% in 2010 to 40% in 2020; to increase student enrollment in HEIs from 29,790,000 in 2009 to 33,500,000 by 2015; to develop HEIs in inland area with special focus on development of departments that are competitive and fostering of teachers.
Provincial level development plan	<u>The 10th 5-year Plan for Economic and Social Development in Gansu Province (2001-2005):</u> To achieve annual economic growth rate of 8% by 2005; develop the key industries including petro-chemistry, metallurgy, mechanical electronics pharmaceutical chemicals, light spinning and food, pharmaceuticals and construction materials.	<u>The 12th 5-year Plan for Economic and Social Development in Gansu Province (2011-2015):</u> To achieve annual economic growth rate of 12% by 2015; to develop the key industries including new energy, manufacturing using new energy, new materials, new pharmaceuticals and bio-based industries and information technology.
Provincial level education sector plan	<u>The 10th 5-year Plan for Education in Gansu Province (2001-2015)</u> To increase higher education enrollment ratio from 7.9% in 2001 to 10.0% in 2005; to increase student enrollment in HEIs to around 210,000 (including around 140,000 in regular HEIs ⁷).	<u>The 12th 5-year Plan for Education in Gansu Province (2011-2015)</u> To increase higher education enrollment ratio from 23% in 2011 to 32% in 2015.

Source: JICA appraisal documents; respective documents of the mentioned development plans.

⁵ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁶ ③: High, ②: Fair, ①: Low

⁷ Regular (or standard) HEIs is a term referring to universities and colleges, including undergraduate programs of comprehensive universities and single-department colleges, specialized colleges (similar to junior colleges in Japan), and graduate programs. Adult higher education and higher vocational education institutions are not included. In this report, “universities” include both universities and colleges that grant undergraduate or higher academic degrees unless otherwise mentioned.

While there were no large policy changes between the ex-ante and ex-post stages, in recent years more importance has been given to higher education development. Also, the key industries of Gansu Province have shifted to those that require higher technologies.

3.1.2 Relevance to the Development Needs of China

Development needs were observed for the quantitative and qualitative enhancement of education at the eight targeted universities at the times of both the ex-ante and ex-post evaluations.

At the time of the ex-ante evaluation, there was a need for quantitative expansion of higher education in order to narrow the economic gap mentioned in “1.1 Background” and following the increase of primary and secondary education in Gansu Province (school intake rates in 1999 were 99.1% for primary education and 94.4% for secondary education). It was forecasted that the number of new entrants in HEIs would increase from 60,000 in 2000 to 80,000 in 2005. There were 18 regular HEIs in Gansu Province, among which the eight targeted universities were the leading provincial universities⁸. They were expected to further expand their roles of producing human resources for the above-mentioned key industrial sectors and teachers for rural areas, but financial resources for developing the hardware (facilities and equipment) and software (teachers’ training) aspects were limited. Also, there were few opportunities provided for the teachers to visit overseas.

At the time of the ex-post evaluation, although economic growth remained high at an annual average of 10.9% for the years 2000-2011, the need for narrowing the economic gap still exists in Gansu Province: provincial per capita GDP is 19,595 yuan in 2011, which is 50% of the national average 39,442 yuan. The number of new entrants to HEIs in the province continued to increase from 100,000 in 2007 to more than 120,000 in 2011, and the need for quantitative and qualitative enhancement of HEIs remains high. On the other hand, the need for hardware development seemed to have been more satisfied compared to the time of the ex-ante evaluation, due to increased financial injection to provincial universities following the above-mentioned higher education development policies. The Education Bureau of Gansu Province, the executing agency of this project, now puts more emphasis on the need to develop the software aspects such as improving the quality of teachers.

3.1.3 Relevance to Japan’s ODA Policy

At the time of the ex-ante evaluation, Japan’s Official Development Assistance (ODA) Charter (1992) placed emphasis on Asian regional support and human resources development

⁸ National and public universities in China are under the jurisdiction of the state (Ministry of Education or other state government organizations) or local (sub-national) governments. In Gansu Province, Lanzhou University (which merged with Lanzhou Medical School, a targeted school of this project) is under the jurisdiction of the state (i.e. overseen by Ministry of Education), and listed in the “Project 211” (1996-), a national project to intensively support approx. 100 key universities to enhance their research capabilities by the 21st century.

support. Additionally, the Country Assistance Policy for China and the Medium-term Strategy for Overseas Economic Cooperation Operations and Country Assistance Strategy put priorities on human resources development from the viewpoint of support for openness and reform and post-WTO economic reform, and on assistance in the mid-western region in China from the aspect of narrowing the economic gap. The project objective was consistent with such aid policies of Japan.

This project has been highly relevant to China's development plans, development needs as well as Japan's ODA policies, and therefore its relevance is evaluated to be high.

3.2 Effectiveness⁹ (Rating: ③)

The objective of the project, "quantitative and qualitative enhancement of higher education of the targeted universities", has been achieved based on the performance of quantitative indicators as well as qualitative information that are presented in the following sections.

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Quantitative expansion of teaching and research¹⁰

The hardware outputs of this project increased the aggregated floor area of school buildings and the monetary value of educational equipment. With respect to the aggregate floor area of school buildings, the ex-ante evaluation set out the target values for individual universities, and those were mostly achieved (Table 2 and Figure 1). The utilization rates of the facilities and equipment developed by this project are high at 100% (for facilities) and more than 80% (for equipment)¹¹ at all universities. Therefore, it can be said that the project well responded to the needs for quantitative expansion of higher education (i.e. constant increase in the number of students as shown in Figure 2).

⁹ Sub-rating for Effectiveness was given with consideration of Impact.

¹⁰ In the ex-ante evaluation, the target year for evaluating the quantitative indicators was set at 2005, which was after the planned project completion date. However, due to the delays in project implementation (see "3.3 Efficiency"), the ex-post evaluation set the actual comparison year as follows: the targets related to the building construction component (completed in 2004) were compared with the actual performance in 2005; the targets related to the equipment (procurement) component and the training component (mostly completed in 2008 except one item (for one university) that was delivered in 2009) were compared with the actual performance in 2009; the targets related to more than two components were compared with the actual performance in 2009. When data for 2009 were not available, the comparison was made with the actual performance in 2011. To show the situation at the time of ex-post evaluation, the data of 2011 were mainly used. While the field study was conducted from 2012 to 2013, the data for 2011 are considered to be the latest reliable data that have been checked and compiled.

¹¹ The utilization rates are based on responses to questionnaires provided by each targeted university. The definition of utilization rates at the time of ex-ante evaluation was "actual usage hours divided by planned usage hours". However, the actual usage could not be compared with the target values based on that definition, since, according to the targeted universities, it was impossible to actually calculate the rates in such manner because planned usage hours varied depending on the types of equipment. According to the interviews with them, the figures provided seemed to represent "the number of equipment that is currently used (i.e. in operation) divided by the total number of equipment procured". Yet, the results of the visits to each university, observation of the facilities/equipment, and review of some usage records are consistent with the figures provided, and thus imply that the questionnaire responses more or less reflect the actual usage of the outputs of the project.

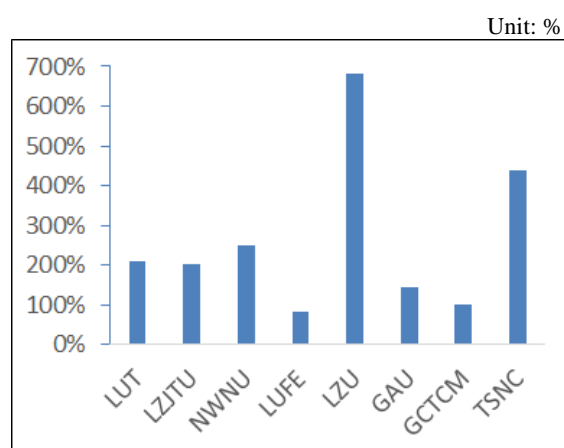
The facilities and equipment related outputs of this project accounted for on average only 3% of the total facilities (in terms of floor area) and 20% of the total educational equipment (in terms of monetary value) of the targeted universities as of 2009 after the project completion. Nevertheless, they played an important role of establishing a foundation on which later development works by the Chinese side took place. More specifically, (i) the project took a strategy to concentrate its resources to the development of key teaching/research areas that required to be strengthened, and (ii) the facilities and equipment developed under this project were highly valued and therefore became the decisive factor in determining the areas that were worth investing in further, which brought in other development funds. In particular in around 2002 when it was difficult for the targeted universities to make large scale facility investments on their own, the effective role played by this project was larger than the actual percentages indicate.

Table 2: School building area

Unit: m²

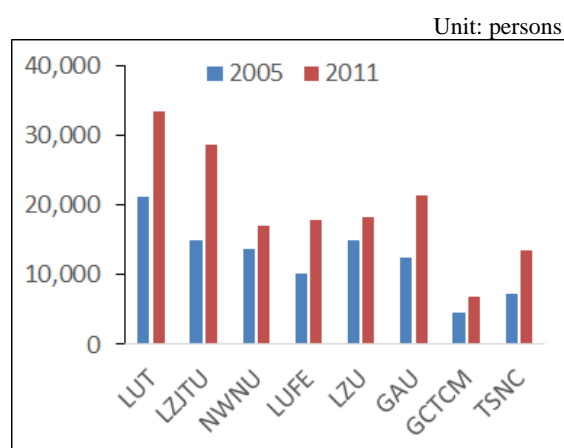
	Actual value 2000	Planned value		Actual value		Actual value 2011
		2005	Portion under this project	2005	Portion under this project	
LUT	268,684	564,000	30,000	694,201	37,455	1,557,000
LZJTU	205,439	421,385	20,000	793,477	20,567	949,100
NWNU	312,101	559,493	28,420	685,363	28,420	685,363
LUFE	145,403	482,014	9,700	427,246	9,700	888,000
LZU	153,000	364,980	4,000	1,181,722	4,000	1,248,737
GAU	165,163	327,450	0	362,544	0	422,635
GCTCM	67,460	96,962	13,000	161,055	13,000	153,255
TSNC	109,679	220,000	8,100	306,853	8,100	353,724
Total	1,426,929	3,036,284	113,220	4,612,461	121,242	6,257,814

Sources: JICA appraisal documents; responses to the questionnaire



Source: responses to the questionnaire

Figure 1: Increase rates of monetary values of educational equipment, 2005-2009



Sources: JICA appraisal documents; responses to the questionnaire

Figure 2: Number of students

(2) Qualitative enhancement

As shown in Table 3, the average school building area per student increased beyond both the target set in the ex-ante evaluation and the national standard, and the monetary value of educational equipment per student satisfied the national standard, implying that the increase in students would not have adversely affected the conditions (quality) of teaching and research at all targeted universities.

Various indicators to measure the achievements of progress in the areas of teaching and research, such as the number of key disciplines and key laboratories¹², the number of faculties/departments and graduate programs, the number of research projects and social (community) services¹³ projects, the number of published research papers, the number of awards, the number of patents granted, etc., showed increasing trends. Although such improvements are the outcome of the overall higher education development policies mentioned in “3.1 Relevance”, many cases are attributable to the outcome of this project through utilization of the facilities/equipment developed under the project and/or involvement of teachers who received training in Japan in teaching/research activities under this project. In particular, the number of provincial or ministerial key laboratories and research papers published in international journals significantly increased comparing before and after the implementation period of this project (Figures 3 and 4), and it was observed in many targeted universities that new key laboratories were approved mainly based on facilities/equipment developed under this project (GCTCM, the Medical School of LZU, TSNC, etc.), and that the training/research in Japan promoted the participating teachers to start publishing articles in international journals (LUT, NWNNU, etc.) For example, Institute of Energy and Power Engineering of LUT have produced 120 research papers related to this project, including more than 30 internationally-published papers listed in the SCI (Science Citation Index).

¹² Key disciplines and key laboratories are ones that the state or a local government designates as a base for teaching or research activities and to which resources are preferentially distributed.

¹³ Social (or community) services are research, testing, etc. that are commissioned by external organizations (government, companies, etc.)

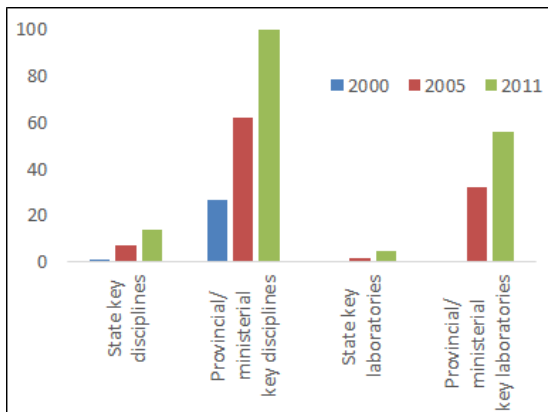
Table 3: School building area per student and monetary value of educational equipment per student

Units: m² or yuan

	School building area per student (m ²)					Value of educational equipment per student (yuan)		
	Actual 2000	Planned 2005		Actual 2005		Actual 2011	Actual 2005	Actual 2011
		Area per student	Increment through this project	Area per student	Increment through this project			
LUT	34	31	0.56	56	2.04	62	6,619	8,670
LZJTU	28	28	0.50	39	1.37	67	6,500	7,600
NWNU	33	36	0.40	29	1.83	35	4,731	9,370
LUFE	30	31	0.70	41	0.61	36	3,700	3,300
LZU	37	46	0.49	87	0.51	78	23,136	45,891
GAU	30	30	0.49	30	0.00	40	5,002	5,210
GCTCM	27	22	0.43	56	2.80	62	6,730	6,027
TSNC	26	29	0.43	39	1.08	67	2,876	6,837
Average	31	31	0.50	47	1.28	56	7,412	11,613

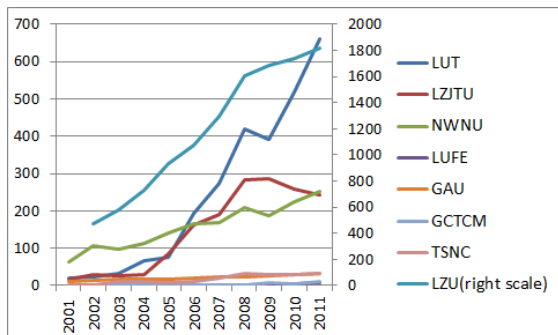
Sources: JICA appraisal documents; responses to the questionnaire

Note: the national standard of school building area per student is “more than 30m²”; the national standard for value of educational equipment per student is “more than 5,000 yuan” for laboratory equipment in faculties of science and technology such as science, engineering, agriculture and medicine, “more than 3,000 yuan” for humanity and social science faculties, and “more than 4,000 yuan” for physical education and art faculties (Interim Provisions for Establishment of Regular Undergraduate Schools, No.18 [2006]).



Sources: JICA appraisal documents; responses to the questionnaire

Figure 3: Total number of key disciplines and key laboratories of the 8 targeted universities



Source: Responses to the questionnaire

Note: The figures represent the total numbers of research papers included in SCI (Science Citation Index), EI (Engineering Index) and ISTP (Index to Scientific & Technical Proceedings) databases.

Figure 4: Total number of internationally-published research papers by each of the 8 targeted universities

3.2.2 Qualitative Effects¹⁴

(1) Effects on enhancement of teaching and research at each targeted university

On the teaching side, all targeted universities said that the facilities and equipment developed under this project improved the conditions for teaching and experiments both quantitatively and qualitatively. Specific comments include: “the lack of experimental facilities was resolved”, “the ratio of classes with experiment increased”, “more creative experiments became possible”, and therefore “comprehensive skills of students improved” and “opening of new courses became possible”. For example, microscopes that GAU had at the beginning of this project had all been produced in the 1970s-80s, and many of them were not in usable condition. Since this project procured basic teaching equipment including microscopes, experiments were introduced to all classes that needed them, which enhanced the students’ practical skills. According to TSNC, immediately prior to the beginning of this project it was upgraded to a university from a tertiary short-cycle (specialized) school, and it faced a need to provide new undergraduate courses (i.e. modern physics). Under this project, 87 sets of equipment were procured for four laboratories, and they are used for 140 course hours of classes every year. Being the only university with undergraduate programs in Tianshui City, the university has become the leading HEI in the city. Also, the equipment procured under this project played an important role in the establishment of a new discipline (Traditional Chinese Medicine at GCTCM) and new graduate programs (LUFU and LUT), though such enhancements were not all attributable to this project alone.

With respect to research and social services, all targeted universities confirmed the improvement of their research activities thanks to the facilities/equipment and teachers’ training provided under this project. For example, at LZJTU, a teacher who attended the training in Japan later took part in national key research projects such as on durability of materials for the Qinghai–Tibet railway using the equipment procured under this project. Those projects received several awards including the State Science and Technology Advancement Award¹⁵. In case of GCTCM, it had received only 10-20 thousand yuan of scientific research grants every year before the project. With the equipment procured under this project, the university established the Research Center, gradually expanded it using its own funds, and started to be engaged in national projects in the field of traditional Chinese medicine which it “had never imagined

¹⁴ In this ex-post evaluation, it was difficult to exclude effects of activities that were not under this project from the planned quantitative indicators. Therefore, while taking the trends of the indicators into consideration, qualitative information (collected by document review, questionnaires and interviews) was used to understand how specifically this project is related to such trends. The evaluator conducted individual or group interviews in a semi-structured manner with the Education Bureau of Gansu Province (executing agency) and, at each targeted university, with persons in charge of the project implementation as well as ex-participants in teachers’ training in Japan. In total, 86 persons from the 8 universities (including 34 ex-participants in teachers’ training in Japan) were interviewed. With respect to interviews with universities in Japan that accepted teachers for training from the targeted universities, the evaluator visited 2 of them and contacted several more universities by telephone or e-mail.

¹⁵ The State Science and Technology Advancement Award is one of the science and technology awards granted at the national level.

before the project”. Consequently, the research grants amounted to 40 million yuan by the time of the ex-post evaluation. In addition, there were a number of instances where research and social services activities related to this project benefited the region, such as the development of cold resistant varieties of agricultural products by GAU, the improvement of alkaline soil in the Silk Road region by NWNNU, and the geological analysis for the Maijishan Grottoes (one of the four stone caves in China) by TSNC.

It was pointed out that the training in Japan had effects such that it helped participating teachers have broader views for improving their teaching content and methods, find new research topics, and deepen and improve the quality of research. For example, a teacher of NWNNU continued the joint research on developmental psychology that she started with a teacher of the host university in Japan, and they co-authored a book published in Japan. A teacher of the School of Chemical and Biological Engineering of LZJTU stayed in the host university in Japan for one year¹⁶ in order to conduct research in the field of super-molecular chemistry that was at the top level of the world, and after his return to China, he presented more than 100 research papers in many academic journals including the Journal of Organic Chemistry (the United States), a leading journal in the field.

The 40-day training courses in university management were highly appreciated by most of the teachers interviewed for this ex-post evaluation: specific merits that many of them mentioned included the smooth proceeding of the training programs based on careful preparation, diversified and specialized programs and contents, and the discussions held on the issues that China is also facing, such as how to cope with the declining birth rate and job shortage. For both specialized fields and university management training, many targeted universities sent candidates for executive positions, which contributed to the university-wide expansion of the effects of training outcomes. For example, the training under this project was the first opportunity for a vice president of GCTCM to visit a university overseas. He said he was deeply shocked by the concepts of university management that he learned in the training program, and after his return to China, he provided suggestions about the concept of “professionally managing a university” to the university authorities, and applied what he learned to various improvement activities such as building disciplines, human resource development, opening an innovation course and developing the management system for the Research Center. In another example, a teacher of TSNC established, based on what he learned in Japan, a graduates’ association that facilitated graduates to make donations and provide opportunities for receiving practical training in companies. He also said that he changed his way of teaching based on ideas to enhance practical skills of students. One of the changes was to have a 5-minute question and answer session at the end of each class.

Table 4 below summarizes notable effects of the project on teaching and research at each

¹⁶ The training period varied from less than one month to one year.

targeted university.

Table 4: Qualitative effects on each targeted university

<p>Lanzhou University of Technology (LUT)</p>	<ul style="list-style-type: none"> · The ratio of classes with experiments became 100% by using the equipment procured under this project. · Before the project, the postgraduate programs had consisted only of master’s programs, and few research papers had been internationally published. The equipment procured under this project served as the main equipment in setting up doctoral programs and increased the number of internationally-published papers every year. · The relationship that had existed from before this project between the School of Civil Engineering and universities in Japan in the field of structural engineering (antiseismic and seismic isolation technologies) was strengthened after the training provided in Japan under this project. After the Great Sichuan Earthquake, the teacher who had communicated with the Japanese side and attended the training program under this project played a central role in evaluating the seismic capacity of building structures and designs of earthquake-resistant or base-isolated buildings in Gansu Province. · The School of Fluid Power and Control Engineering used the equipment procured under this project as the main equipment at the testing center for hydraulic pumps and the fluid pressure laboratory that it newly established. Their research outcomes, such as a petroleum pump developed through technical assistance to a company, received awards from Gansu Province and Lanzhou City. Also, academic exchanges with Japanese universities started from the training in Japan, and as part of such exchanges the university hosted a national level forum for enhancing exchanges among researchers in fluid power in China and Japan in 2008.
<p>Lanzhou Jiaotong University (LZJTU)</p>	<ul style="list-style-type: none"> · Shortage of experimental equipment was solved through the procurement, updating and replacement of basic equipment for teaching. · The facilities and equipment were used for practical education and promotion of innovation. In recent years, students are actively entering competitions and winning prizes. · The School of Civil Engineering took part in national key research projects using the equipment procured under this project (e.g. study of durability of materials for the Qinghai-Tibet railways and development of the Lanzhou-Chongqing railways) and won prizes. The training in Japan also contributed to such research. · A teacher at the School of Chemical and Biological Engineering was engaged in research in the field of super-molecular chemistry for one year in Japan, and after his return to LZJTU produced more than 100 research papers, one of which was published in the Journal of Organic Chemistry of the United States. He is continuing the academic exchange with the host university in Japan.
<p>Northwest Normal University (NWNNU)</p>	<ul style="list-style-type: none"> · NWNNU had generated ethnic minority teachers from before this project. In 2004, it established the Research Center for the Educational Development of Minorities, and used the equipment procured under this project to train students to be teachers. · Currently, the ratio of students for teacher training to those for non-teacher training is set at 1:1 and research is being promoted. The equipment procured by the College of Chemistry and Chemical Engineering played a role in setting-up new laboratories such as the key laboratory of Ministry of Education in the field of polymer chemistry. Some research or social service outcomes have already been put to practical use (e.g. improvement of alkaline soil in the Silk Road region and technical transfer to companies in Fujian Province.) · In the training component, all teachers stayed in Japan for one year in order to be deeply involved in research. The consequent research outcomes include the increasing number of SCI-cited research papers that had been very few before the project, involvement in key national research projects and obtaining patents, in such fields as chemical engineering and life science. A teacher of the College of Psychology conducted a joint research with her counterpart in the host university in Japan, and they co-authored a book published in Japan. They are continuing their academic exchange.
<p>Lanzhou University of Finance and Economics (LUFU)</p>	<ul style="list-style-type: none"> · The ratio of classes with experiments increased to 97% using the basic teaching equipment procured under this project. · Many graduates are employed by leading companies in Gansu Province (mostly in the finance and banking sectors) and contribute to the promotion of a market economy. · Teachers are engaged in research in the fields that they studied in Japan after their return to LUFU (School of Information Engineering, School of Accounting). A teacher at the School of Business Media extended his stay in Japan at his own expense. He studied production of animations and gained an understanding of Japanese culture. · Many of the equipment procured under this project (e.g. PCs) became obsolete quickly and some

	<p>of them have already been replaced using the university's own funds. After replacement, old machines are disassembled by students studying information engineering in order to obtain hardware skills. In such manner, all equipment are utilized until the very end of their useful lives.</p>
Lanzhou University (LZU) (Medical School)	<ul style="list-style-type: none"> · The Medical School established the Key Laboratory of Preclinical Study for New Drugs in Gansu Province using the equipment procured under this project such as analytical instruments in the field of molecular biology and electron microscopes, and has expanded the laboratory using the university's own funds. Consequently, development of new drugs was promoted and new patents were granted. · It also established the Research Center to share a transmission electron microscope (JEM) and a scanning electron microscope (JSM). Consequently, the equipment are frequently used.
Gansu Agricultural University (GAU)	<ul style="list-style-type: none"> · The GAU's microscopes had been procured in the 1970s-80s, and many of them had become usable before the project. The project added microscopes and resolved the shortage, and the ratio of classes with experiments rose to 97% by the time of project completion. The ratio reached 100% after the project. · GAU is preparing to share the equipment procured under this project within the entire university through the development of an equipment management network. · Although not fully attributed to this project which procured basic equipment for teaching, some research outcomes that used such equipment have already been put into practical use (e.g. cold-resistant varieties of field mustard and improved varieties of corn are cultivated by farmers). · The majority of graduates are active as agricultural technologists in project units¹⁷ in townships and villages.
Gansu College of Traditional Chinese Medicine (GCTCM)	<ul style="list-style-type: none"> · With a comprehensive set of equipment procured under the project, the Animal Laboratory started to provide SPF (specific pathogen-free) animals to the northwestern region. · The teaching and research environment greatly improved comparing before and after the project. Teachers had never imagined before the project that GCTCM would take part in national research projects. The Research Center developed by the project was designated as a key laboratory by Ministry of Education and the Education Board of Gansu Province. · A vice president who attended the university management course applied, after his return, many things he learned for improvement of university management. · GCTCM contributes to development of new drugs through producing graduates who are employed by pharmaceutical companies in the province.
Tianshui Normal University (TSNC)	<ul style="list-style-type: none"> · TSMC was upgraded to a university from a tertiary short-cycle school just before this project, and faced the need to provide the modern physics course. The project developed the necessary facilities and equipment, and TSMC has become the only university with undergraduate programs in Tianshui City. · The College of Life Science established the Key Laboratory for New Molecule Materials Design and Function, partly using the equipment procured under this project. Besides teaching, the laboratory conducts testing services for external clients such as testing or the geological analysis of the Maijishan Grottoes. · Most graduates have become teachers in rural areas. As 30% of teachers in basic education in Tianshui City are graduates from TSNC, it has contributed to the upgrading of basic education in the city. · Having been enlightened by the concept of focusing on practice, a teacher who attended the university management course established a graduates' association to facilitate graduates to make donations and provide opportunities for practical training in companies. Also, he started to conclude his classes with a 5-minute question and answer sessions.

Sources: JICA, "The Supervision Survey Report on JICA Loaned Higher Education Project", 2010; responses to the questionnaire and interviews; websites; etc.

¹⁷ A project unit is similar to an incorporated administrative agency or a government-affiliated corporation in Japan.



Ethnic minority students conducting experiment. They will become teachers in rural areas. (NWNNU)



A scanning electron microscope. The researcher explained that it was very frequently used. (Medical School, LZU)



Usage and inspection records of an instrument at the Modern Physics Laboratory. There seemed to be data entry (i.e. usage) every day. (TSNC)

(2) Use of the procured equipment

By the time of the ex-post evaluation, nearly seven years had passed since majority of the equipment procured under this project was installed. Therefore, some PCs and monitors have passed their useful lives and have already been disposed of in accordance with the university regulations. However, it was confirmed from the visits to and interviews with the targeted universities that most of the other major teaching/research equipment was still used in good conditions and effective at the time of the ex-post evaluation.

Moreover, the stance to fully utilize the equipment until the very end of their lifetime was observed in several universities. For example, teachers and students exercised their ingenuity in using equipment for which components were no longer in production, which became a part of the educational process (e.g. microwave interferometer of LZJTU). In another example, PCs that were procured by this project but then later became obsolete and replaced by new ones were disassembled by students in information engineering classes in order to obtain hardware skills (LUFU).

3.3 Impact

3.3.1 Intended Impacts

(1) Enhancement of teaching and research at the provincial level

Table 5 shows selected higher education indicators at the provincial level. Improvement is seen in the indicators for quantitative expansion such as the number of students and enrollment ratios, to which this project is partly involved through the expansion of the facilities and equipment at the eight targeted universities.

On the other hand, school building area per student which represents qualitative improvement does not show an increasing trend in the province taken as a whole. Although the same indicator at the targeted universities were above the provincial average both before and after the project and showed an increasing trend, its effects on improvement of the figure in the entire province, where there are 37 HEIs (including 14 universities), was limited, and there is a possibility that past investments may have been concentrated on the targeted universities of this

project. Nevertheless, given the fact that the targeted universities are all leading universities in Gansu Province, the upgrading of teaching and research level at these universities as shown in Table 4 could be considered as the upgrading of teaching and research level of the entire province.

Table 5: Higher education indicators of Gansu Province

	Actual 2000	Planned 2005	Actual 2005	Actual 2009	Actual 2011
Number of HEIs	18	30	33	39	37 (of which universities with undergraduate programs: 14)
Number of students enrolled in HEIs	1313,600	210,000	222,605	356,201	405,306
Enrollment rate in HEIs	6.7%	10.0%	N.A.	21% (national average: 24.2%)	23% (national average: 26.9%)
School building area per student (m ² /person)	27.7 (average of targeted universities: 31.0)	32.0	N.A.	N.A.	12.0 (average of targeted universities: 56.0)

Sources: JICA appraisal documents; JICA, “The Supervision Survey Report on JICA Loaned Higher Education Project”, 2010; China Statistical Yearbook 2011; Educational Statistical Yearbook of China 2011; Gansu Province Statistical Yearbook 2011

(2) Contribution to promotion of market-oriented economic reform, reduction of disparity, development of rural areas and reform of state-owned enterprises

The titled impacts were expected in the ex-ante evaluation. Although the information was limited to the results of the interviews with the executing agency and individual targeted universities and observations, they are considered to have been achieved to a certain extent through production of graduates in the key industries, promotion of research and development (R&D), fostering of teachers for rural areas, and training for laid-off workers.

1. Promotion of market-oriented economic reform: the number of graduates in the fields of accounting, law and financial management increased by between 100 and 500 persons in all targeted universities except GCTCM (whose area of specialization is not very relevant to this subject). Only TSNC confirmed the direct relationship between those graduates and this project, but LUFU seems to play a role in this respect as well through use of the facilities and equipment developed and teachers’ training in Japan under this project.
2. Reduction of disparity: among the targeted universities, only LUT and TSNC said that the project directly contributed to human resource development in the key industrial sectors designated by the 10th 5-year Plan (see “3.1 Relevance”). LUT fosters human

resources in petrochemical industry, metallurgy, mechanical and electronic industry, light spinning and food, and construction materials, and TSNC does so in the mechanical and electronic industry. Apart from these two universities, other targeted universities that installed educational facilities/equipment in relevant schools/disciplines and which confirmed the enhancement of students' practical skills as a result of this project, such as the Medical School of LZU and GCTCM that produced graduates who then took jobs at drug manufacturers in the province, may also have made a similar level of contribution. In each targeted university, the job placement rate remained around 70-90% in both 2005 (during project implementation) and 2011 (after project completion). Also, it was observed in several targeted universities that the research outcomes involving the outputs of this project were put into practical use in some key industries¹⁸.

3. Development of rural areas: in NWNNU and TSNC, graduates who received the upgraded education through better experimental conditions later became teachers in rural areas (the number of graduates who became rural teachers amounted to: 1,601 persons in 2005 and 1,522 persons in 2009 in NWNNU, and 1,620 persons in 2005 and 2,680 persons in 2009 in TSNC). In addition, many graduates from GAU obtained their jobs related to rural development in townships and villages. The university also contributed to rural areas through research and development activities, namely, in the field of breed improvement technologies of agricultural products such as field mustard, corn and potato that have already been disseminated.
4. Support to reform of state-owned enterprises (addressing the issue of laid-off workers): three targeted universities said they used the facilities constructed under this project to train laid-off workers. The number of laid-off workers trained at these three universities is increasing, though relation to this project is not clear.

3.3.2 Other Impacts

(1) Impacts on the natural environment

No negative impacts were observed. By the time of the ex-ante evaluation, all targeted universities had completed the necessary domestic procedures of environmental clearance with the environmental impact assessments (EIA) approved by the environmental protection department of Gansu Province or the cities where the universities are located. Some noises, vibrations and dusts due to the building construction and foul water due to the use of the constructed facilities had been expected but to a small scale. All universities reported that

¹⁸ As for the issue of disparity, however, it was stated in "3.1.2 Relevance to the Development Needs of China" that the gap in per capita GDP between Gansu Province and the national average has not been narrowed due to the nation-wide economic development.

during the construction phase they controlled the noises, etc. and thus kept the negative effects at a minimum.

(2) Land acquisition and resettlement

As planned in the ex-ante evaluation, there was no land acquisition and resettlement associated with this project.

(3) Strengthening of exchanges and cooperation with universities in Japan

It was observed in several targeted universities that academic exchanges with universities in Japan have been enhanced through this project. However, in many cases contact was lost in a few years after the training under this project. Around five out of 34 ex-participants in the training interviewed for this ex-post evaluation have somehow maintained the exchanges. Three of them had active exchanges from before this project (School of Civil Engineering of LUT) or further developed the exchanges by extending their stays in Japan with funding by the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of Health, Labor and Welfare for doctoral degree or continuing research (LZJTU the College of Chemistry and Chemical Engineering of NWNNU). Feedback about difficulties in continuing exchanges includes the language barrier (GAU) and lack of the particular field of study that the potential participating teachers were interested in at such universities that could accept teachers from China (Medical School of LZU).

Basically, it was each targeted university's responsibility to find host universities in Japan and arrange for the training by communicating with them individually. However, many universities could not find their partners in the initial stage of the project. To respond to such situation, JICA provided various support such as holding of workshops to promote exchange with participation by targeted universities of the Higher Education Projects and interested Japanese universities in 2004 and thereafter, opening of the Higher Education Projects website to share information among participants in the Projects from 22 provinces as well as Japanese universities, and setting up of the help desk by hiring consultants. Despite those efforts the number of participants in the training was far below the planned number (see "3.4 Efficiency"). In some cases where the ex-participants said they could not study what they really wanted to, all participants from the same Chinese university studied in the same Japanese university due to the relationship which their university had with that Japanese host university from before the project. These cases indicate the importance and difficulty of matching the fields of study.

The outcomes of individual cases of exchange are described in Table 4. Overall, almost all of the interviewed ex-participants in the teachers' training under this project said that they had been strongly impressed by the elaborateness of teaching and research activities at universities in Japan and seriousness of the Japanese people, and had come to feel more familiar with Japan. Generally, western countries tend to be more preferred as the place to visit, but many teachers

who participated in this project said that they talked about their research and life in Japan to their colleagues and students, who then had a better understanding of Japan. There was also a case where an ex-participant sent his students to doctorate programs in Japan.

This project has largely achieved its objectives, therefore its effectiveness is evaluated to be high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The actual production of the outputs is summarized in “Comparison of the Original and Actual Scope of the Project” on the final page of this report (the floor area of the buildings constructed for each university is in Table 2). The hardware outputs (facilities and equipment) were developed mostly as planned with some differences as follows:

- Building construction: floor area increased by 107% compared to the plan mainly due to the increase in demand.
- Procurement of equipment: it is difficult to precisely compare the actually-procured equipment with the original plan prepared in the project appraisal stage, because detailed consideration and final selection took place after the commencement of the project. However, the colleges/disciplines to which equipment were installed and the major equipment items installed were mostly in accordance with the plan.

As for the software outputs (i.e. training of teachers at the targeted universities in Japan or invitation of teachers from Japan), adjustments were made due to financial constraints and difficulties in finalizing host universities in Japan. Accordingly, the actual number of participants were 114 persons compared to the planned 176 persons (65% of the plan), and the actual person months was 415 person months compared to the planned 1,137 person months (36% of the plan).



Teaching Building constructed using funds from the Chinese side (GCTCM)



Fluid experiment system (LUT)



Microscopes for undergraduate students. The necessary number was secured. (GAU)

3.4.2 Project Inputs

3.4.2.1 Project Cost

As shown in the table below, the total project cost was 7,347 million yen (of which the Japanese ODA loan was 4,280 million yen), which was within the plan (ratio against the plan: 95%). The major reasons for the increase or decrease in each cost item are as follows:

- Building construction: although the cost increased due to the increase of the floor area and prices of materials, the increase was more or less proportional to the increase in the outputs and thus considered to be appropriate.
- Equipment: the cost (in foreign currency) slightly increased as the contract amount exceeded the estimates made in the appraisal.
- Training: the cost decreased due to the shortening of the training period as mentioned above.

Table 6: Planned and actual project costs

Unit: million yen

	Plan (appraisal)			Actual		
	Foreign currency	Local currency	Total	Foreign currency	Local currency	Total
1. Building construction	0	2,385	2,385	0	2,628	2,628
2. Equipment	4,179	515	4,694	4,180	439	4,619
3. Training	197	0	197	100	0	100
4. Price contingency	67	5	72	0	0	0
6. Physical contingency	222	145	367	0	0	0
Total	4,665	3,050	7,715	4,280	3,067	7,347

Sources: JICA appraisal documents; project completion report; responses to the questionnaire
 Note: The exchange rates applied were: (planned) 1 yuan=15 yen; (actual) 1 yuan=14.17 yen.

3.4.2.2 Project Period

As shown in Table 7, the actual project period was 91 months, which was significantly longer than the planned 36 months (ratio against the plan: 253%) due to the following reasons:

- Building construction: although both tender and construction was progressing smoothly, the project activities were suspended during the period from April to September 2003 to avoid the spread of SARS, which caused a delay.
- Equipment: the process was significantly delayed mainly because it took time for adjustments made on the list of equipment to be purchased and the finalization of specifications, and some contract negotiations failed due to factors such as price increase.
- Training: the process was significantly delayed due to difficulties in selecting and contacting host universities as well as SARS.

Table 7: Planned and actual project periods

	Plan (appraisal)	Actual
Signing on Loan Agreement	March 2002	March 2002
Building construction	September 2003	July 2004
Procurement of equipment	December 2004	September 2009
Training	March 2005	December 2008
Project completion (lengths of months)	March 2005 (36 months)	September 2009 (91 months)

Sources: JICA appraisal documents; project completion report; responses to the questionnaire

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Due to the nature of the project, a quantitative analysis of the internal rate of return was not possible.

Although the project cost was within the plan, the project period exceeded the planned period, and therefore efficiency of the project is evaluated to be fair.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

As planned during the ex-ante evaluation, the facilities and equipment developed under this project are operated and maintained by each targeted university, and the Education Bureau of Gansu Province, the executing agency, oversees them. All targeted universities added the developed facilities and the equipment to the universities' fixed assets, and established the operation and maintenance system with clearly defined responsibilities and procedures through establishing regulations such as the procedures for maintenance of large equipment and fund management, work regulations on experiment teaching, the procedures for fixed asset management, etc. There are no issues recognized with respect to the number of staff in charge of operation and maintenance.

3.5.2 Technical Aspects of Operation and Maintenance

No problem was observed in the technical aspects as all targeted universities regularly carry out maintenance and inspection of the facilities and equipment, and outsource repair works to contractors such as suppliers when necessary. To secure the skills necessary to operate and maintain large or sensitive laboratory equipment, the universities appoint full-time technical staff for each instrument or laboratory to manage the equipment in an integrated manner. Also, some universities such as GCTCM send laboratory staff to training in operation and maintenance in order to maintain the necessary skills level.

3.5.3 Financial Aspects of Operation and Maintenance

The targeted universities are all overseen by the government of Gansu Province except

Lanzhou University (that merged Lanzhou Medical School, a targeted school of this project) that is under the Ministry of Education. Their budgets consist of subsidies from the state or province and own income such as tuitions and fees. The provincial budget is generally in an increasing trend, and expenditures to the education sectors are also increasing (Table 8).

In all targeted universities, cost for operation and maintenance of the facilities and equipment is part of the university budget and managed under standardized procedures. Normally, certain amount of the operation and maintenance budget is allocated from such expense items as operating expenses. Also, laboratories spend part of the laboratory operating expenses, research fund and income from social services (e.g. consulting services) for routine maintenance of equipment. Revenues are constantly increasing in all targeted universities, and operation and maintenance expenses are stable (Table 9)¹⁹. In the interviews for the ex-post evaluation, both management and laboratory-level staff of all targeted universities said that the necessary amounts of operation and maintenance cost were secured.

Table 8: Budget of Gansu Province

	Unit: billion yuan		
	2009	2010	2011
Fiscal revenue	60.40	74.52	93.36
Fiscal expenditures	124.63	146.86	179.11
of which, total expenditures in education	20.64	22.82	28.43
Higher education	N.A.	N.A.	6.09
Higher education expenditure per student (yuan)	N.A.	N.A.	15,026

Source: Gansu Province Statistical Yearbook 2011
 Note: The revenue only includes provincial fiscal revenue. Deficits are compensated by the central government.

Table 9: Operation and maintenance expenditures related to this project

	Unit: thousand yuan		
	2009	2010	2011
LUT	97	110	121
LZJTU	87	87	87
NWNU	N.A.	N.A.	N.A.
LUFE	88	88	88
LZU	57	98	118
GAU	18	21	22
GCTCM	14.5	17.3	19.6
TSNC	19	18	18

Sources: Responses to the questionnaire; "The Supervision Survey Report on JICA Loaned Higher Education Project", 2010

3.5.4 Current Status of Operation and Maintenance

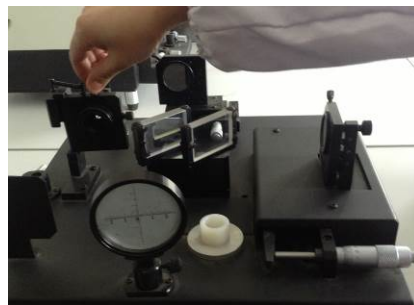
In all targeted universities, the equipment developed by this project are registered in the maintenance and management database. Based on observation and review of usage or inspection records, it was confirmed that the equipment were mostly in good condition. A user of equipment must record the usage as well as the conditions of the equipment every time they use it.

Most of the laboratories which were visited had posted the operational procedures and maintenance plan for each instrument on the wall or in a place easily seen by users, and such procedures seem to be well followed. Also, it was observed that for sensitive equipment, the

¹⁹ The evaluator confirmed, through the data provided through the questionnaire, that the revenues and expenditures of each university were at surplus or balanced in recent years.

environment of the laboratories was managed by recording room temperature and humidity.

In all universities, breakdowns and other troubles are handled either by repairing by themselves or by outsourcing (sending the equipment to manufacturers or having repair persons visit the laboratory). It was also reported that there were no major problems in purchasing and keeping stock of consumables. Spare parts of some equipment are no longer produced, but teachers and students devise ways to utilize it.



A microwave interferometer. Spare parts are not produced anymore, but teachers and students devise ways to utilize the instrument (LZJTU)

No major problems were observed in the operation and maintenance system, and therefore sustainability of the project effect is evaluated to be high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed to improve teaching and research at eight major universities in Gansu Province through the development of their facilities and equipment as well as providing training for teachers. Relevance of the project was evaluated to be high, as it was in line with (i) the higher education policies of China and Gansu Province, (ii) development needs for quantitative and qualitative enhancement of the universities, and (iii) Japan's assistance policies. Effectiveness/impact was also high, based on the observations that the project satisfied such needs, improved education activities by enabling more experiments, and improved research activities through outcomes achieved from advanced equipment and training, and thereby contributed to the promotion of the key industries as well as production of teachers for rural areas. Efficiency of the project was evaluated to be fair on the whole: although the project cost was within the plan, the project period significantly exceeded the planned period due to delays in the determination of training host universities in Japan, delays in procurement of some equipment, as well as external factors such as SARS. Sustainability was evaluated to be high, with no problem observed in institutional, technical and financial aspects, and due to the good status of operation and maintenance of the facilities and equipment developed by the project.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

The targeted universities are recommended to continue the proper use of the facilities and equipment developed under this project in teaching and research, as well as to extend the

knowledge that has been gained from exchanges with Japan.

4.2.2 Recommendations to JICA

To take advantage of the relationship that have been cultivated through this project, it could be effective to update the Higher Education Projects website even with respect to the completed projects as much as possible (e.g. reports on exchange after the project completion), so that it would serve as a focal point for continuing and expanded exchange for universities in China and Japan.

4.3 Lessons Learned

(1) Effectiveness of the training component

In the area of assistance in higher education, in addition to assistance in hardware, it is effective to provide software-type assistance (such as teachers' training) in a way that is responsive to existing needs. Past higher education assistance projects have proven effectiveness in training on individual fields of teaching and research, and this was also confirmed in this project. In addition, university management courses such as the ones implemented under this project could be effective even in short training periods, if participants are selected who are candidates for executive positions and have potential to extend the outcomes and based on careful planning by the host universities as was the case in this project.

(2) Indicator setting for evaluation

In this project, as well as in other Higher Education Projects in China by Japanese ODA loans, although it was targeted to a limited number of universities (and particular facilities/equipment and teachers of those universities), many effectiveness indicators were ones which measure provincial-level situations (such as aggregated education indicators of the province) or indicators which measure aspects beyond the direct benefits of the project. This ex-post evaluation used those indicators to evaluate Impact. In order to measure the net effect of the project, the ex-ante evaluation should distinguish indicators that measure direct outcomes and indicators that do not measure.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	Target: 8 universities in Gansu Province	Target: same as planned
(a) Hardware		
i) Building construction	7 buildings such as research building; total floor area of 113,220 m ²	7 buildings; total floor area of 121,242 m ²
ii) Procurement of educational equipment	Physics, chemistry, biology, architecture, pharmaceuticals, multimedia, PCs, etc.	Areas of education: same as planned Total 10,576 items
(b) Software		
Teachers' training in Japan or acceptance of experts from Japan	Total 176 persons (including 5 experts from Japan)	Total 114 persons from 42 Japanese universities or institutions (experts from Japan: none)
2. Project Period	March 2002 – March 2005 (36 months)	March 2002 to September 2009 (91 months)
3. Project Cost		
Amount paid in Foreign currency	4,665 million yen	4,380 million yen
Amount paid in Local currency	3,050 million yen (203 million yuan)	3,067 million yen (216 million yuan)
Total	7,715 million yen	7,347 million yen
Japanese ODA loan portion	4,665 million yen	4,380 million yen
Exchange rate	1 yuan = 15 yen (As of September 2001)	1 yuan = 14.17 yen (Average between 2003 and 2009)

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan

Sichuan Higher Education Project

External Evaluator: Takako Haraguchi, International Development Associates

0. Summary

This project aimed to improve teaching and research at eight major universities in Sichuan Province through the development of their facilities and equipment as well as providing training for teachers. Relevance of the project was evaluated to be high, as it was in line with (i) the higher education policies of China and Sichuan Province, (ii) development needs for quantitative and qualitative enhancement of the universities, and (iii) Japan's assistance policies. Effectiveness/impact of the project was also high, based on the observations that the project satisfied such needs, improved education activities by enabling more experiments, and improved research activities through outcomes achieved from advanced equipment and training, and thereby contributed to the promotion of the key industries as well as production of teachers for rural areas. Efficiency of the project was evaluated to be fair on the whole: although the project cost was within the plan, the project period significantly exceeded the planned period due to delays in the determination of training host universities in Japan, delays in production of some equipment, as well as external factors such as severe acute respiratory syndrome (SARS) and the Great Sichuan Earthquake. Sustainability was evaluated to be high, with no problem observed in institutional, technical and financial aspects, and due to the good status of operation and maintenance of the facilities and equipment developed by the project.

In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Location



Research Building, Chengdu University of Traditional Chinese Medicine

1.1 Background¹

In China, together with the remarkable economic development, several development issues have arisen such as narrowing internal disparity between coastal and inland areas, reducing poverty, preparing for joining in the World Trade Organization (WTO) and handling global issues. To deal with these issues, the Chinese government put high priority on development of human resources that are essential for the accelerated efforts towards developing a market economy and narrowing economic gaps under the policy to strengthen reform and promote openness. Accordingly, the government set out a target to increase the higher education enrollment ratio to 15% as well as adopting a policy to strengthen higher education institutions (HEIs) in inland areas.

Sichuan Province (total population of 86,020,000 persons in 2000; total area of approx. 485,000 km²) achieved high economic growth with an average annual gross domestic product (GDP) increase rate of 8.8% in the years 1996-2000. However, per capita GDP (4,784 yuan in 2000) still remained at 68% of the national average (7,078 yuan). Aiming towards promotion of a market economy and further economic development, the provincial government planned to increase the number of students in higher education to around 840,000 persons and the enrollment ratio to 15.5% by 2005. However, in order to achieve such targets, existing constraints in the “hardware” aspects (such as school facilities and equipment), “software” aspects (teachers) as well as financial aspects had to be addressed.

1.2 Project Outline

The objective of this project was to quantitatively and qualitatively enhance higher education at eight major universities in Sichuan Province (Southwest University of Science and Technology (SWUST), Sichuan Agricultural University (SAU), Chengdu University of Technology (CDUT), Southwest Petroleum University (SWPU), Sichuan Normal University (SNU), Xihua University, Chengdu University of Information Technology (CUIT), Chengdu University of Traditional Chinese Medicine (CDUTCM))² by developing educational infrastructures such as buildings and equipment (improvement of the hardware aspects) and teachers’ training (strengthening of the software aspects), thereby contributing to the market-oriented economic reform in Sichuan Province and reduction of disparity with coastal areas³.

¹ This project is one of the Higher Education Projects funded by Japanese ODA loans targeted to universities in 22 provinces, municipalities or autonomous regions in inland China.

² The names of the universities are those as of today. The following universities had different names at the time of the ex-ante evaluation of this project:

- Southwest Petroleum University: formerly known as Southwest Petroleum Institute (renamed in 2000).
- Xihua University: formerly known as Sichuan University of Information Technology (merged with Chengdu Teachers' College and renamed in 2003).

³ At the time of the ex-ante evaluation, the direct targeted outcome of the project was “to improve quantitatively and qualitatively higher education in Sichuan Province”, and the indirect targeted? outcome (impact) was “to contribute

Loan Approved Amount/ Disbursed Amount	6,131 million yen / 5,911 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2002 / March 2002
Terms and Conditions	Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: Bilateral tied
Borrower / Executing Agency	The government of People's Republic of China / Sichuan Provincial People's Government (Education Bureau)
Final Disbursement Date	July 2009
Main Contractor (Over 1 billion yen)	None
Main Consultant (Over 100 million yen)	None
Feasibility Studies, etc.	<ul style="list-style-type: none"> - "Feasibility Research Report Central and Western China Talent Training Project", Sichuan International Engineering Consulting Corp, 2001. - "Special Assistance for Project Implementation (SAPI) for Higher Education Project in China", Japan International Cooperation Agency (JICA), 2003, 2004 and 2005. - "The Supervision Survey Report on JICA Loaned Higher Education Project", JICA, 2010.

2. Outline of the Evaluation Study

2.1 External Evaluator

Takako Haraguchi (International Development Associates Ltd.)

2.2 Duration of Evaluation Study

Duration of the Study: August 2012 – September 2013

Duration of the Field Study: March 17 – April 10, 2013 and May 26 – June 3, 2013⁴

to the market-oriented economic reform *in China* and reduction of disparity". However, since the targeted universities were only part of the HEIs in the province, the target area was lowered by one level for this ex-post evaluation.

⁴ The field study period includes the periods for ex-post evaluation of the Chongqing Higher Education Project and the Gansu Higher Education Project.

3. Results of the Evaluation (Overall Rating: A⁵)

3.1 Relevance (Rating: ③⁶)

3.1.1 Relevance to the Development Plan of China

The objective of this project is consistent with the five-year plans for economic and social development and the five-year plans for the education sector at both the national and provincial levels, as well as other education-related development strategies and the Western Development Project, which all aim at quantitative and qualitative development of higher education both at the times of ex-ante and ex-post evaluations of this project (Table 1).

Table 1: Main objectives of development plans related to this project

	At the time of ex-ante evaluation	At the time of ex-post evaluation
National level development plan	<u>The 10th 5-year Plan for National Economic and Social Development (2001–2005):</u> To increase higher education enrollment ratio to around 15% by 2005.	<u>The 12th 5-year Plan for National Economic and Social Development (2011–2015):</u> To emphasize higher education for promoting industrial advances (quantitative targets include 87% of junior secondary graduates to go on to senior secondary school)
National level education sector plan	<u>The 10th National 5-year Plan for Education (2001–2005):</u> To increase student enrollment in HEIs to 16,000,000 by 2005; to develop human resources that have high skills in high technology, biotechnologies, manufacturing technologies etc. that are necessary for industrial structural adjustment; to strengthen support to HEIs that are relatively at a high level; to strengthen support to fostering of teachers.	<u>The 12th National 5-year Plan for Education (2011–2015) and National Mid- and Long-term Reform and Development Plan for Education Sector” (2010–2020):</u> To increase higher education enrollment ratio from 26.5% in 2010 to 40% in 2020; to increase student enrollment in HEIs to 33,500,000 by 2015; to develop HEIs in inland areas with special focus on development of departments that are competitive and fostering of teachers.
Provincial level development plan	<u>The 10th 5-year Plan for Economic and Social Development in Sichuan Province (2001–2005):</u> To achieve annual economic growth rate of 8% by 2005; develop the key industries including electronic information, hydropower generation, mechanical metallurgy, pharmaceutical chemicals, beverage and food.	<u>The 12th 5-year Plan for Economic and Social Development in Sichuan Province (2011–2015):</u> To achieve annual economic growth rate of 12% by 2015; to develop the key industries including equipment manufacturing, electronic information, aerospace, Chinese medicine and biomedical.
Provincial level education sector plan	<u>The 10th 5-year Plan for Education in Sichuan Province (2001–2015):</u> To increase higher education enrollment ratio from 10.7% in 2000 to 15.5% in 2005; to increase student enrollment in HEIs to around 840,000 (including around 530,000 in regular HEIs ⁷)	<u>The 12th 5-year Plan for Education in Sichuan Province (2011–2015):</u> To increase higher education enrollment ratio from 25% in 2010 to 32.7% in 2015; to increase student enrollment in HEIs from 1,670,000 to 1,960,000 (from 1,590,000 to 1,650,000 in regular HEIs)

Source: JICA appraisal documents; respective documents of the mentioned development plans.

⁵ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁶ ③: High, ②: Fair, ①: Low

⁷ Regular (or standard) HEIs is a term referring to universities and colleges, including undergraduate programs of comprehensive universities and single-department colleges, specialized colleges (similar to junior colleges in Japan), and graduate programs. Adult higher education and higher vocational education institutions are not included. In this report, “universities” include both universities and colleges that grant undergraduate or higher academic degrees unless otherwise mentioned.

While there were no large policy changes between the ex-ante and ex-post stages, in recent years more importance has been given to higher education development. Also, the key industries of Sichuan Province have shifted to those that require higher technologies.

3.1.2 Relevance to the Development Needs of China

Development needs were observed for the quantitative and qualitative enhancement of education at the eight targeted universities at the times of both the ex-ante and ex-post evaluations.

At the time of the ex-ante evaluation, there was a need for quantitative expansion of higher education in order to narrow the economic gap mentioned in “1.1 Background” and following the increase of primary and secondary education in Sichuan Province (school intake rates in 2000 were 99.1% for primary education and 85.0% for secondary education). It was forecasted that the number of new entrants in HEIs would increase from 170,000 in 2000 to 250,000 in 2005. There were 43 regular HEIs in Sichuan Province, among which the eight targeted universities were the leading provincial universities⁸. They were expected to further expand their roles of producing human resources for the above-mentioned key industrial sectors and teachers for rural areas, but financial resources for developing the hardware (facilities and equipment) and software (teachers’ training) aspects were limited. Also, there were few opportunities provided for the teachers to visit overseas.

At the time of the ex-post evaluation, although economic growth remained high at an annual average of 11.8% for the years 2000-2011, the need for narrowing the economic gap still exists in Sichuan Province: provincial per capita GDP is 26,133 yuan in 2011, which is 66% of the national average 39,442 yuan. The number of new entrants to HEIs in the province continued to increase from 270,000 in 2005 to 350,000 in 2011, and the need for quantitative and qualitative enhancement of HEIs remains high. On the other hand, the need for hardware development seemed to have been more satisfied compared to the time of the ex-ante evaluation, due to increased financial injection to provincial universities following the above-mentioned higher education development policies. The Education Bureau of Sichuan Province, the executing agency of this project, now puts more emphasis on the need to develop the software aspects such as improving the quality of teachers.

⁸ National and public universities in China are under the jurisdiction of the state (Ministry of Education or other state government organizations) or local (sub-national) governments. In Sichuan Province, while the eight universities targeted by this project are all provincial (i.e. under the jurisdiction of the province), there are four universities that are under the jurisdiction of the state: Sichuan University, Southwest Jiaotong (traffic) University, University of Electronic Science and Technology of China, and Southwestern University of Finance and Economics, all overseen by the Ministry of Education. These four universities are listed in the “Project 211” (1996-), a national project to intensively support approx. 100 key universities to enhance their research capabilities by the 21st century. Among the target universities of this project, Sichuan Agricultural University is listed in the Project 211.

3.1.3 Relevance to Japan's ODA Policy

At the time of the ex-ante evaluation, Japan's Official Development Assistance (ODA) Charter (1992) placed emphasis on Asian regional support and human resources development support. Additionally, the Country Assistance Policy for China and the Medium-term Strategy for Overseas Economic Cooperation Operations and Country Assistance Strategy put priorities on human resources development from the viewpoint of support for openness and reform and post-WTO economic reform, and on assistance in the mid-western region in China from the aspect of narrowing the economic gap. The project objective was consistent with such aid policies of Japan.

This project has been highly relevant to China's development plans, development needs as well as Japan's ODA policies, and therefore its relevance is evaluated to be high.

3.2 Effectiveness⁹ (Rating: ③)

The objective of the project, "quantitative and qualitative enhancement of higher education of the targeted universities", has been achieved based on the performance of quantitative indicators as well as qualitative information that are presented in the following sections.

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Quantitative expansion of teaching and research¹⁰

The number of students is increasing in all targeted universities. The hardware outputs of this project increased the aggregate floor area of school buildings and the monetary value of educational equipment. With respect to the aggregate floor area of school buildings, the ex-ante evaluation set out the target values for individual universities, and those were mostly achieved (Table 2 and Figure 1). The utilization rates of the facilities and equipment developed by this project are high at 90-100% (for facilities) and 80-100% (for equipment)¹¹ at all universities.

⁹ Sub-rating for Effectiveness was given with consideration of Impact.

¹⁰ In the ex-ante evaluation, the target year for evaluating the quantitative indicators was set at 2005, which was after the planned project completion date. However, due to the delays in project implementation (see "3.3 Efficiency"), the ex-post evaluation set the actual comparison year at 2009, which was a year after the actual completion of major parts of each project component, and it analyzed the actual achievement in that year using the targets that were supposed to be achieved in 2005. When data for 2009 were not available, the comparison was made between 2005 and 2011. To show the situation at the time of ex-post evaluation, the data of 2011 were mainly used. While the field study was conducted from 2012 to 2013, the data for 2011 are considered to be the latest reliable data that have been checked and compiled.

¹¹ The utilization rates are based on responses to questionnaires provided by each targeted university. The definition of utilization rates at the time of ex-ante evaluation was "actual usage hours divided by planned usage hours". However, according to target universities, it was impossible to actually calculate the rates in such manner, because planned usage hours varied depending on the types of equipment. Therefore, the figures provided represent "the number of equipment that is currently used (i.e. in operation) divided by the total number of equipment procured". Also, some universities said that they could not provide any numerical answers, but could only comment that utilization was "high". Yet, the results of the visits to each university, observation of the facilities/equipment, and review of some usage records are consistent with the figures provided, and thus imply that the questionnaire responses more or less reflect the actual usage of the outputs of the project.

Therefore, it can be said that the project well responded to the needs for quantitative expansion of higher education (i.e. constant increase in the number of students).

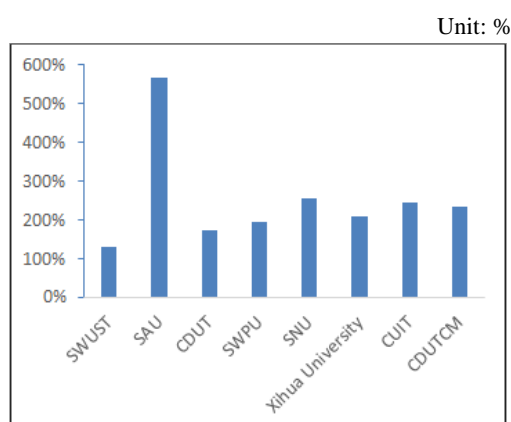
The facilities and equipment related outputs of this project accounted for on average only 5% of the total facilities (in terms of floor area) and 2% of the total educational equipment (in terms of monetary value) of the targeted universities as of 2009 after project completion. Nevertheless, they played an important role of establishing a foundation on which later development works by the Chinese side took place. More specifically, (i) the project took a strategy to concentrate its resources to the development of key teaching/research areas that required to be strengthened, and (ii) the facilities and equipment developed under this project were highly valued and therefore became the decisive factor in determining the areas that were worth investing in further, which brought in other development funds. In particular around 2002 when it was difficult for the targeted universities to make large scale facility investments on their own, the effective role played by this project was larger than the actual percentages indicate.

Table 2: School building area

Unit: m²

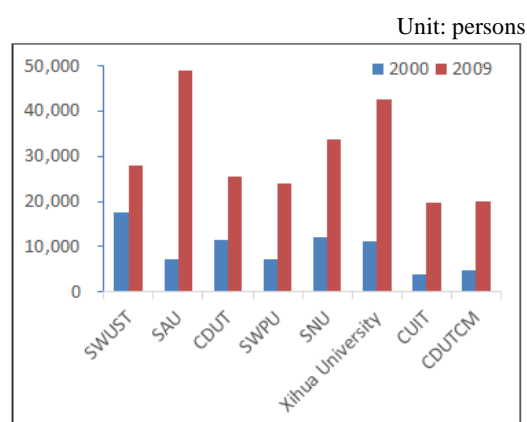
	Actual value 2000	Planned value		Actual value		Actual value 2011
		2005	Portion under this project	2009	Portion under this project	
SWUST	319,508	1,103,608	25,000	973,490	26,152	1,119,226
SAU	253,477	447,477	30,314	695,420	31,155	1,092,842
CDUT	396,716	662,640	35,000	872,128	40,112	799,365
SWPU	205,074	478,874	48,500	903,762	56,500	922,005
SNU	370,000	850,000	20,000	1,113,775	36,353	953,828
Xihua University	292,380	592,380	30,000	937,816	46,300	967,748
CUIT	125,722	480,000	28,000	514,280	41,015	620,165
CDUTCM	172,768	290,000	16,000	538,975	17,401	545,847
Total	2,135,645	4,904,979	232,814	6,549,646	294,988	7,023,037

Sources: JICA appraisal documents; responses to the questionnaire.



Source: responses to the questionnaire

Figure 1: Increase rates of monetary values of educational equipment, 2005-2009



Sources: JICA appraisal documents; responses to the questionnaire

Figure 2: Number of students

(2) Qualitative enhancement

As shown in Table 3, the average school building area per student was slightly below, but more or less achieved, the target set in the ex-ante evaluation and the national standard, implying that the increase in students would not have adversely affected the conditions (quality) of teaching and research. The executing agency and the targeted universities explained the reason for such generally lower level of achievement than expected, stating that it took some time until a constructed building was registered as the university's capital asset. Monetary value of educational equipment per student satisfied the national standard in all targeted universities.

Table 3: School building area per student and monetary value of educational equipment per student

Units: m² or yuan

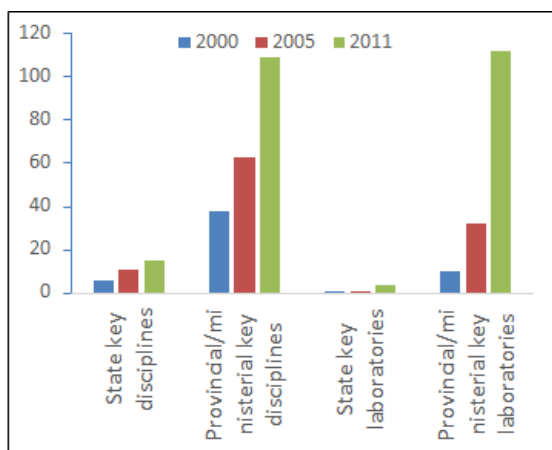
	School building area per student (m ²)					Value of educational equipment per student (yuan)		
	Actual 2000	Planned 2005		Actual 2009		Actual 2011	Actual 2005	Actual 2011
		Area per student	Increment through this project	Area per student	Increment through this project			
SWUST	18	32	0.71	35	0.94	40	7,376	12,219
SAU	34	31	2.11	22	0.99	30	6,313	10,605
CDUT	34	30	1.59	32	1.47	25	6,575	9,783
SWPU	29	30	2.99	37	2.31	33	8,530	11,273
SNU	31	29	0.68	25	0.82	22	2,285	5,103
Xihua University	26	24	1.21	22	1.09	21	3,291	4,044
CUIT	33	30	1.75	26	2.07	31	4,584	9,060
CDUTCM	35	23	1.29	25	0.81	25	6,057	8,946
Average	30	29	1.54	28	1.31	28	5,626	8,879

Sources: JICA appraisal documents; responses to the questionnaire.

Note: the national standard of school building area per student is "more than 30m²"; the national standard for value of educational equipment per student is "more than 5,000 yuan" for laboratory equipment in faculties of science and technology such as science, engineering, agriculture and medicine, "more than 3,000 yuan" for humanity and social science faculties, and "more than 4,000 yuan" for physical education and art faculties (Interim Provisions for Establishment of Regular Undergraduate Schools, No.18 [2006]).

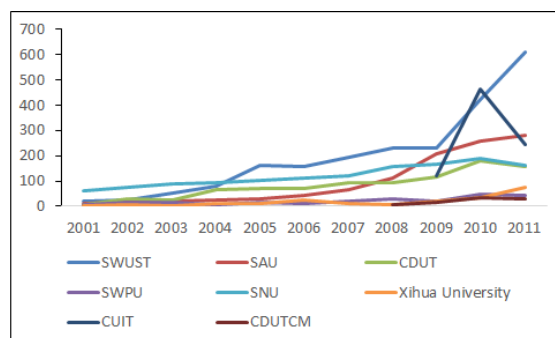
Various indicators to measure the achievements of progress in the areas of teaching and research, such as the number of key disciplines and key laboratories (which the state or a local government designates as a base for teaching or research activities and preferentially distributes resources), the number of faculties/departments and graduate programs, the number of research projects and social (community) services projects, the number of published research papers, the number of awards, the number of patents granted, etc., showed increasing trends. Although such improvements are the outcome of the overall higher education development policies mentioned in "3.1 Relevance", part of it is attributable to the outcome of this project through utilization of the facilities/equipment developed under the project and/or involvement of teachers who received training in Japan in teaching/research activities under this project. In particular, the

number of provincial or ministerial key laboratories and research papers published in international journals significantly increased comparing before and after the implementation period of this project (Figures 3 and 4), and it was observed in many targeted universities that new key laboratories were approved mainly based on facilities/equipment developed under this project, and that the training/research in Japan promoted the participating teachers to start publishing articles in international journals. Individual cases of direct outcome of this project are described in “3.2.2 Qualitative effects”.



Sources: JICA appraisal documents; responses to the questionnaire

Figure 3: Total number of key disciplines and key laboratories of the 8 targeted universities



Source: responses to the questionnaire
Note: the figures represent the total numbers of research papers included in SCI (Science Citation Index), EI (Engineering Index) and ISTP (Index to Scientific & Technical Proceedings) databases.

Figure 4: Total number of internationally-published research papers by each of the 8 targeted universities

3.2.2 Qualitative Effects¹²

(1) Effects on enhancement of teaching and research at each targeted university

The visits to and the observation at the targeted universities confirmed the following outcomes of the project: the facilities and equipment developed under this project have enhanced the comprehensive skill capacity of students by enabling the provision of practical classes and more experiments, and have promoted research activities that often have a distinctive character of the region. Also, the training in Japan (in the respective fields of teaching/research and in university management) has helped participating teachers have broader

¹² In this ex-post evaluation, it was difficult to exclude effects of activities that were not under this project from the planned quantitative indicators. Therefore, while taking the trends of the indicators into consideration, qualitative information (collected by document review, questionnaires and interviews) was used to understand how specifically this project is related to such trends. The evaluator conducted individual or group interviews in a semi-structured manner with the Education Bureau of Sichuan Province (executing agency) and, at each targeted university, with persons in charge of the project implementation as well as ex-participants in teachers' training in Japan. In total, 88 persons from the 8 universities (including 26 ex-participants in teachers' training in Japan) were interviewed. With respect to interviews with universities in Japan that accepted teachers for training from the target universities, the evaluator visited 2 of them and contacted several more universities by telephone or e-mail.

views, find new research topics, deepen and improve the quality of research, and improve ways of university management. Notably, the training courses in university management were only 3 weeks long, but highly appreciated by most of the teachers interviewed for this ex-post evaluation: specific points that many of them mentioned include the smooth proceeding of the training programs based on careful preparation, diversified and specialized programs and contents, and the discussions held on the issues that China is also facing, such as how to cope with the declining birth rate and job shortage. For both specialized fields and university management training, many targeted universities sent candidates for executive positions, which contributed to university-wide expansion of the effects of training outcomes.

Table 4 below summarizes notable effects of the project on teaching and research at each targeted university.

Table 4: Qualitative effects on each targeted university

Southwest University of Science and Technology (SWUST)	SWUST had been producing human resources and research outputs to support high tech industry such as electronic information and mechanical engineering since before this project. Using both the building constructed and large laboratory equipment developed under this project, SWUST established a university-wide platform of teaching and research equipment (Center of Analysis and Testing) in 2006. As a result, use of the equipment became more frequent. Another building the project constructed, Student Science and Technology Center, is being used as a unique place to promote students' research and innovation, which has led to good results in student contests such as electronic design or robot. The Student Science and Technology Center was designated as an experimental model teaching center at the provincial level in 2007 and at the state level in 2008.
Sichuan Agricultural University (SAU)	SAU had been listed in the "Project 211" ¹³ , and its level of teaching and research level had been relatively high from even before this project. Since the Comprehensive Teaching and Experimenting Building was constructed under this project, teaching and research have been further enhanced, as shown in the winning of the second prize of the State Science and Technology Advancement Award ¹⁴ several times and the upgrading of some disciplines such as horticulture to the first level state key disciplines. Also, based on the connections with Japanese universities that started from the teachers' training under this project, some students have begun to study in doctoral programs in Japan. Joint research efforts with universities in Japan in fields such as rice quality management were strengthened.
Chengdu University of Technology (CDUT)	CDUT has had a comparative advantage in the field of geology from before the project, and its level has been further enhanced through the development of equipment under this project. For example, a scanning electron microscope (SEM) procured under the project enabled the Laboratory of Geology to analyze the micro structure of rocks, landslides, etc., which encouraged the designation of the laboratory as a state key laboratory in 2007. Also, the SEM course opened in 2012. As to the training component, for example, a faculty member of the College of Tourism and Urban-rural Planning ¹⁵ used what she had studied about hot springs in Japan to start research on hot springs in Sichuan Province after her return to CDUT. She published a book on hot springs development, and gave lectures in another JICA project ¹⁶ about the subject matter. Some research results have already been put into practical use. They include soil analysis and conservation of ecosystems of slope land on highways or in the Three Gauges Dam area, software development, etc.

¹³ See footnote 8 of the "Project 211".

¹⁴ The State Science and Technology Advancement Award is one of the science and technology awards granted at the national level. In 2012, for example, a total of 212 prizes including grand, first and second prizes were awarded in the whole country. The number of second prizes was 187.

¹⁵ "College" or "School" of universities in China is similar to "Faculty" in universities in Japan.

¹⁶ Revitalization Project Based on the Promotion of Tourism Industry Using Sichuan Province's Hot Spring Resources (grassroots technical cooperation project, 2010-2013).

Southwest Petroleum University (SWPU)	SWPU had been active in research related to development of petroleum and other natural resources. Unlike other targeted universities that mainly procured advanced laboratory equipment, SWPU procured basic teaching equipment such as computers and language laboratory (LL) classrooms. As a result, the need of the whole university for such basic equipment was satisfied, as it had moved to within the city of Chengdu and opened a new campus. Regarding the training in Japan, a faculty member of the School of Mechanical and Electric Engineering learned about a three-dimensional computer aided design (3D CAD) software in Japan, and after his return developed a new drilling bit for oil wells, which won prizes and was patented and put into practical use. In the area of educational management, the same teacher introduced the seminar-style teaching method that he learned in Japan. Also, the head of the personnel department, based on what he learned in the university management course, started to provide support of career design for teachers by promoting teachers' training overseas and establishing a "center for capacity development of teaching staff".
Sichuan Normal University (SNU)	SNU is a comprehensive university mainly for producing teachers. This project developed facilities and equipment of the Physics Education Laboratory, which was open to students and enhanced their practical capacity. As a result, more students have come to apply for national level student contests in electronics, etc. and have won prizes. Also, the construction of the music building that has piano rooms, a performing theater and an auditorium, together with the procurement of equipment including 60 pianos, have contributed to students' creativity. Regarding the training outcome, a faculty member of the College of Clothing who learned pottery in Japan established the pottery course after she came back to SNU. At the same time, the project procured equipment for teaching pottery, which is a good example of coordination of the hardware and software components.
Xihua University	This project developed educational facilities and equipment related to the fields of mechanical engineering and electrical engineering. At the School of Mechanical Engineering and Automation, the procurement of equipment such as a modular production and processing (manufacturing) system enabled classes to conduct experiments that had not been possible before the project. In another case, a faculty member of the School of Electrical and Information Engineering has continued joint research on topics which she started with the university in Japan which she attended under this project, such as biological monitoring and health surveillance and diagnosis of cardiac diseases. This collaborative relationship has developed into a joint application for an international patent, introduction of a double degree programs, and also led to her and her counterpart teacher in Japan obtaining positions at both universities. The host university in Japan commented on such relationship, stating that it had selected its partner among universities in inland China based on future prospects in human resource development for manufacturing, together with strategic consideration given to advantages on the Japanese side (i.e. securement of graduate students to study in Japan).
Chengdu University of Information Technology (CUIT)	<p>Formerly known as Chengdu Meteorology College, CUIT had been advanced in the field of meteorology from before this project. The mainframe computer procured under this project was used for numerical model computation for meteorological forecasts until recently (by the time of this ex-post evaluation, a more powerful computer was additionally purchased for research, and the one procured under this project is used mainly for teaching purposes). As a result of the development of experimental equipment for teaching such as laser equipment, the ratio of classes with experiments increased to 90%. Also, a vice president who attended the university management training course in Japan still keeps and refers to the training materials distributed during the course in developing a student-centered campus such as flexible classroom layouts and a full open shelf library. The library is known as one of the best libraries in the southwestern area, with more than 640,000 visitors in total and 360,000 titles of books used in 2012.</p> <p>In addition, there are many cases of joint research projects with the government or companies and practical realization of research results using the equipment procured under this project and/or by the teachers who participated in the training program in Japan. For example, a meteorological radar signal processing system is already widely used by the China Meteorological Administration. Other cases include development and practical use of an information system and flue-gas desulfurization techniques.</p>
Chengdu University of Traditional Chinese Medicine (CDUTCM)	CDUTCM had been a leading university in the area of modernization of traditional Chinese medicine in Sichuan Province, China's largest producer of medicinal herbs. The Research Building and laboratory equipment such as various types of microscopes and analytical apparatuses developed under this project are all frequently used, contributing to the upgrading of education. A faculty member who participated in the training at a leading virus research institution in Japan used the experience of advanced virus research and equipment management for establishment of the first traditional Chinese medicine antiviral laboratory in China. Also, there are many cases of development of Chinese medicine jointly by CDUTCM and pharmaceutical manufacturers in China and Japan which made use of the equipment procured under this project and/or by the teachers who participated in the training in Japan.

Sources: JICA, "The Supervision Survey Report on JICA Loaned Higher Education Project", 2010; responses to the questionnaire and interviews; websites; etc.



LL classroom. The university procured basic teaching equipment for its new campus. The condition of the equipment including personal computers (PCs) is still good (SWPU).



Graduate students using an atomic absorption- photometer (School of Biological Engineering, Xihua University).



Liquid chromatograph mass spectrometer that became one of the main equipment of the state key laboratory (Institute of Animal Nutrition, SAU).

(2) Use of the procured equipment

By the time of the ex-post evaluation, nearly seven years had passed since the majority of the equipment procured under this project was installed. Therefore, some PCs and monitors have passed their useful lives and have already been disposed of in accordance with the university regulations. However, it was confirmed from the visits to and interviews with the targeted universities that most of the other major teaching/research equipment was still used in good conditions and effective at the time of the ex-post evaluation. Underlying factors for such good status of the equipment may include: (i) the project selected the equipment that would be advanced and at the same time useful for a long time, and for that purpose an expert in equipment from Sichuan Agricultural University joined the project implementation team as the deputy leader of equipment and led the selection process, and (ii) each targeted university has carefully used the equipment with proper maintenance (see “3.5 Sustainability” for details).

3.3 Impact

3.3.1 Intended Impacts

(1) Enhancement of teaching and research at the provincial level

Table 5 shows selected higher education indicators at the provincial level. Improvement is seen in the indicators for quantitative expansion such as the number of students and enrollment ratios, in which this project is partly involved through the expansion of the facilities and equipment at the 8 targeted universities.

On the other hand, school building area per student which represents qualitative improvement does not show an increasing trend in the province taken as a whole. Although the same indicator has improved at the targeted universities from below the provincial average before the project to above it after the project, its effects on improvement of the figures in the entire province, where there are 94 HEIs (including 31 universities), is limited. Nevertheless, given the fact that the targeted universities are all leading universities in Sichuan Province, the upgrading of teaching and research level at these universities as shown in Table 4 could be considered as the upgrading of teaching and research level of the entire province.

Table 5: Higher education indicators of Sichuan Province

	Actual 2000	Planned 2005	Actual 2005	Actual 2009	Actual 2011
Number of HEIs	86	94	72	92	94 (of which universities with undergraduate programs: 31)
Number of students enrolled in HEIs	235,470	840,000	775,436	1,035,934	1,139,316
Enrollment rate in HEIs	10.7%	15.5%		22% (national average: 24.2%)	27% (national average: 26.9%)
School building area per student (m ² /person)	32.3 (average of targeted universities: 28.0)	29.8	29.7 (2006)	25.4 (average of targeted universities: 28.0)	NA (average of targeted universities: 28.4)

Sources: JICA appraisal documents; JICA, "The Supervision Survey Report on JICA Loaned Higher Education Project", 2010; China Statistical Yearbook 2011; Educational Statistical Yearbook of China 2011; Sichuan Province Statistical Yearbook 2011

(2) Contribution to promotion of market-oriented economic reform, reduction of disparity, development of rural areas and reform of state-owned enterprises

The titled impacts were expected in the ex-ante evaluation. Although the information was limited to the results of the interviews with the executing agency and individual targeted universities and observations, they are considered to have been achieved to a certain extent through production of graduates in the key industries, promotion of research and development (R&D), fostering of teachers for rural areas, and training for laid-off workers.

1. Promotion of market-oriented economic reform: the number of graduates in the fields of accounting, law and financial management increased by between 100 and 500 persons in all targeted universities except CDUTCM (whose area of specialization is not very relevant to this subject). Two of them commented that the project contributed to promotion of a market economy through the enhanced capacities of those graduates.
2. Reduction of disparity: an increasing number of graduates from the targeted universities found jobs in Sichuan's key industries such as electronics, heavy machinery, engineering, food, pharmaceuticals, railways and power generation. In each targeted university, the job placement rate was around 80-90% in both 2005 (during project implementation) and 2011 (after project completion), generally showing an increasing trend. Five targeted universities said that this project contributed to a higher capacity of human resources in the key industries through the enhanced capacities of their graduates in research and operation of laboratory equipment as well as through broader views and knowledge of the teachers. Also, as mentioned above, it was observed in several targeted universities that

the research outcomes involving the outputs of this project were put into practical use in some key industries¹⁷.

3. Development of rural areas: in 2011, 58 out of the 727 graduates from SNU became teachers in rural areas. Also, a faculty member of CDUTCM who participated in the training in Japan is currently assigned as a vice governor of Mili Tibetan Autonomous County, Liangshan Yi Autonomous Prefecture in Sichuan Province, and working on poverty reduction through measures including introduction of growing of Chinese medicinal herbs. Although the direct relationship between this particular case and the project is not clear, the fact that the project selected such a qualified candidate for training in Japan and thereby helped him widen his views could be seen to have indirectly contributed to development of rural areas.
4. Support to reform of state-owned enterprises (addressing the issue of laid-off workers): three targeted universities use the facilities constructed under this project to train laid-off workers. The total number of laid-off workers trained at these three universities was 1,371 in 2005 and 1,616 in 2009.

3.3.2 Other Impacts

(1) Impacts on the natural environment

No negative impacts were observed. By the time of the ex-ante evaluation, all targeted universities had completed the necessary domestic procedures of environmental clearance with the environmental impact assessments (EIA) approved by the environmental protection department of Sichuan Province or the cities where the universities are located. Some noises, vibrations and dusts due to the building construction and foul water due to the use of the constructed facilities had been expected but to a small scale. All universities reported that during the construction phase they controlled the noises, etc. and thus kept the negative effects at a minimum. After project completion, the above-mentioned environmental protection departments conducted environmental monitoring for all universities. Both of the two targeted universities that provided information on the monitoring results reported that the parameters were within the standard.

(2) Land acquisition and resettlement

As planned in the ex-ante evaluation, there was no land acquisition and resettlement associated with this project.

¹⁷ As for the issue of disparity, however, it was stated in “3.1.2 Relevance to the Development Needs of China” that the gap in per capita GDP between Sichuan Province and the national average has not been narrowed due to the nation-wide economic development.

(3) Strengthening of exchanges and cooperation with universities in Japan

It was observed in several targeted universities that academic exchanges with universities in Japan have been enhanced through this project. In some cases such as that of SAU, joint research or teachers' visits that had existed before the project was reinforced, while in other cases as seen in the case of Xihua University the project created a relationship with a new partner university in Japan which later developed to various and active exchange.



CUIT planted cherry blossom trees and placed a monumental stone in memory of this project in the courtyard of the building constructed under the project (inscription: “(being separated only by) a narrow strip of water”)

Basically, it was each targeted university's responsibility to find host universities in Japan and arrange for the training by communicating with them individually. However, many universities could not find their partners in the initial stage of the project. To respond to such situation, JICA provided various support such as holding of workshops to promote exchange with participation by targeted universities of the Higher Education Projects and interested Japanese universities in 2004 and thereafter, opening of the Higher Education Projects website to share information among participants in the Projects from 22 provinces as well as Japanese universities, and setting up of the help desk by hiring consultants. The above-mentioned case of Xihua University was made possible as a result of these efforts. At the same time, Xihua University reported a different case where the host university did not have the particular field of study that it was interested in and therefore the training outcomes were not achieved as expected. These cases indicate the importance and difficulty of matching the fields of study.

The outcomes of individual cases of exchange are described in Table 4. Overall, almost all of the interviewed 26 ex-participants in the teachers' training under this project said that they had been strongly impressed by the elaborateness of teaching and research activities at universities in Japan and seriousness of the Japanese people, and had come to feel more familiar with Japan. Generally, western countries tend to be more preferred as the place to visit, but many teachers who participated in this project said that they talked about their research and life in Japan to their colleagues and students, who then had a better understanding of Japan. There was also a case where an ex-participant sent his students to doctorate programs in Japan.

This project has largely achieved its objectives, therefore its effectiveness is evaluated to be high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The actual production of the outputs is summarized in “Comparison of the Original and Actual Scope of the Project” on the final page of this report (the floor area of the buildings constructed for each university is in Table 2). The hardware outputs (facilities and equipment) were developed mostly as planned with some differences as follows:

- Building construction: floor area increased by 127% compared to the plan, mainly due to the increase in demand.
- Procurement of equipment: it is difficult to precisely compare the actually-procured equipment with the original plan prepared in the project appraisal stage, because detailed consideration and final selection took place after the commencement of the project. However, the colleges/disciplines to which equipment were installed and the major equipment items installed were mostly in accordance with the plan.



Student Science and Technology Center of SWUST. Located in Mianyang, the city closest to the center of the Great Sichuan Earthquake. All exterior walls fell off in the earthquake, however, they were promptly repaired.



A piano room at the Music College of SNU.

The Great Sichuan Earthquake on May 12, 2008 damaged some buildings that were completed or under construction with detached exterior walls and broken glasses. However, all those damages were promptly repaired using funds from the Chinese side, and did not cause any major problems.

As for the software outputs (i.e. training of teachers at the targeted universities in Japan or invitation of teachers from Japan), adjustments were made in the number of participants (especially accounting for a large increase of trainees for the university management course) and the lengths of stay to cope with the funding status and needs of each university. Accordingly, the actual number of participants were 268 persons compared to the planned 223 persons (120% of the plan), but the actual person months was 648 person months compared to the planned 1,009 person months (64% of the plan).

3.4.2 Project Inputs

3.4.2.1 Project Cost

As shown in the table below, the total project cost was 11,039 million yen (of which the Japanese ODA loan was 5,911 million yen), which was 127% of the plan. However, considering

the increase of the output, it can be said that the cost incurred was more or less as planned. The major reasons for the increase or decrease in each cost item are as follows:

- Building construction: the cost increased due to the increase of the floor area (output).
- Equipment: the cost increased as the contract amount exceeded the estimates made in the appraisal.
- Training: the cost decreased due to the shortening of the training period as mentioned above.

Although the training costs had been planned to be funded from the ODA loan, it was actually borne 100% by each targeted university. This was because the large scale of education and the urgent need for the quantitative expansion of the hardware urged the decision to use the ODA loan fund to fulfill the pressing needs for buildings and equipment.

Table 6: Planned and actual project costs

Unit: million yen

	Plan (appraisal)			Actual		
	Foreign currency	Local currency	Total	Foreign currency	Local currency	Total
1. Building construction	3,912	2,129	6,041	4,005	4,968	8,973
2. Equipment	1,575	323	1,898	1,906	0	1,906
3. Training	281	0	281	0	160	160
4. Price contingency	72	8	79	0	0	0
6. Physical contingency	292	123	415	0	0	0
Total	6,131	2,583	8,715	5,911	5,128	11,039

Sources: JICA appraisal documents; project completion report; responses to the questionnaire.

Note: The exchange rates applied were: (planned) 1 yuan = 15 yen; (actual) 1 yuan = 14.17 yen.

3.4.2.2 Project Period

As shown in Table 7, the actual project period was 85 months, which was significantly longer than the planned 36 months (ratio against the plan: 236%) due to the following reasons:

- The breakout of SARS in 2002-2003 delayed the start of each project component.
- Due to the above-mentioned delay, the list of equipment had to be reviewed again, and it took time to make necessary adjustment to the list (some equipment that the targeted university urgently or highly needed was procured using its own fund). Also, the manufacturing of certain equipment with complicated and highly specialized specifications took a longer time than originally planned.
- The initially prepared training plan had to be adjusted due to SARS. Also, as the conditions for accepting teachers were not sufficient in Japan, matching of those sending teachers and those receiving the teachers did not go smoothly.
- The Education Bureau was heavily involved in rescue and recovery operations for a period of at least for six months after the Great Sichuan Earthquake in 2008.

Table 7: Planned and actual project periods

	Plan (appraisal)	Actual
Signing on Loan Agreement	March 2002	March 2002
Building construction	July 2004	August 2008
Procurement of equipment	December 2004	March 2009
Training	April 2005	September 2008
Project completion (lengths of months)	March 2005 (36 months)	March 2009 (85 months)

Sources: JICA appraisal documents; project completion report; responses to the questionnaire.

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Due to the nature of the project, a quantitative analysis of the internal rate of return was not possible.

Although the project cost was mostly as planned, the project period exceeded the planned period, and therefore efficiency of the project is evaluated to be fair.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

As planned during the ex-ante evaluation, the facilities and equipment developed under this project are operated and maintained by each targeted university, and the Education Bureau of Sichuan Province, the executing agency, oversees them. All targeted universities added the developed facilities and the equipment to the universities' fixed assets, and established the operation and maintenance system with clearly defined responsibilities and procedures through establishing regulations such as the procedures for maintenance of large equipment and fund management, work regulations on experiment teaching, the procedures for fixed asset management, etc. There are no issues recognized with respect to the number of staff in charge of operation and maintenance.

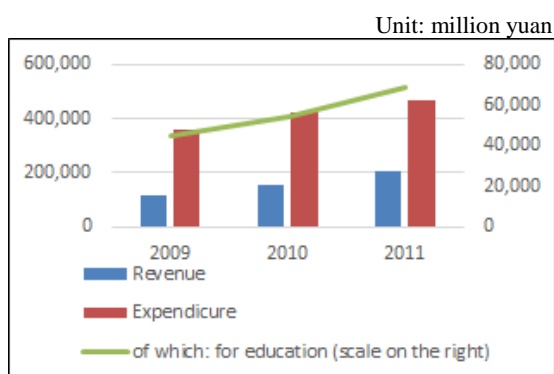
3.5.2 Technical Aspects of Operation and Maintenance

No problem was observed in the technical aspects as all targeted universities regularly carry out maintenance and inspection of the facilities and equipment, and outsource repair works to contractors such as suppliers when necessary. To secure the skills necessary to operate and maintain large or sensitive laboratory equipment, the universities appoint full-time technical staff for each instrument or laboratory to manage the equipment in an integrated manner. Also, some universities send laboratory staff to training in operation and maintenance in order to maintain the necessary skills level.

3.5.3 Financial Aspects of Operation and Maintenance

The targeted universities all belong to the government of Sichuan Province, and their budgets consist of subsidies from the province and own income such as tuitions and fees. The provincial budget is generally in an increasing trend, and expenditures to the education sectors is also increasing (Figure 5).

In all targeted universities, cost for operation and maintenance of the facilities and equipment is part of the university budget and managed under standardized procedures. Normally, certain amount of the operation and maintenance budget is allocated from such expense items as operating expenses. Also, laboratories spend part of the laboratory operating expenses, research fund and income from social services (e.g. consulting services) for routine maintenance of equipment. Revenues are constantly increasing in all targeted universities, and operation and maintenance expenses are stable (Table 8)¹⁸. In the interviews for the ex-post evaluation, both management and laboratory-level staff of all targeted universities said that the necessary amounts of operation and maintenance cost were secured.



Source: Sichuan Province Statistical Yearbook 2011
 Note: The revenue only includes provincial fiscal revenue. Deficits are compensated by the central government.

Figure 5: Budget of Sichuan Province

Table 8: Operation and maintenance expenditures related to this project

	2009	2010	2011
SWUST	1,000	1,000	1,000
SAU	3,742	2,398	2,617
CDUT	14,000	14,000	14,000
SWPU	1,100	1,130	1,150
SNU	2,137	2,224	2,226
Xihua University	600	600	600
CUIT	220	280	130
CDUTCM	1,600	1,800	1,800

Sources: Responses to the questionnaire; "The Supervision Survey Report on JICA Loan Higher Education Project", 2010
 Note: the figures of CDUT represent the total operation and maintenance cost for the whole university.

¹⁸ The evaluator confirmed, through the data provided through the questionnaire, that the revenues and expenditures of each university were at a surplus or balanced in recent years.

3.5.4 Current Status of Operation and Maintenance

In all targeted universities, the equipment developed by this project are registered in the maintenance and management database. Based on observation and review of usage or inspection records, it was confirmed that the equipment were mostly in good condition. A user of equipment must record the status of usage as well as the condition of the equipment every time they use it.

Most of the laboratories which were visited had posted the operational procedures and maintenance plan for each instrument on the wall or in a place easily seen by users, and such procedures seem to be well followed. Also, it was observed that for sensitive equipment, the environment of the laboratories was managed by recording room temperature and humidity.

In all universities, breakdowns and other troubles are handled either by repairing by themselves or by outsourcing (sending the equipment to manufacturers or having repair persons visit the laboratory). It was also reported that there were no major problems in purchasing and keeping stock of consumables.

No major problems were observed in the operation and maintenance system, and therefore sustainability of the project effect is evaluated to be high.



Operation manual and other notices posted besides the scanning electron microscope (CDUT)

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed to improve teaching and research at eight major universities in Sichuan Province through the development of their facilities and equipment as well as providing training for teachers. Relevance of the project was evaluated to be high, as it is in line with (i) the higher education policies of China and Sichuan Province, (ii) development needs for quantitative and qualitative enhancement of the universities, and (iii) Japan's assistance policies. Effectiveness/impact of the project was also high, based on the observations that the project satisfied such needs, improved education activities by enabling more experiments, and improved research activities through outcomes achieved from advanced equipment and training, and thereby contributed to the promotion of the key industries as well as production of teachers for rural areas. Efficiency of the project was evaluated to be fair on the whole: although the project cost was within the plan, the project period significantly exceeded the planned period due to delays in the determination of training host universities in Japan, delays in production of some equipment, as well as external factors such as severe acute respiratory syndrome (SARS)

and the Great Sichuan Earthquake. Sustainability was evaluated to be high, with no problem observed in institutional, technical and financial aspects, and due to the good status of operation and maintenance of the facilities and equipment developed by the project.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

The targeted universities are recommended to continue the proper use of the facilities and equipment developed under this project in teaching and research, as well as to extend the knowledge that has been gained from exchanges with Japan.

4.2.2 Recommendations to JICA

To take advantage of the relationship that have been cultivated through this project, it could be effective to update the Higher Education Projects website even with respect to the completed projects as much as possible (e.g. reports on exchange after the project completion and related reports such as this ex-post evaluation report; articles requested to ex-participants), so that it would serve as a focal point for continuing and expanded exchange for universities in China and Japan.

4.3 Lessons Learned

(1) Effectiveness of the training component

In the area of assistance in higher education, in addition to assistance in hardware, it is effective to provide software-type assistance (such as teachers' training) in a way that is responsive to existing needs. Past higher education assistance projects have proven effectiveness in training on individual fields of teaching and research, and this was also confirmed in this project. In addition, university management courses such as the ones implemented under this project could be effective even in short training periods, if participants are selected who are candidates for executive positions and have potential to extend the outcomes, and based on careful planning by the host universities as was the case in this project.

Also, as seen in a case of Xihua University, if the exchange is strategically important or beneficial not only to the Chinese side but also to Japanese universities, it is more likely to be continued and expanded upon.

(2) Indicator setting for evaluation

In this project, as well as in other Higher Education Projects in China by Japanese ODA loans, although it was targeted to a limited number of universities (and particular facilities/equipment and teachers of those universities), many effectiveness indicators were ones which measure provincial-level situations (such as aggregated education indicators of the

province) or indicators which measure aspects beyond the direct benefits of the project. This ex-post evaluation used those indicators to evaluate Impact. In order to measure the net effect of the project, the ex-ante evaluation should distinguish indicators that measure direct outcomes and indicators that do not measure.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	Target: 8 universities in Sichuan Province	Target: same as planned
(a) Hardware		
i) Building construction	11 buildings such as research building; total floor area of 232,814 m ²	Total floor area of 294,988 m ²
ii) Procurement of educational equipment	Science, engineering, medicine, pharmaceuticals, basic research, art, PC, etc.	Areas of education: same as planned Total 5,552 items
(b) Software		
Teachers' training in Japan or acceptance of experts from Japan	Total 223 persons (including 34 experts from Japan)	Total 268 persons from 42 Japanese universities or institutions (including 31 experts from Japan)
2. Project Period	March 2002 – March 2005 (36 months)	March 2002 to March 2009 (85 months)
3. Project Cost		
Amount paid in Foreign currency	6,131 million yen	5,911 million yen
Amount paid in Local currency	2,584 million yen (172 million yuan)	5,128 million yen (362 million yuan)
Total	8,715 million yen	11,039 million yen
Japanese ODA loan portion	6,131 million yen	5,911 million yen
Exchange rate	1 yuan = 15 yen (As of September 2001)	1 yuan = 14.17 yen (Average between 2003 and 2009)

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan

Chongqing Higher Education Project

External Evaluator: Takako Haraguchi, International Development Associates

0. Summary

This project aimed to improve teaching and research at ten major universities in the Municipality of Chongqing through the development of their facilities and equipment as well as providing training for teachers. Relevance of the project is evaluated to be high, as it is in line with (i) the higher education policies of China and Chongqing, (ii) development needs for quantitative and qualitative enhancement of the universities, and (iii) Japan's assistance policies. Effectiveness/impact of the project is also high, based on the observations that the project satisfied such development needs, i.e., it improved education activities by enabling more experiments, and improved research activities through outcomes achieved from advanced equipment and training, and thereby contributed to the promotion of the key industries. Efficiency of the project is evaluated to be fair on the whole: although the project cost was within the plan, the project period significantly exceeded the planned period due to delays resulting from the high concentration of procurement works for the Higher Education Projects that were implemented in many provinces at the same time to certain suppliers, as well as external factors such as Severe Acute Respiratory Syndrome (SARS) and the Great Sichuan Earthquake. Sustainability is evaluated to be high, with no problem observed in institutional, technical and financial aspects, and due to the good status of operation and maintenance of the facilities and equipment developed by the project.

In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Location



Students attending a real trial at the court simulation facility developed by this project (Southwest University of Political Science and Law)

1.1 Background¹

In China, together with the remarkable economic development, several development issues have arisen such as narrowing internal disparity between coastal and inland areas, reducing poverty, preparing for joining in the World Trade Organization (WTO) and handling global issues. To deal with these issues, the Chinese government put a high priority on development of human resources that are essential for the accelerated efforts towards developing a market economy and narrowing economic gaps under the policy to strengthen reform and promote openness. Accordingly, the government set out a target to increase the higher education enrollment ratio to 15% by 2005 as well as adopting a policy to strengthen higher education institutions (HEIs) in inland areas.

Chongqing Municipality (a direct-controlled municipality since 1997; total population of 30,900,000 persons in 2000; total area of approx. 82,000 km²), a long-developed center of economy and important point for traffic in the southwest China and the upper Changjiang (Yangtze) regions, achieved high economic growth with an average annual gross domestic product (GDP) increase rate of 9.6% in the years 1996-2000. However, per capita GDP (5,157 yuan in 2000) still remained at 73% of the national average (7,078 yuan). Aiming towards promotion of a market economy and further economic development, the municipal government planned to increase the number of students in higher education to around 350,000 and the enrollment ratio to 15% by 2005. However, in order to achieve such targets, existing constraints in the “hardware” aspects (such as school facilities and equipment), “software” aspects (teachers) as well as financial aspects had to be addressed.

1.2 Project Outline

The objective of this project was to quantitatively and qualitatively enhance higher education at 10 major universities in Chongqing Municipality (Southwest University (SWU), Chongqing Technology and Business University (CTBU), Chongqing University of Technology (CQUT), Chongqing University of Science and Technology (CQUST), Chongqing University of Arts and Sciences (CUAS), Yangtze Normal University (YZNU), Southwest University of Political Science and Law (SWUPL), Chongqing Medical University (CQMU), Chongqing Jiaotong University (CQJTU) and Sichuan International Studies University (SISU))² by

¹ This project is one of the Higher Education Projects funded by Japanese ODA loans targeted to universities in 22 provinces, municipalities or autonomous regions in inland China.

² The names of the universities are those as of today. The following universities had different names at the time of the ex-ante evaluation of this project:

- Southwest University: formerly known as Southwest Agricultural University (merged with Xinan (Southwest Normal University and renamed in 2005).
- Chongqing Technology and Business University: formerly known as Chongqing Institute of Commerce (merged with Yuzhou University and renamed in 2005).
- Chongqing University of Technology: formerly known as Chongqing Institute of Technology (renamed in 2009).
- Chongqing University of Science and Technology: formerly known as Chongqing Technology College (merged with Chongqing Petroleum College and renamed in 2004).
- Chongqing University of Arts and Sciences: formerly known as Yuxi College (renamed in 2005).

developing educational infrastructures such as buildings and equipment (improvement of the hardware aspects) and teachers' training (strengthening of the software aspects), thereby contributing to the market-oriented economic reform in Chongqing Municipality and reduction of disparity with coastal areas³.

Loan Approved Amount/ Disbursed Amount	4,683 million yen / 4,480 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2002 / March 2002
Terms and Conditions	Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: Bilateral tied
Borrower / Executing Agency	The government of People's Republic of China / Chongqing Municipal People's Government (Education Commission)
Final Disbursement Date	July 2009
Main Contractor (Over 1 billion yen)	None
Main Consultant (Over 100 million yen)	None
Feasibility Studies, etc.	<ul style="list-style-type: none"> - Feasibility Study Report by Chongqing Investment Consulting Corporation, 2001. - "Special Assistance for Project Implementation (SAPI) for Higher Education Project in China", Japan International Cooperation Agency (JICA), 2003, 2004 and 2005. - "The Supervision Survey Report on JICA Loaned Higher Education Project", JICA, 2010.

2. Outline of the Evaluation Study

2.1 External Evaluator

Takako Haraguchi (International Development Associates Ltd.)

- Yangtze Normal University: formerly known as Fuling Teacher's College (renamed in 2006).

³ At the time of the ex-ante evaluation, the direct targeted outcome of the project was "to improve quantitatively and qualitatively higher education in Chongqing Municipality", and the indirect targeted outcome (impact) was "to contribute to the market-oriented economic reform in China and reduction of disparity". However, since the targeted universities were only part of the HEIs in the municipality, the target area was lowered by one level for this ex-post evaluation.

2.2 Duration of Evaluation Study

Duration of the Study: August 2012 – September 2013

Duration of the Field Study: March 17 – April 10, 2013 and May 26 – June 3, 2013⁴

3. Results of the Evaluation (Overall Rating: A⁵)

3.1 Relevance (Rating: ③⁶)

3.1.1 Relevance to the Development Plan of China

The objective of this project is consistent with the five-year plans for economic and social development and the five-year plans for the education sector at both the national and provincial (municipal) levels, as well as other education-related development strategies and the Western Development Project, which all aim at quantitative and qualitative development of higher education both at the times of ex-ante and ex-post evaluations of this project (Table 1). While there were no large policy changes between the ex-ante and ex-post stages, in recent years more importance has been given to higher education development. Also, the key industries of Chongqing Municipality have shifted to those that require higher technologies.

Table 1: Main objectives of development plans related to this project

	At the time of ex-ante evaluation	At the time of ex-post evaluation
National level development plan	<u>The 10th 5-year Plan for National Economic and Social Development (2001–2005):</u> To increase higher education enrollment ratio to around 15% by 2005.	<u>The 12th 5-year Plan for National Economic and Social Development (2011–2015):</u> To emphasize higher education for promoting industrial advances (quantitative targets include 87% of junior secondary graduates to go on to senior secondary school)
National level education sector plan	<u>The 10th National 5-year Plan for Education (2001–2005):</u> To increase student enrollment in HEIs to 16,000,000 by 2005; to develop human resources that have high skills in high technology, biotechnologies, manufacturing technologies etc. that are necessary for industrial structural adjustment; to strengthen support to HEIs that are relatively at a high level; to strengthen support to fostering of teachers.	<u>The 12th National 5-year Plan for Education (2011–2015) and National Mid- and Long-term Reform and Development Plan for Education Sector” (2010–2020):</u> To increase higher education enrollment ratio from 26.5% in 2010 to 40% in 2020; to increase student enrollment in HEIs from 29,790,000 in 2009 to 33,500,000 by 2015; to develop HEIs in inland areas with special focus on development of departments that are competitive and fostering of teachers.
Provincial (municipal) level development plan	<u>The 10th 5-year Plan for Economic and Social Development in Chongqing Municipality (2001–2005):</u> To achieve annual economic growth rate of 9.2% by 2005; develop the key industries including machines (automobiles and motorcycles), pharmaceutical chemicals, food,	<u>The 10th 5-year Plan for Economic and Social Development in Chongqing Municipality (2011–2015):</u> To achieve annual economic growth rate of 12.5% by 2015; to develop the key industries including communication equipment, high-performance integrated circuits,

⁴ The field study period includes the periods for ex-post evaluation of the Sichuan Higher Education Project and the Gansu Higher Education Project.

⁵ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁶ ③: High, ②: Fair, ①: Low

	At the time of ex-ante evaluation	At the time of ex-post evaluation
	construction materials, and tourism.	energy-saving and new energy- powered vehicles, train equipment, environment conservation equipment, wind power generation devices/systems, optical instruments, new materials, machines, and biotechnology-based pharmaceuticals.
Provincial (municipal) level education sector plan	<u>The 10th 5-year Plan for Education in Chongqing Municipality (2001-2015):</u> To increase higher education enrollment ratio from 13.0% in 2000 to 15.2% in 2005; to increase student enrollment in HEIs to around 350,000 (including around 220,000 in regular HEIs ⁷)	<u>The 12th 5-year Plan for Education in Chongqing Municipality (2011-2015):</u> To increase higher education enrollment ratio from 30% in 2010 to 35% in 2015.

Source: JICA appraisal documents; respective documents of the mentioned development plans; Answers to questionnaires.

3.1.2 Relevance to the Development Needs of China

Development needs were observed for the quantitative and qualitative enhancement of education at the 10 targeted universities at the times of both the ex-ante and ex-post evaluations.

At the time of the ex-ante evaluation, there was a need for quantitative expansion of higher education in order to narrow the economic gap mentioned in “1.1 Background” and following the increase of primary and secondary education in Chongqing Municipality (school intake rates in 2000 were 99.9% for primary education and 89.0% for secondary education). It was forecasted that the number of new entrants in HEIs would increase from approx. 80,000 in 2000 to approx. 100,000 in 2005. There were 23 regular HEIs in Chongqing Municipality, among which the 10 targeted universities were the leading municipal universities⁸. They were expected to further expand their roles of producing human resources for the above-mentioned key industrial sectors, but financial resources for developing the hardware (facilities and equipment) and software (teachers’ training) aspects were limited. Also, there were few opportunities provided for the teachers to visit overseas.

At the time of the ex-post evaluation, the need for narrowing the economic gap still existed even though economic growth remained high at an annual average of 13.3% for the years 2000-2011 and the provincial (municipal) per capita GDP increased up to 34,500 yuan in 2011, which was 87% of the national average 39,442 yuan. The number of new entrants to HEIs in the

⁷ Regular (or standard) HEIs is a term referring to universities and colleges, including four-year undergraduate programs of comprehensive universities and single-department colleges, specialized colleges (similar to junior colleges in Japan), and graduate programs. Adult higher education and higher vocational education institutions are not included. In this report, “universities” include both universities and colleges that grant undergraduate or higher academic degrees unless otherwise mentioned.

⁸ National and public universities in China are under the jurisdiction of the state (Ministry of Education or other state government organizations) or local (sub-national) governments. At the time of the ex-ante evaluation, Chongqing University and Xinan (Southwest) Normal University were under the jurisdiction of the state (i.e. overseen by Ministry of Education). Later, Xinan Normal University was merged with Southwest Agricultural University, a targeted school of this project, and was renamed to Southwest University, which was accordingly placed under the jurisdiction of the Ministry of Education. Both Chongqing University and Southwest University are listed in the “Project 211” (1996-), a national project to intensively support approx. 100 key universities to enhance their research capabilities by the 21st century.

municipality continued to increase from approx. 120,000 in 2005 to approx. 180,000 in 2011, and the need for quantitative and qualitative enhancement of HEIs remains high. On the other hand, the need for hardware development seemed to have been more satisfied compared to the time of the ex-ante evaluation, due to increased financial injection to municipal universities following the above-mentioned higher education development policies.

3.1.3 Relevance to Japan's ODA Policy

At the time of the ex-ante evaluation, Japan's Official Development Assistance (ODA) Charter (1992) placed emphasis on Asian regional support and human resources development support. Additionally, the Country Assistance Policy for China and the Medium-term Strategy for Overseas Economic Cooperation Operations and Country Assistance Strategy put priorities on human resources development from the viewpoint of support for openness and reform and post-WTO economic reform, and on assistance in the mid-western Region in China from the aspect of narrowing the economic gap. The project objective was consistent with such aid policies of Japan.

This project has been highly relevant to China's development plans, development needs as well as Japan's ODA policies, and therefore its relevance is evaluated to be high.

3.2 Effectiveness⁹ (Rating: ③)

The objective of the project, "quantitative and qualitative enhancement of higher education of the targeted universities", has been achieved based on the performance of quantitative indicators as well as qualitative information that are presented in the following sections.

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Quantitative expansion of teaching and research¹⁰

The hardware outputs of this project increased the aggregate floor area of school buildings and the monetary value of educational equipment. With respect to the aggregate floor area of school buildings, the ex-ante evaluation set out the target values for individual universities, and those were mostly achieved (Table 2 and Figure 1). The utilization rates of the facilities and

⁹ Sub-rating for Effectiveness was given with consideration of Impact.

¹⁰ In the ex-ante evaluation, the target year for evaluating the quantitative indicators was set at 2005, which was after the planned project completion date. However, due to the delays in project implementation (see "3.3 Efficiency"), the ex-post evaluation set the actual comparison year as follows: the targets related to the building construction component (completed in 2004) were compared with the actual performance in 2005; the targets related to the equipment (procurement) component and the training component (mostly completed in 2008) were compared with the actual performance in 2009; the targets related to more than two components were compared with the actual performance in 2009. When data for 2009 were not available, the comparison was made between 2005 and 2011. To show the situation at the time of the ex-post evaluation, the data of 2011 were mainly used. While the field study was conducted from 2012 to 2013, the data for 2011 are considered to be the latest reliable data that have been checked and compiled.

equipment developed by this project are high at 90-100% (for facilities) and around 80-100% (for equipment)¹¹ at all universities. Therefore, it can be said that the project well responded to the needs for quantitative expansion of higher education (i.e. constant increase in the number of students as shown in Figure 2).

The facilities and equipment related outputs of this project accounted for on average only 16% of the total facilities (in terms of floor area) and 3% of the total educational equipment (in terms of monetary value) of the targeted universities as of 2009 after project completion. Nevertheless, they played an important role of establishing a foundation on which later development works by the Chinese side took place. More specifically, (i) the project took a strategy to concentrate its resources to the development of key teaching/research areas that required to be strengthened, and (ii) the facilities and equipment developed under this project were highly valued and therefore became the decisive factor in determining the areas that were worth investing in further, which brought in other development funds. In particular around 2002 when it was difficult for the targeted universities to make large scale facility investments on their own, the effective role played by this project was larger than the actual percentages indicate.

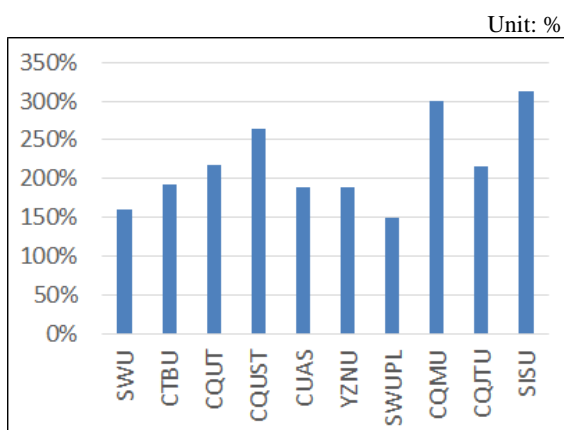
Table 2: School building area

Unit: m²

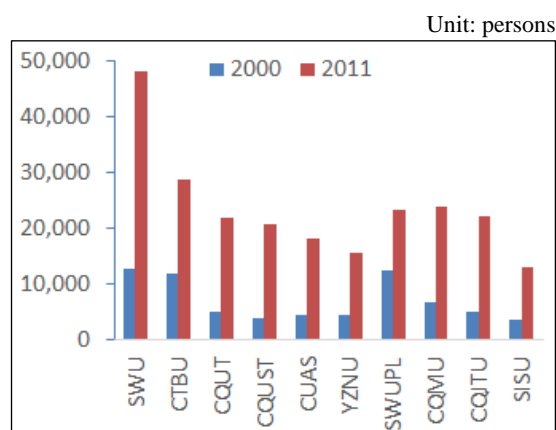
	Actual value 2000	Planned value		Actual value		Actual value 2011
		2005	Portion under this project	2005	Portion under this project	
SWU	421,016	781,000	11,000	1,315,585	25,812	1,666,104
CTBU	368,400	600,000	19,000	532,768	22,103	945,342
CQUT	157,000	382,000	8,544	508,531	19,900	871,437
CQUST	155,000	220,775	9,000	337,704	9,000	479,659
CUAS	115,637	239,000	4,000	368,316	7,886	502,188
YZNU	200,000	279,000	9,000	364,508	9,000	613,911
SWUPL	201,836	582,000	9,000	545,567	9,000	666,716
CQMU	196,609	407,770	8,300	402,355	8,300	652,456
CQJTU	285,890	439,490	8,129	549,047	8,600	698,288
SISU	123,234	220,532	17,470	164,975	17,470	449,054
Total	2,224,622	4,151,567	103,443	5,089,356	137,071	7,545,154

Sources: JICA appraisal documents; responses to the questionnaire by the executing agency and targeted universities.

¹¹ The utilization rates are based on responses to questionnaires provided by each targeted university. The definition of utilization rates at the time of the ex-ante evaluation was “actual usage hours divided by planned usage hours”, and the target values were set at between 72-85%, depending on the university. However, the actual usage could not be compared with the target values based on that definition, since, according to the targeted universities, it was impossible to actually calculate the rates in such manner because planned usage hours varied depending on the types of equipment. According to the interviews with them, the figures provided seemed to represent “the number of equipment that is currently used (i.e. in operation) divided by the total number of equipment procured”. Yet, the results of the visits to each university, observation of the facilities/equipment, and review of some usage records are consistent with the figures provided, and thus it is implied that the questionnaire responses more or less reflect the actual usage of the outputs of the project.



Source: Responses to the questionnaire



Sources: JICA appraisal documents; responses to the questionnaire

Figure 1: Increase rates of monetary values of educational equipment, 2005-2011

Figure 2: Number of students

(2) Qualitative enhancement

As shown in Table 3, the average school building area per student was below both the target set in the ex-ante evaluation and the national standard at many universities in 2005, the target year. The executing agency and the targeted universities explained the reason for such generally lower level of achievement than expected, stating that it took some time until a constructed building was registered as the university's capital asset. Nevertheless, the incremental increase achieved particularly through this project reached the target values at most universities. Also, in 2011 the target values set for this project were more or less achieved, and the national standards were mostly satisfied as well. This implies that the increase in students would not have adversely affected the conditions (quality) of teaching and research. Monetary value of educational equipment per student satisfied the national standard in all targeted universities.

Table 3: School building area per student and monetary value of educational equipment per student

Units: m² or yuan

	School building area per student (m ²)						Value of educational equipment per student (yuan)	
	Actual 2000	Planned 2005		Actual 2005		Actual 2011	Actual 2005	Actual 2011
		Area per student	Increment through this project	Area per student	Increment through this project			
SWU	33	39	0.55	28.8	0.57	34.5	7,391	11,188
CTBU	31	33	1.06	26.8	1.11	32.8	3,395	4,505
CQUT	31	32	0.71	35.0	1.37	39.9	4,595	6,669
CQUST	39	37	1.50	25.5	0.68	23.0	3,571	5,987

	School building area per student (m ²)					Value of educational equipment per student (yuan)		
	Actual 2000	Planned 2005		Actual 2005		Actual 2011	Actual 2005	Actual 2011
		Area per student	Increment through this project	Area per student	Increment through this project			
CUAS	25	24	0.40	29.3	0.62	38.9	3,989	5,294
YZNU	43	30	0.97	29.0	0.73	27.2	3,540	5,247
SWUPL	16	29	0.45	30.9	0.51	28.5	3,060	3,459
CQMU	29	34	0.69	25.5	0.53	27.3	4,541	8,950
CQJTU	55	32	0.59	35.4	0.55	31.6	5,918	8,952
SISU	33	31	2.43	24.3	2.57	34.4	4,010	6,533
Average	34	32	0.93	29.0	0.92	31.8	6,073	7,147

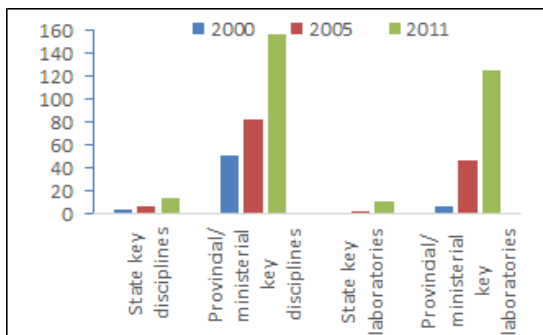
Sources: JICA appraisal documents; responses to the questionnaire.

Note: the national standard of school building area per student is “more than 30 m²”; the national standard for value of educational equipment per student is “more than 5,000 yuan” for laboratory equipment in faculties of science and technology such as science, engineering, agriculture and medicine, “more than 3,000 yuan” for humanity and social science faculties, and “more than 4,000 yuan” for physical education and art faculties (Interim Provisions for Establishment of Regular Undergraduate Schools, No.18 [2006]).

Various indicators to measure the achievements of progress in the areas of teaching and research, such as the number of key disciplines and key laboratories¹², the number of faculties/departments and graduate programs, the number of research projects and social (community) service¹³ projects, the number of published research papers, the number of awards, the number of patents granted, etc., showed increasing trends. In particular, the number of provincial or ministerial key laboratories and research papers published in international journals significantly increased comparing before and after the implementation period of this project (Figures 3 and 4). Although such improvements are the outcome of the overall higher education development policies mentioned in “3.1 Relevance”, part of it is attributable to the outcome of this project through utilization of the facilities/equipment developed under the project and/or involvement of teachers who received training in Japan in teaching/research activities under this project. It was observed in all targeted universities that new provincial/ministerial key laboratories were approved mainly based on facilities/equipment developed under this project, and that the training/research in Japan promoted the participating teachers to start publishing articles in international journals. For example, SWU reported that the number of research papers related to this project amounted to 3,000 in domestic journals and 1,372 in the SCI (Science Citation Index), EI (Engineering Index) and ISTP (Index to Scientific & Technical Proceedings) databases.

¹² Key disciplines and key laboratories are ones that the state or a local government designates as a base for teaching or research activities and to which resources are preferentially distributed.

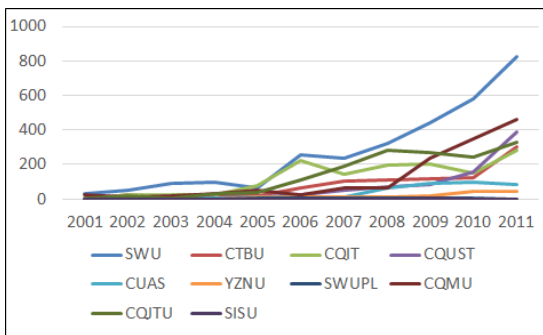
¹³ Social (or community) services are research, testing, etc. that are commissioned by external organizations (government, companies, etc.)



Sources: JICA appraisal documents; responses to the questionnaire

Note: The figures are aggregates of the figures of the 10 targeted universities.

Figure 3: Total number of key disciplines and key laboratories of the 10 targeted universities



Source: Responses to the questionnaire

Note: The figures represent the total numbers of research papers included in SCI, EI and ISTP databases.

Figure 4: Total number of internationally-published research papers by each of the 10 targeted universities

3.2.2 Qualitative Effects¹⁴

(1) Effects on enhancement of teaching and research at each targeted university

On the teaching side, all targeted universities said that the facilities and equipment developed under this project improved the conditions for teaching and experiments both quantitatively and qualitatively. Specific comments include: “the ratio of classes with experiment increased” (YZNU), “sufficient number of microscopes were secured for all students in the class” (CUAS), “more creative experiments became possible” (CQJTU), and “opening of new courses became possible” (e.g. mechanical analytical instruments course at CQJTU). Positive changes were reported in the humanities fields as well. For example, according to SISU, the development of language laboratories and a simultaneous interpretation system resulted in the improvement of students’ speaking and listening abilities in foreign languages. A court simulation facility developed at SWUPL is a unique case of project effectiveness. The facility, equipped with a courtroom, a room for judges, a room for criminal defendants and other related facilities, is used not only for judicial trial simulation lessons but also for real trials under the jurisdiction of Chongqing Municipality, and students have enhanced practical skills by simulating and observing such trials. When the evaluator visited SWUPL for this ex-post evaluation, a real trial was in session, and many students were observing it.

¹⁴ In this ex-post evaluation, it was difficult to exclude effects of activities that were not under this project from the planned quantitative indicators. Therefore, while taking the trends of the indicators into consideration, qualitative information (collected by document review, questionnaires and interviews) was used to understand how specifically this project is related to such trends. The evaluator conducted individual or group interviews in a semi-structured manner with the Education Bureau of Sichuan Province (executing agency) and, at each targeted university, with persons in charge of the project implementation as well as ex-participants in teachers’ training in Japan. In total, 88 persons from the 8 universities (including 26 ex-participants in teachers’ training in Japan) were interviewed. With respect to interviews with universities in Japan that accepted teachers for training from the target universities, the evaluator visited 2 of them and contacted several more universities by telephone or e-mail.

With respect to research, all targeted universities confirmed the improvement of their research activities thanks to the facilities/equipment and teachers' training provided under this project. Individual cases reported include ones where research areas that had already been advanced before this project were further enhanced with the use of the equipment procured under this project (SWU, CQMU, etc.), promotion of university-industry collaboration (CQUST), and provision of social services to the central and Chongqing governments (forensic identification by SWUPL, testing/measurement of roads and bridges by CQJTU, etc.). In addition, there were some cases, though not many, where the combined effects of the procurement of equipment and teachers' training in Japan could be observed (SWUPL and CQJTU).

It was pointed out that the training in Japan had effects as it helped participating teachers have broader views for improving their teaching content and methods, find new research topics, and deepen and improve the quality of research. For example, after staying in Japan for six months in the training program of this project, a teacher of the School of Vehicle Engineering of CQUT studied in Japan again and received a doctoral degree. After returning to CQUT he continued the research he started in Japan, which has developed into joint research with a Japanese university. Also, there are cases, such as the undergraduate program of Japanese language at YZNU, where teachers who attended the project's training program played a key role in establishing new disciplines/programs.

As to the university management training courses, the Education Commission of Chongqing Municipality, the executing agency, focused on the importance of such courses before other executing agencies of Higher Education Projects in other provinces, and established four courses (approx. 1-2 month long) with different curriculums, namely, "Executive Course", "Management Course", "Fund Management Course", and "Asset Management Course", with cooperation from the host university in Japan. These courses were highly appreciated by most of the teachers interviewed for this ex-post evaluation: specific points that many of them mentioned include the smooth proceeding of the training programs based on careful preparation, diversified and specialized programs and contents, and the discussions held on the issues that China is also facing, such as how to cope with the declining birth rate and job shortage.

For both specialized fields and university management training, many targeted universities sent candidates for executive positions, which contributed to an university-wide expansion of the effects of training outcomes.

Table 4 below summarizes notable effects of the project on teaching and research at each targeted university.

Table 4: Qualitative effects on each targeted university (Summary)

<p>Southwest University (SWU)</p>	<ul style="list-style-type: none"> · In the field of sericulture (i.e. cultivating silkworms) that had been an advanced research area at SWU from before this project, the equipment procured by the project played a significant role in establishment of key laboratories/disciplines such as in silkworm genome. Accordingly, the research level was further upgraded. · In the fishery area, the equipment procured by this project contributed to the establishment of a state key laboratory. · After returning to SWU, teachers who attended the training in Japan introduced the seminar-style teaching method, which was regarded as a method of education to cultivate students' interests.
<p>Chongqing Technology and Business University (CTBU)</p>	<ul style="list-style-type: none"> · Students from the entire university benefited from this project through the improvement of equipment at the basic research center and the development of the school LAN. · The equipment installed at the green package laboratory at the School of Mechanical Engineering¹⁵ was used for research and development activities (e.g. degradable and environment-friendly cushioning materials were developed and put into practical use jointly with a company in Guizhou Province). · A teacher who attended the training in Japan joined in development planning for districts.
<p>Chongqing University of Technology (CQUT)</p>	<ul style="list-style-type: none"> · After staying in Japan under the training program of this project, a teacher of the School of Vehicle Engineering studied in Japan again and received a doctoral degree. After returning to CQUT he continued the research (of control of engine vibration) he started in Japan, which has developed into joint research with a Japanese university. · A teacher who attended a university management course applied what he learned in Japan, such as introduction of the concept of student-centered education, to the layout of school facilities in the new campus. · CQUT developed a project management software jointly with the Chongqing Education Commission. The software was used for this project as well as within the Higher Education Project in other provinces, and promoted efficient project implementation (also see "3.4 Efficiency").
<p>Chongqing University of Science and Technology (CQUST)</p>	<ul style="list-style-type: none"> · The equipment procured under this project contributed to the establishment of the field of industrial production safety in addition to petroleum and metallurgy, the two major fields of education at CQUST. · From before this project, CQUST had been active in university-industry collaboration and research and development (R&D). The equipment procured by this project further accelerated such activities by attracting companies and thus promoting partnership between the university and such companies. Some of the collaborative efforts promoted using the project equipment are already in the stages of practical realization. · As a social services activity to promote local industries, CQUST established the Chongqing Waste to Energy Research and Technology Institute jointly with the Science and Technology Commission of Chongqing Municipality and local companies, and used the equipment procured by this project at the institute. · A technical cooperation program (technical transfer such as in the manufacturing area to laid-off workers) jointly organized by CQUST and the Chongqing Municipal Labor and Social Security Bureau uses the equipment procured under this project.
<p>Chongqing University of Arts and Sciences (CUAS)</p>	<ul style="list-style-type: none"> · The equipment installed in the internet center promoted information sharing. The equipment installed in the research and training center of the School of Computer Science provided students in the entire university with opportunities for self-learning and practice. · The MIDI (musical instrument digital interface) studio and recording equipment installed in the audio visual laboratory are open to public.

¹⁵ "School" or "College" of universities in China is similar to "Faculty" in universities in Japan.

<p>Yangtze Normal University (YZNU)</p>	<ul style="list-style-type: none"> · With the equipment procured under this project, the ratio of classes with experiments reached 100%, and the number of students winning awards at national and municipal levels increased. · The teacher training center (where a monitoring system for teaching practice was installed by this project) contributed to generating teachers. · The undergraduate program of the Japanese language was established partly as a result from the training in Japan. An agreement was concluded on mutual visits between YZNU and the university in Japan that accepted teachers under this project.
<p>Southwest University of Political Science and Law (SWUPL)</p>	<ul style="list-style-type: none"> · The court simulation facility is used for real trials, which are observed by students. · At the Center for Forensic Science (established in 1986), equipment such as analytical instruments procured by this project played a central role in the improvement of research capacity, and the center expanded to become one of the 10 leading national-level forensic institutions in China (and the only national-level forensic institution in the Midwestern region). The number of cases of forensic identification sharply increased from 800 cases in 2003 to 2,300 cases in 2011. · A combined effect of the procurement of equipment and teacher's training in Japan was observed in the Center for Forensic Science (i.e. a teacher learned how to operate the DNA analytical system and other equipment in Japan, and after her return to the center, continued her research using the same equipment procured by this project). · Teachers improved the case study course by referring to what they learned in Japan. They maintain a close relationship with the Japanese Association of the Law of Civil Procedure.
<p>Chongqing Medical University (CQMU)</p>	<ul style="list-style-type: none"> · The equipment procured under this project, such as electron microscopes, is centrally managed by the newly-established Institute of Life Sciences for better usability. · Spare parts of some equipment (such as a flow cytometer) are no longer produced, but teachers devise ways to utilize such equipment.
<p>Chongqing Jiaotong University (CQJTU)</p>	<ul style="list-style-type: none"> · From before this project, the School of Civil Engineering had been engaged in various research projects on roads and bridges in Chongqing and the Three Gorges Dam area, commissioned by government organizations such as the Ministry of Communication, the Ministry of Industry and Information Technology as well as Chongqing Municipality. Many of those projects had received state or municipal-level awards. After the project, the School used the bridge model (structural test system), the most expensive and largest equipment procured for CQJTU by this project, for tests conducted for the Qincaobei Bridge (780 m) over the Yangtze River that is currently under construction. The School also provides calibration services to external customers using the equipment procured by this project. The core faculty members attended the training in Japan and learned how to operate the equipment procured. · The center of traffic and transport engineering used the ITS (intelligent transport system) model procured by this project for research on traffic control in Chongqing. · The equipment at the hydraulic laboratory of the School of River and Sea Architectural Engineering were all procured by this project. The main equipment is the integrated hydraulic experimental system that is capable of 13 experimental items. The laboratory is open to students after school to cultivate students' interest and encourage innovative experiments. In 2012, a total of 1,457 students used the equipment (equivalent to more than 20,000 student hours of use).
<p>Sichuan International Studies University (SISU)</p>	<ul style="list-style-type: none"> · The language laboratory equipment enhanced students' language skills. · The level of SISU's Japanese language teaching had been high before this project (all teachers had made almost perfect scores on Level 1 of the Japanese Language Proficiency Test; the average score on Grade 8 of the test for university students majoring in Japanese language had always been higher than the national average and the highest among universities in the southwestern region). Through training in Japan of half of the 24 Japanese language teachers, the teaching level was further upgraded. · Japanese language teachers taught Japanese to teachers (including those from other targeted universities) who were participating in the training in Japan before their departure.

Sources: Responses to the questionnaire and interviews; websites; etc.



A class using a three-dimensional measuring machine. This machine is also used for research and R&D. (College of Mechanical Engineering, CQUST)



Analyzing muscles using an electron scanning microscope. He belongs to a research team that won in a competition of the university (CQMU).



Fish science laboratory. Conducting experiments on feed for aqua-cultured fish. Before this project, such experiments had used outside ponds. (SWU).



Officer of the Education Commission in charge of this project checking the usage records of a fluorescence spectrophotometer upon his visit for the ex-post evaluation (CUAS).



Monitoring system for teaching practices. Practices in individual classrooms are centrally controlled. (YZNU).



A model bridge facility that is frequently used for various tests in Chongqing, a "city of bridges". (CQJTU).

(2) Use of the procured facilities and equipment

Currently, mergers and abolition of universities and moving of campuses to university cities are under way in accordance with the government's higher education reform policies. Among the targeted universities of this project as well, three universities (CQUT, CQUST and YZNU) moved to new campuses after they constructed school buildings in their old campuses under this project. All those construction works were funded by the Chinese side, and two of them (except CQUST that exchanged their buildings and another property) still use the constructed buildings (by the project) on the old campuses for teaching and research.

By the time of the ex-post evaluation, nearly seven years had passed since the majority of the equipment procured under this project was installed. Therefore, some PCs and monitors have passed their useful lives and have already been disposed of in accordance with the university regulations. Also, along with progress in technological innovation, some equipment has been replaced by equipment of higher performance/precision. However, it was confirmed from the visits to and interviews with the targeted universities that most of the other major teaching/research equipment was still used in good conditions and effective at the time of the ex-post evaluation. The equipment that could no longer be used for advanced research was used for teaching undergraduate students. According to SWUPL, for example, it brought a faculty

member who was highly specialized and had a good knowledge of trends of the relevant equipment into the procurement team in the stage of deciding on specifications. By doing so, the university selected the equipment with better future prospects (i.e. specialized equipment) and made by top-level manufacturers (i.e. sophisticated equipment), which consequently was used for many years.

It is worth noting that Chongqing Municipality has a municipal platform for sharing large-scale laboratory equipment. The platform was established in 2004, and currently lists a total of 1,878 items of laboratory equipment owned by HEIs and research institutions, including large-scale equipment procured to the targeted universities by this project, for shared use. Searching and application for use of the registered equipment can be conducted on the internet. An average operation rate (per 800 hours) is reported to be 74.68% during the period from January 2009 and August 2012.



The Homepage of the Chongqing municipal platform for sharing large-scale laboratory equipment (www.csts.net.cn).

3.3 Impact

3.3.1 Intended Impacts

(1) Enhancement of teaching and research at the provincial (municipal) level

Table 5 shows selected higher education indicators at the municipal level. Improvement is seen in the indicators for both quantitative expansion (such as the number of students and enrollment rate) and qualitative enhancement (school building area per student). The enrollment rate is significantly increasing beyond the national average. This project is partly involved in such improvements through the expansion of the facilities and equipment at the 10 targeted universities. Also, given the fact that there are 64 HEIs (including 17 universities) in Chongqing Municipality and that the targeted universities are all leading universities in the municipality, the upgrading of teaching and research level at these universities as shown in Table 4 could be considered as the upgrading of teaching and research level of the entire province.

Table 5: Higher education indicators of Chongqing Municipality

	Actual 2000	Planned 2005	Actual 2005	Actual 2009	Actual 2011
Number of HEIs	41	50	51	57	64 (of which universities with undergraduate programs: 17)
Number of students enrolled in HEIs	260,000	360,000	333,563	523,379	567,813

	Actual 2000	Planned 2005	Actual 2005	Actual 2009	Actual 2011
Enrollment rate in HEIs	12.1%	15.2%	19.0%	27.0% (national average: 24.2%)	32.0% (national average: 26.9%)
School building area per student (m ² /person)	N.A. (average of targeted universities: 31.0)	N.A. (average of targeted universities: 30.0)	33.44	74.9 (average of targeted universities: 31.0)	32.10 (average of targeted universities: 31.8)

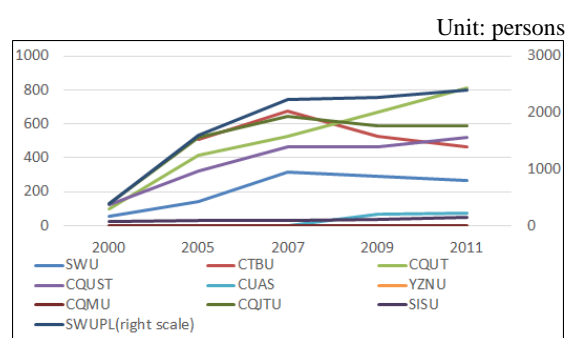
Sources: JICA appraisal documents; JICA, “The Supervision Survey Report on JICA Loaned Higher Education Project”, 2010; Project Completion Report; China Statistical Yearbook 2011; Educational Statistical Yearbook of China 2011; Chongqing Municipality Statistical Yearbook 2011.

Note: The reason for the unusually high school building area per student in 2009 is unknown. However, as it dropped to 29.22m², the same level as other years, in 2010, the figure in 2009 is considered to be either incorrect or representing a temporary special situation for some reason.

(2) Contribution to promotion of market-oriented economic reform, reduction of disparity, development of rural areas and reform of state-owned enterprises

The titled impacts were expected in the ex-ante evaluation. Although the information was limited to the results of the interviews with the executing agency and individual targeted universities and observations, they are considered to have been achieved to a certain extent through production of graduates in the key industries, promotion of R&D (these two factors were observed at several universities), training for laid-off workers (observed only at CQUST), and utilization of equipment by other institutions through the Chongqing municipal platform for sharing large-scale laboratory equipment.

1. Promotion of market-oriented economic reform: As shown in Figure 5, there is a common trend in the number of graduates in the fields of accounting, law and financial management among the universities that are relevant in these fields: it sharply increased in the early 2000s, and thereafter has remained at almost the same level. Three targeted universities, including SWUPL that produces more than 2,000



Source: Responses to the questionnaire.

Figure 5: Number of graduates in the fields of accounting, law and financial management

graduates in the field of law every year, commented that the project contributed to promotion of a market economy through the enhanced capacities of those graduates¹⁶.

¹⁶ The president of the Supreme People's Court at the time of the ex-post evaluation was also a graduate of SWUPL.

2. Reduction of disparity: A stable number of graduates from the targeted universities have found jobs in Chongqing Municipality's key industries. For example, 200-300 graduates from CQUT are employed in the mechanical electronics industry every year, and 65% of them are working at companies in Chongqing. In each targeted university, the job placement rate was around 80-90% in both 2005 (during project implementation) and 2011 (after project completion), generally showing an increasing trend. Nine targeted universities said that this project contributed to a higher capacity of human resources in the key industries through the enhanced capacities of their graduates in research and operation of laboratory equipment as well as through broader views and knowledge of the teachers. As mentioned in "3.1.2 Relevance to the Development Needs in China", Chongqing Municipality has achieved high economic growth, and the gap in GDP per capita between

3. Chongqing and the national average is decreasing. The human resources that the targeted universities of this project have produced play a part in such development.

4. Development of rural areas: Although seven targeted universities such as CUAS produce graduates who then became teachers in rural areas, and 80 graduates from CQMU in 2009 became rural doctors, all of these universities said that those graduates were not directly related to this project. Also, ex-participants in the training in Japan from some targeted universities such as SWU and CTBU have conducted research on rural development, although its relation to this project is not clear.

5. Support to reform of state-owned enterprises (addressing the issue of laid-off workers): Only CQUST uses the facilities constructed under this project to train laid-off workers (Table 4). In 2009, 285 laid-off workers were trained in this regard.

3.3.2 Other Impacts

(1) Impacts on the natural environment

No negative impacts were observed. By the time of the ex-ante evaluation, all targeted universities had completed the necessary domestic procedures of environmental clearance with the Environmental Impact Assessments (EIA) approved by the Environmental Protection Department of Chongqing Municipality. Some noises, vibrations and dusts due to the building construction and foul water due to the use of the constructed facilities had been expected but to a small scale. All universities reported that during the construction phase they controlled the noises, etc. and thus kept the negative effects at a minimum. The executing agency explained that environmental monitoring after the project completion is not required considering the small scale of impact. According to SWUPL and CQMU that said the above-mentioned

Environmental Protection Department conducted environmental monitoring, the monitoring results reported that the major environmental parameters were within the standard.

(2) Land acquisition and resettlement

As planned in the ex-ante evaluation, there was no land acquisition and resettlement associated with this project.

(3) Strengthening of exchanges and cooperation with universities in Japan

It was observed in several targeted universities that academic exchanges with universities in Japan have been enhanced through this project. In some cases such as that of SWUPL, joint research or teachers' visits that had existed before the project were reinforced by the project, while in other cases, as seen in the case of SWU, there had been exchanges with universities overseas but not with those in Japan. At several universities such as CQJTU, the relationships that the project created are maintained or have been further developed. According to the executing agency, the current exchanges across the fields of study are owed to having leaders at the time of project implementation or candidates for leaders (who are leaders at present) learn about the higher education system and university management in Japan. As an interesting case, CQMU employed graduates from the Japanese language program of SISU (ex-students taught by teachers who attended the training in Japan) at its administrative section. Therefore, further promotion of understanding of Japan is expected in the future.



Graduates from SISU who found jobs at the office of the president, CQMU. They speak fluent Japanese.

At the same time, several universities pointed out issues for continuing exchanges, such as mismatch of priorities in selection of partners (i.e. the Chinese side tends to prefer universities in Western countries while the Japanese side tends to prefer universities in coastal China), exchanges relying only on single-shot research funds (CQUT), and host universities' tendency to accept trainees from China but not to send teachers from Japan (SISU).

Overall, this project has largely achieved its objectives; therefore its effectiveness is evaluated to be high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The actual production of the outputs is summarized in “Comparison of the Original and Actual Scope of the Project” on the final page of this report (the floor area of the buildings constructed for each university is in Table 2). The hardware outputs (facilities and equipment)

were developed mostly as planned with some changes as follows:

- Building construction: floor area increased by 133% compared to the plan, mainly due to the increase in demand.
- Procurement of equipment: it is difficult to precisely compare the actually-procured equipment with the original plan prepared in the project appraisal stage, because detailed consideration and final selection took place after the commencement of the project. However, the colleges/disciplines to which equipment were installed and the major equipment items installed were mostly in accordance with the plan.



Experimental devices for electrical and electro technology (CTBU)

As for the software outputs (i.e. training of teachers in Japan or invitation of teachers from Japan), adjustments were made in the number of participants and the lengths of stay to cope with the funding status and needs of each university. Accordingly, the actual number of participants were 257 persons compared to the planned 192 persons (134% of the plan), but the actual person months was 1,107 person months compared to the planned 1,446 person months (77% of the plan).

3.4.2 Project Inputs

3.4.2.1 Project Cost

As shown in Table 6, the total project cost was 7,123 million yen (of which the Japanese ODA loan was 4,480 million yen), which was 97% of the plan. According to the executing agency, it adjusted the training plan so that the total project cost would be within the planned amount even after taking into account the increase or decrease in construction and procurement cost. This can be said to be a good practice of optimal use of funds.

Table 6: Planned and actual project costs

Unit: million yen

	Plan (appraisal)			Actual		
	Foreign currency	Local currency	Total	Foreign currency	Local currency	Total
1. Building construction	569	2,062	2,631	549	2,092	2,641
2. Equipment	3,609	467	4,076	3,664	487	4,152
3. Training	219	0	219	267	64	330
4. Price contingency	64	6	69	0		0
6. Physical contingency	223	127	350	0		0
Total	4,683	2,662	7,345	4,480	2,643	7,123

Sources: JICA appraisal documents; project completion report; responses to the questionnaire.

Note: The exchange rates applied were: (planned) 1 yuan = 15 yen; (actual) 1 yuan = 14.25 yen.

3.4.2.2 Project Period

As shown in Table 7, the actual project period was 82 months, which was significantly longer than the planned 43 months (ratio against the plan: 191%) due to the following reasons:

- To avoid the spread of SARS that broke out in 2002-2003, meetings for selection of equipment to be procured or other purposes could not be conducted for 12 months.
- For half a year after the Great Sichuan Earthquake in 2008, transportation of goods was restricted to those related to relief and reconstruction. Chongqing was the eastern gateway for transportation of goods to the affected area.
- There was a certain period during which all of the Higher Education Projects funded by Japanese ODA loans in 22 provinces were being implemented¹⁷. However, as the number of suppliers who qualified for international competitive bidding was limited, one supplier ended up contracting with several provinces, and concluded longer contracts than originally estimated to avoid shortage of working capital. The executing agency handled this situation by switching source of funding for some equipment from the Japan ODA loan to funding from China, or by cancelling procurement of some equipment.

Despite the significant overall delay, the building construction completed earlier than planned. Also, the total duration of the project was still shorter than the duration of other Higher Education Projects. These are possibly attributable to the high level of project management capacity of the executing agency and the use of project management software it developed with CQUT (also see Table 4), which enabled constant monitoring and updating of the progress of the project at different levels from overall implementation to individual tasks as well as the status of payments.

Table 7: Planned and actual project periods

	Plan (appraisal)	Actual
Signing on Loan Agreement	March 2002	March 2002
Building construction	December 2004	September 2004
Procurement of equipment	December 2004	December 2008
Training	September 2005	July 2008
Project completion (lengths of months)	September 2005 (43 months)	October 2008 (82 months)

Sources: JICA appraisal documents; project completion report; responses to the questionnaire.

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Due to the nature of the project, a quantitative analysis of the internal rate of return was not possible.

¹⁷ The Higher Education Projects in 22 provinces were implemented in five batches. This project (Chongqing Municipality) was in the first batch, and the fifth (final) batch started in 2006. Therefore, during the implementation of this project, a maximum of 22 provinces implemented the projects at around the same time.

Although the project cost was mostly as planned, the project period exceeded the planned period, and therefore efficiency of the project is evaluated to be fair.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

As planned during the ex-ante evaluation, the facilities and equipment developed under this project are operated and maintained by each targeted university, and the Education Commission of Chongqing Municipality, the executing agency, oversees them. All targeted universities added the developed facilities and the equipment to the universities' fixed assets, and established the operation and maintenance system with clearly defined responsibilities and procedures through establishing regulations such as the procedures for maintenance of large equipment and fund management, work regulations on experiment teaching, the procedures for fixed asset management, etc. There are no issues recognized with respect to the number of staff in charge of operation and maintenance.

3.5.2 Technical Aspects of Operation and Maintenance

No problem was observed in the technical aspects as all targeted universities regularly carry out maintenance and inspection of the facilities and equipment, and outsource repair works to contractors such as suppliers when necessary. To secure the skills necessary to operate and maintain large or sensitive laboratory equipment, the universities appoint full-time technical staff for each instrument or laboratory to manage the equipment in an integrated manner.

3.5.3 Financial Aspects of Operation and Maintenance

The targeted universities except SWU (directly administered by the Ministry of Education) are overseen by the government of Chongqing Municipality, and their budgets consist of subsidies from the municipality and own income such as tuitions and fees. The municipal budget is generally in an increasing trend, and expenditures to the education sectors are also increasing (Table 8).

In all targeted universities, cost for operation and maintenance of the facilities and equipment is part of the university budget and managed under standardized procedures. Normally, certain amount of the operation and maintenance budget is allocated from such expense items as operating expenses. Also, laboratories spend part of the laboratory operating expenses, research fund and income from social services for routine maintenance of equipment. Revenues are constantly increasing in all targeted universities, and operation and maintenance expenses are stable or increasing (Table 9)¹⁸. In the interviews for the ex-post evaluation, both

¹⁸ The evaluator confirmed, through the data provided in the questionnaire, that the revenues and expenditures of each university were at a surplus or balanced in recent years.

management and laboratory-level staff of all targeted universities said that the necessary amounts of operation and maintenance cost were secured.

Table 8: Budget of Chongqing Municipality

Unit: billion yuan

	2009	2010	2011
Fiscal revenue	116.56	96.47	150.81
Fiscal expenditures	180.81	103.33	164.14
of which, total expenditures in education	27.88	37.00	42.15
Higher education	5.52	7.84	12.30
Higher education expenditure per student (yuan)	10,645	13,978	20,064

Source: Response to the questionnaire by the executing agency.

Note: The revenue only includes municipal fiscal revenue. Deficits are compensated by the central government.

Table 9: Operation and maintenance expenditures related to this project

Unit: thousand yuan

	2009	2010	2011
SWU	93	130	120
CTBU	303	280	474
CQUT	111	95	101
CQUST	1,250	1,630	1,940
CUAS	407	511	614
YZNU	45	50	61
SWUPL	150	161	96
CQMU	760	830	91
CQJTU	148	287	303
SISU	53	64	80

Sources: Responses to the questionnaire.

3.5.4 Current Status of Operation and Maintenance

In all targeted universities, the equipment developed by this project is registered in the maintenance and management database. Based on observation and review of usage or inspection records, it was confirmed that the equipment was mostly in good condition. A user of equipment must record the status of usage as well as the condition of the equipment every time they use it.

Most of the laboratories which were visited had posted the operational procedures and maintenance plan for each instrument in a place easily seen by users, and such procedures seem to be well followed. Also, it was observed that for sensitive equipment, the environment of the laboratories was managed by recording room temperature and humidity.

In all universities, breakdowns and other troubles are handled either by repairing by themselves or by outsourcing (sending the equipment to manufacturers or having repair persons visit the laboratory). It was also reported that there were no major problems in purchasing and keeping stock of consumables. Some universities such as SWUPL said that they made efforts to procure equipment that could be easily maintained, for example, to select equipment of high performance rather than with multiple functions so that future maintenance would be easier, to procure the main unit, accessories and spare parts altogether, and to select the same manufacturer as much as possible in order to receive better after-sales services.



All universities keep usage and inspection records for each instrument (the photograph was taken at CQUT)

No major problems were observed in the operation and maintenance system, and therefore sustainability of the project effect is evaluated to be high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed to improve teaching and research at ten major universities in the Municipality of Chongqing through the development of their facilities and equipment as well as providing training for teachers. Relevance of the project is evaluated to be high, as it is in line with (i) the higher education policies of China and Chongqing, (ii) development needs for quantitative and qualitative enhancement of the universities, and (iii) Japan's assistance policies. Effectiveness/impact of the project is also high, based on the observations that the project satisfied such development needs, i.e., it improved education activities by enabling more experiments, and improved research activities through outcomes achieved from advanced equipment and training, and thereby contributed to the promotion of the key industries. Efficiency of the project is evaluated to be fair on the whole: although the project cost was within the plan, the project period significantly exceeded the planned period due to delays resulting from the high concentration of procurement works for the Higher Education Projects that were implemented in many provinces at the same time to certain suppliers, as well as external factors such as SARS and the Great Sichuan Earthquake. Sustainability is evaluated to be high, with no problem observed in institutional, technical and financial aspects, and due to the good status of operation and maintenance of the facilities and equipment developed by the project.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

The targeted universities are recommended to continue the proper use of the facilities and equipment developed under this project in teaching and research, as well as to extend the knowledge that has been gained from exchanges with Japan.

4.2.2 Recommendations to JICA

To take advantage of the relationship that have been cultivated through this project, it could be effective to update the Higher Education Projects website even with respect to the completed projects as much as possible (e.g. reports on exchange after the project completion), so that it would serve as a focal point for continuing and expanded exchanges for universities in China and Japan.

4.3 Lessons Learned

(1) Effectiveness of the training component

In the area of assistance in higher education, in addition to assistance in hardware, it is effective to provide software-type assistance (such as teachers' training) in a way that is responsive to existing needs. Past higher education assistance projects have proven effectiveness in training on individual fields of teaching and research, and this was also confirmed in this project. In addition, university management courses such as the ones implemented under this project could be effective even in short training periods, if participants are selected among those who are candidates for executive positions and have potential to extend the outcomes, and based on careful planning by the host universities as was the case in this project.

(2) Indicator setting for evaluation

In this project, as well as in other Higher Education Projects in China by Japanese ODA loans, although it was targeted to a limited number of universities (and particular facilities/equipment and teachers of those universities), many effectiveness indicators were ones which measure provincial-level situations (such as aggregated education indicators of the province) or indicators which measure aspects beyond the direct benefits of the project. This ex-post evaluation used those indicators to evaluate Impact. In order to measure the net effect of the project, the ex-ante evaluation should distinguish indicators that measure direct outcomes from indicators that do not.

(3) Utilization of strengths of related organizations in project implementation

One of the promoting factors for implementation and effectiveness of this project is that it utilized strengths of related organizations in project implementation, for example, (i) the Chongqing Education Commission and CQUT jointly developed the project implementation system and managed this project using such system, (ii) universities such as SWUPL brought experts in their procurement teams for selection of equipment with high effectiveness and sustainability, and (iii) teachers of the Japanese language program of SISU conducted training in Japanese for teachers before they left for Japan. As such, when the related organizations have high level of skills, those could be actively utilized for efficient and effective project implementation.

(4) Sharing of laboratory equipment

Major laboratory equipment procured under this project was registered in the Chongqing municipal platform for sharing large-scale laboratory equipment, and is widely open for use by external institutions through simple web-based procedures to search and apply for certain equipment. This system could be a sample model for common use of equipment. Projects that

procure expensive laboratory equipment often aim at improvement of operation rates by sharing the equipment with others. Therefore, when designing similar systems of equipment sharing, it is advisable to refer to the system of the Chongqing platform.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	Target: 10 universities in Chongqing Municipality	Target: same as planned
(a) Hardware		
i) Building construction	11 buildings such as research building; total floor area of 103,443 m ²	Total floor area of 137,371 m ²
ii) Procurement of educational equipment	Biology, electronics, machines, physics, materials, medicine, basic education, information, etc.	Areas of education: same as planned Total 11,360 items
(b) Software		
Teachers' training in Japan or acceptance of experts from Japan	Total 192 persons (including 40 experts from Japan)	Total 257 persons from 52 Japanese universities or institutions (including 4 experts from Japan)
2. Project Period	March 2002 – September 2005 (43 months)	March 2002 to October 2008 (82 months)
3. Project Cost		
Amount paid in Foreign currency	4,683 million yen	4,480 million yen
Amount paid in Local currency	2,662 million yen (177 million yuan)	2,643 million yen (186 million yuan)
Total	7,345 million yen	7,123 million yen
Japanese ODA loan portion	4,683 million yen	4,480 million yen
Exchange rate	1 yuan = 15 yen (As of September 2001)	1 yuan = 14.25 yen (Average between 2003 and 2008)

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan

Yunnan Higher Education Project

External Evaluator: Naomi Murayama, OPMAC Corporation

0. Summary

The project objective was to improve higher education in Yunnan Province quantitatively and qualitatively by supporting the construction of buildings, the procurement of equipment and the training of teachers in the target universities. This objective has been highly relevant to the country's development plan and development needs as well as to Japan's ODA policy; therefore its relevance is high. Despite a significant increase in students from the project commencement to the ex-post evaluation, the effectiveness and impact of the project was high because quantitative indicators on education and research (building areas, amount of educational equipment) and qualitative indicators (number of key faculties and laboratories, number of research papers etc.) have been improving. The outputs were essentially completed in line with the initial plans, and the project cost was within the plan. The project period, however, significantly exceeded the plan; therefore efficiency of the project is fair. No major problems have been observed in the operation and maintenance system; therefore the sustainability of the project effects is high.

In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Location



Library

Yunnan University of Finance and Economics

1.1 Background

In the Yunnan Province 10th Five-Year Plan (2001-2005), Yunnan provincial government Government planned to make further efforts toward the establishment of a market economy and toward economic growth, targeting a GDP growth rate of more than 8 % (4.9% in 2000).

This was for rectification of disparity among regions. The provincial government recognized the necessity to expand higher education in order to attain the objective, and announced a policy to raise higher education enrollment from about 189,000 in 2000 to about 320,000 in 2005. Furthermore, the government put a priority on the development and enforcement of higher education institutions for poverty alleviation in urban areas. Vocational training by state enterprises was to be provided for laid-off employees and education was promoted in rural areas through training programs for teachers dispatched to these areas.

1.2 Project Outline

The Objective of this project was to improve higher education in Yunnan Province quantitatively and qualitatively by developing educational infrastructure such as school buildings and equipment and by enhancing human resources through the training of teachers in 11 universities¹ which play an important role in disparity rectification between coastal areas, in rural development and in state enterprise reform, thereby contributing to market-oriented economic reform and disparity rectification in China.

Loan Approved Amount/ Disbursed Amount	4,540 million yen/ 4,328 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March, 2002/ March, 2002
Terms and Conditions	Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: Bilateral tied
Borrower/ Executing Agency	The Government of the People's Republic of China/ Yunnan Provincial People's Government
Final Disbursement Date	July, 2009
Main Contractor (Over 1 billion yen)	—
Main Consultant (Over 100 million yen)	—
Feasibility Studies, etc.	1. F/S: "Midwest China Human Resource Development Project Using the Loan from OECF of Japan, Feasibility Report" (Yunnan Engineering Consulting Company, April 2001) 2. JICA report: 1) "FY 2001 Special Assistance for Project Implementation (SAPI) for the Higher Education Project in China" (August 2003)

¹ Yunnan University, Kunming University of Science and Technology, Yunnan Normal University, Yunnan Agricultural University, Kunming Medical College, Yunnan University of Finance and Economics, Southwest Forestry University, Yunnan Nationalities University, Yunnan Arts University, Yunnan University of Traditional Chinese Medicine, and Dali University.

	2) “SAPI for a Higher Education Project in the People’s Republic of China” (March 2004) 3) “SAPI for a Higher Education Project in China” (May 2005)
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2. Outline of the Evaluation Study

2.1 External Evaluator

Naomi Murayama, OPMAC Corporation

2.2 Duration of Evaluation Study

Duration of the Study: August, 2012 – September 2013

Duration of the Field Study: March 15, 2013 – April 3, 2013, May 27, 2013 – June 3, 2013

3. Results of the Evaluation (Overall Rating: A²)

3.1 Relevance (Rating: ③³)

3.1.1 Relevance to the Development Plan of China

China was admitted to the World Trade Organization (hereinafter referred to as WTO) in December 2001 and was aiming at high rates of economic growth, openness and reform through industrial structural adjustment. Disparities between coastal and inland areas, and between urban and rural areas were issues in China.

This project sought 1) to tackle industrial structural adjustment through the development of highly-skilled human resources in key industries in Yunnan Province, 2) to respond flexibly to market needs and international competition after becoming a WTO member state through the development of high-quality human resources in the fields of law, finance and trade, and 3) to rectify the disparities between coastal and inland areas and between urban and rural areas. These project objectives were in line with “10th Five-Year Plan for National Economic and Social Development (2001-2005)”, “10th Five-Year Plan for Education”, “China Western Development” and “Yunnan Province 10th Five-Year Plan for Education”.

At the time of ex-post evaluation, the “National Mid- and Long-Term Reform and Development Plan for Education Sector (2010-2020)” had been formulated in addition to the “12th Five-Year Plan for National Economic and Social Development (2011-2015)”, “12th Five-Year Plan for Education”, “China Western Development” and “Yunnan Province 12th Five-Year Plan for Education” and China have been promoting human resource development and regional disparity rectification for further economic growth, openness and reform.

² A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

³ ③: High, ②: Fair, ①: Low

In Yunnan Province, the construction of Kunming sub-center in Chenggong County was suggested in May 2003 at almost exactly the same time as educational reform at national and provincial levels (Chenggong County later became Chenggong District in May 2011⁴). Part of this plan was the establishment of an academic city in Chenggong District. Nine universities, including the target universities of the project, have been gradually constructing and relocating their campuses since 2009. In addition, there is an overall restructuring of the universities within the province along with other significant reforms such as campus reorganization, integration and university allocation.

As described above, some of the target universities of this project were relocated due to the new idea of Chenggong academic city. However, this does not affect evaluation of the project's relevance for the following reasons:

- (1) Since the campus relocation plan of the provincial government was made and approved after commencement of this project, there had been no such assumption at the time of project appraisal. Therefore this is not contradictory to the relevance of project planning and the selection of the target universities.
- (2) The equipment procured by this project is still owned and used by the same universities where a campus was sold or transferred, the equipment was transferred to the new campus site).
- (3) In some cases in which a university campus, including buildings constructed by this project, was sold or transferred after campus relocation, the buyer or new owner has been a higher education institute. The campus is therefore still in use according to its original purpose. Of the three target universities that have sold/transferred their campuses, two of them have sold/transferred them to other target universities⁵.

3.1.2 Relevance to the Development Needs of China

At the time of appraisal, the quantitative demand for higher education was growing along with the increase in the number of secondary graduates. However, the lack of facilities and teaching staff of universities was an issue. It was necessary to strengthen facilities, human resources and the financial aspects in order to address this challenge. This project supported the strengthening of facilities and human resources; therefore it was consistent with the development needs of China.

⁴ The county was changed into a district. In Chinese administrative hierarchy, cities are found above counties. However in a big city such as Kunming city (capital city of Yunnan province), the city includes districts, counties and autonomous counties. Kunming city, is currently composed of 6 districts, 1 city, 4 counties and 3 autonomous counties.

⁵ Yunnan University made a sales agreement with Kunming University (not a target university of this project) on its old campus and it relocated to a new campus in Chenggong college town. The Bailong Campus of Kunming University of Science and Technology was sold to Southwest Forestry University. The Lóngquánlù campus of Yunnan Normal University was transferred to Yunnan University of Finance and Economics (a target university) with compensation. (Transferring with compensation means transferring with a concessional price, not the market value.)

Table 1: Number of Postsecondary Students and Tertiary Enrollments in Yunnan Province

	Unit: person		
	2005 (forecast at appraisal)	2005 (actual)	2009 (actual)
Secondary graduates	107,500	116,030	192,310
Tertiary enrollments	55,000	84,487	161,266

Source: Yunnan Province Education Department

As shown in Table 1, at the time of the ex-post evaluation, the numbers of graduates from high schools and enrollment into higher education had been increasing more than estimated. This indicates a growing need for higher education⁶. Moreover, the project was implemented at the same time as higher education reform in China which required intensive improvement of facilities and in the quality of lecturers. The higher education reform is still continuing. The project objectives are also consistent with the development needs of universities.

3.1.3 Relevance to Japan's ODA Policy

Japan's ODA Charter at the time of appraisal placed importance on assistance in the Asian region and assistance in human resource development; therefore the project objectives were consistent with Japan's ODA policy.

Furthermore, the Country Assistance Policy for China, the Medium-Term Strategy for Overseas Economic Cooperation Operations and the Country Assistance Strategy at the time of appraisal put priority on human resource development from the viewpoint of support for openness and reform and post-WTO economic reform, as well as on assistance in the Mid-Western Region of China for disparity rectification. The project objectives were consistent with Japan's aid policies.

This project has been highly relevant to China's development plan, development needs, as well as to Japan's ODA policy; therefore its relevance is high.

3.2 Effectiveness⁷ (Rating: ③)

This project aimed at quantitative and qualitative improvement of higher education in Yunnan Province by supporting the construction of buildings, the procurement of equipment and training of teachers in the target universities. Improvement of the indicators of project objectives was usually identified. There were 68 universities in Yunnan Province as of March 2013. Only eleven out of these 68 were target universities. It is difficult for the project to directly contribute to quantitative and qualitative improvement of all the higher education institutions in Yunnan Province. Therefore, only quantitative and qualitative improvement in the target universities was analyzed in this section.

⁶ Higher education includes vocational schools, universities (colleges), universities (undergraduate) and graduate schools. Although general higher education mentioned here includes only universities (colleges and undergraduate) graduate schools are usually included as well.

⁷ To be rated in judging effectiveness by taking impact into account.

3.2.1 Quantitative Effects (Operation and Effect Indicators)

In this ex-post evaluation study, the evaluator analyzed the quantitative effects using the indicators directly related to the three project components, i.e. building construction, educational equipment and training. Specifically, contributions (effects) to increasing the number of students were evaluated by analyzing school building area (floorage), the monetary value per student of educational equipment and the utilization rate of school buildings and educational equipment for quantitative improvement.

For qualitative improvements, educational environment by floorage per student and the monetary value per student of educational equipment were analyzed. Then, the project's contributions to aspects of education and research were evaluated based on especially the number of key faculties, key laboratories, research papers, research projects, patents for invention and so on.

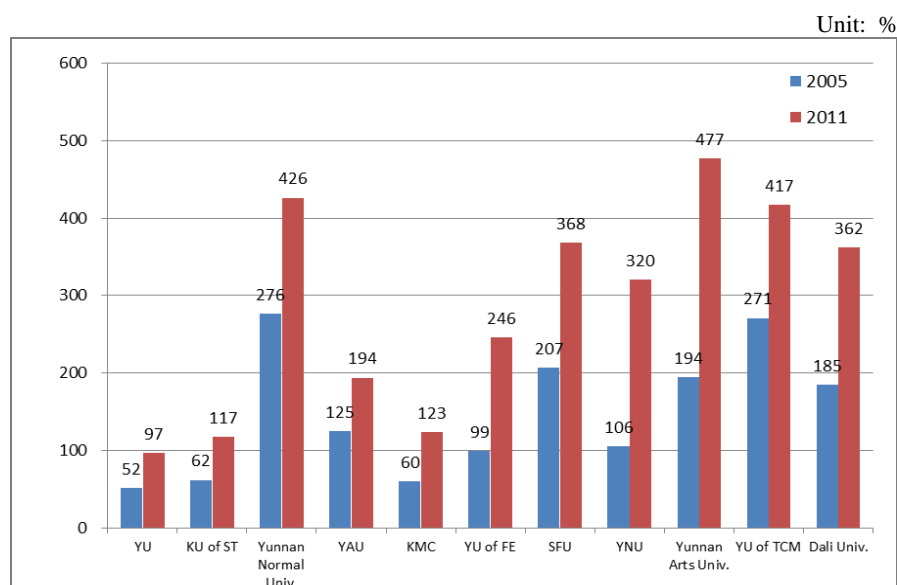
Furthermore, the influence of campus relocation on project effectiveness was judged based on the utilization rate of the main school buildings and equipment.

3.2.1.1 Quantitative Indicators

(1) Changes in the number of students

In China, the number of university students has sharply increased since the release of the "Action Plan for Educational Vitalization Facing the 21st Century" in 1998, which aimed to increase the university enrollment rate from 9.8% in 1998 to 15% in 2010. In the meantime, the number of universities in Yunnan Province increased from 34 in 2000 to 68 as of March 2013. The number of students also increased from 189 thousand in 2000 to 738 thousand as of December 2012 (a rise of 390%).

The increase in number of students is prominent in the target universities. *Figure 1* below shows the increase rate of student enrollment in 2005 and 2011 based on the number of students in 2000. There was an increase of 146,511 students, a rise of 229%, in 10 years from 63,967 (2000) to 210,478 (2011) within overall target universities.



Source: Responses to the questionnaire

Note: YU: Yunnan University, KU of ST: Kunming University of Science and Technology, YAU: Yunnan Agricultural University, KMC: Kunming Medical College, YU of FE: Yunnan University of Finance and Economics, SFU: Southwest Forestry University, YUN: Yunnan Nationalities University, and YU of TCM: Yunnan University of Traditional Chinese Medicine.

Figure 1: Growth rate of students in the target universities

(2) Change in school building areas

To meet the increase in university students mentioned in the above (1), each target school constructed education and laboratory buildings, libraries, gymnasiums and so on. Currently the universities are half way through their campus relocation plans and therefore, in 2011, there were some differences in performance, increased rates and project share⁸ among universities which had already completed campus relocation, universities that were planning to relocate and those which had sold or bought their campuses. However, there was an increase in school building areas in all universities and the figures are continuing to increase. This project is involved in 1.2% to 24.9% of all school building areas (Figure 2). Although this does not cover much as a whole, it shows a significant influence on building construction and is a fair share in the target universities of this project. This is illustrated in sites like Yunnan Agricultural University which increased its school building area by 8% from 2000 to 2011. A number of people from each target university felt that Japan's ODA with its lower interest rate compared to other commercial banks, has partly solved the building and equipment shortage while there remained a need for massive building construction and equipment procurement as part of higher education reform. From the above, it can be considered that to a certain degree the project has

⁸ The share of this project is a percentage of the project target areas within the actual building areas as of 2011. For this reason, Yunnan University which has relocated its campus in 2010 and Kunming Medical College and Yunnan University of Traditional Chinese Medicine which did not conduct building constructions within this project are not reflected in Table 2.

contributed to the quantitative indicators such as school building areas.

Table 2: Change in school building area at the target universities

Unit: m²

	Baseline (2000)	Actual (2011)	Growth rate (%)	Project area	Share of the project (%)
Yunnan University	393,976	815,338	107	—	—
Kunming University of Science and Technology	431,094	569,629	32	19,014	3.3
Yunnan Normal University	392,139	929,400	137	11,000	1.2
Yunnan Agricultural University	178,684	193,254	8	48,044	24.9
Kunming Medical College	96,974	530,000	447	—	—
Yunnan University of Finance and Economics	104,792	269,180	157	48,384	18.0
Southwest Forestry University	129,466	483,936	274	42,745	8.8
Yunnan Nationalities University	150,775	589,320	291	13,506	2.3
Yunnan Arts University	64,638	131,117	103	12,068	9.2
Yunnan University of Traditional Chinese Medicine	78,519	125,301	60	—	—
Dali University	—	235,694	—	7,480	3.2

Source: JICA appraisal documents, Responses to the questionnaire

(3) Change in the monetary value of educational equipment

In Yunnan Province, not only the floorage of school buildings but also the monetary value of educational equipment has increased annually against the increase in the number of university students. The Undergraduate University Establishment Standards of China by the Ministry of Education of the People's Republic of China has the following requirements: that the monetary value of educational equipment per student for science faculties is not less than RMB 5,000; for literature and social faculties it should be not less than RMB 3,000; for gymnastic and art faculties not less than RMB 4,000. All of the target universities have fulfilled the requirement in their performances in 2011. The monetary value of educational equipment and development of this project was 2,173.5 million JPY and the total number of enrolled students in 2011 was 210,478, therefore it is simply calculated that the benefit of such educational equipment per student was 10,326 JPY (approximately RMB 690 with the exchange rate of RMB 1=15 JPY) in the project target universities. From the above, this project is considered to have influenced the increased amount of the monetary value of educational equipment.

Table 3: Monetary value of educational equipment per student

Unit: RMB

	Baseline (2000)	Actual (2005)	Actual (2011)
Yunnan University	16,596	17,981	18,129
Kunming University of Science and Technology	4,579	5,994	8,216
Yunnan Normal University	4,295	5,199	5,715
Yunnan Agricultural University	3,800	7,405	9,360
Kunming Medical College	2,482	5,133	12,506
Yunnan University of Finance and Economics	About 26,700	About 31,800	About 27,600
Southwest Forestry University	4,000	8,000	10,000
Yunnan Nationalities University	3,800	4,205	10,775
Yunnan Arts University	12,427	5,727	4,449
Yunnan University of Traditional Chinese Medicine	—	4,214	5,902
Dali University	4,500	5,600	6,300

Source: Responses to the questionnaire

Note: Although Yunnan University of Finance and Economics and Yunnan Arts University fulfilled the national standard requirement, their actual values decreased in 2011 because of the large amount of disposed educational equipment (Yunnan University of Finance and Economics) and increased number of students (Yunnan Arts University).

(4) Utilization rate of school buildings and educational equipment

As mentioned above, the school building area and the monetary value of educational equipment per student increased as each target school quantitatively responded to the increase of students. However, effectiveness cannot be discussed if these buildings and equipment are not actually utilized.

Table 4 shows the utilization rate of major school buildings. In every university, the utilization rate is more than 90% since the buildings are constructed and completed with immediate preparations to start utilization. This rate is very high. There is no data for Yunnan University in 2011 since its campus, including the school buildings constructed by this project, was sold to Kunming College in 2010. However, the evaluator visited Kunming College at the time of the project evaluation and confirmed during an interview with the university's infrastructure administrator that the buildings were well utilized as the main buildings of the College.

Table 4: Utilization rate of major school buildings

	Unit: %			
	2005	2006	2009	2011
YU	100	100	100	—
KU of ST	More than 50	More than 90	More than 90	More than 90
Yunnan Normal University	—	90	100	90
YAU	100	100	100	100
KMC	No construction	—	—	—
YU of FE	More than 30	More than 90	More than 90	More than 90
SFU	60	60	More than 95	100
YNU	More than 90	More than 90	More than 90	More than 90
Yunnan Arts Univ.	—	—	More than 90	100
YU of TCM	No construction	—	—	—
Dali University	100	100	100	100

Source: Responses to the questionnaire

Note: YU: Yunnan University, KU of ST: Kunming University of Science and Technology, YAU: Yunnan Agricultural University, KMC: Kunming Medical College, YU of FE: Yunnan University of Finance and Economics, SFU: Southwest Forestry University, YUN: Yunnan Nationalities University, and YU of TCM: Yunnan University of Traditional Chinese Medicine.

Table 5: Utilization rate of major equipment

	Unit: %		
	2005	2009	2011
YU	92.3	More than 90	97.1
KU of ST		Analysis testing equipment: 75 Valuable equipment: 60 Electronic equipment: >90 Machinery and electric equipment: Approx.70	Analysis testing equipment: 78 Valuable equipment: 62 Electronic equipment: 75 Machinery and electric equipment: approx.73
Yunnan Normal University	0	More than 90	80
YAU	—	More than 90	100
KMC	—	70	More than 80
YU of FE	97	More than 90	90
SFU	80	Analysis testing equipment: 70 Valuable equipment: 55 Electronic equipment: >90 Machinery and electric equipment: approx. 80	Analysis testing equipment: 70 Valuable equipment: 55 Electronic equipment: >90 Machinery and electric equipment: approx. 80
YNU	—	More than 90	More than 90
Yunnan Arts Univ.	—	More than 90	100
YU of TCM	—	More than 80	More than 90
Dali University	95	More than 90	95

Source: Responses to the questionnaire

Note: YU: Yunnan University, KU of ST: Kunming University of Science and Technology, YAU: Yunnan Agricultural University, KMC: Kunming Medical College, YU of FE: Yunnan University of Finance and Economics, SFU: Southwest Forestry University, YUN: Yunnan Nationalities University, and YU of TCM: Yunnan University of Traditional Chinese Medicine.

Table 5 shows the utilization rate of major equipment at the target universities. This is also a very high ratio. Although the utilization rate of valuable machinery worth more than RMB 400,000 is approximately 55 - 60% in some science universities, this is rather a general figure for the utilization rate for valuable machinery. As seen above, regarding quantitative improvement, the number of students at the target schools drastically increased, in the lowest case this growth rate was 96.9% (Yunnan University) and in the highest case it was 477.3 % (Yunnan Arts University). Despite this, however, the monetary value of educational equipment per student increased at all the target universities. Although the project share varies from a lowest rate of 1.2% (Yunnan Normal University) to a highest rate of 24.9% (Yunnan Agricultural University), a number of people from each target university felt that Japan's ODA

with its lower interest had significantly helped in solving the building and equipment shortage while there remained a need for massive building constructions and equipment procurement during higher education reform. Therefore, it is considered that the project has contributed to the increase in the number of students and the pressure reduction of university scale expansion in response to the trend of student increases.

3.2.1.2 Qualitative improvement

(1) Floorage and monetary value of educational equipment per student

The Undergraduate University Establishment Standards of China required that the 2006 national standard of floorage per student was more than 30 m². Yunnan University of Finance and Economics, Yunnan Nationalities University, Yunnan Arts University, and Yunnan University of Traditional Chinese Medicine did not fulfill the requirement (Table 6) in 2011 and their student increase rates were 246%, 320%, 477% and 417%, respectively. These four universities were unable to keep up with building development needs caused by significantly rapid student increases as of 2011. However, Yunnan Nationalities University, Yunnan Arts University, and Yunnan University of Traditional Chinese Medicine are planning on moving some parts of their schools to new campuses, and thus the floorage issue should be solved in a few years. Considering the plan of transferring to new campuses, the floorage per student at the target universities had either been improved compared to the standard value confirmed at the time of project appraisal in 2000 or reached the national standard.

The increased floorage per student achieved by this project is not so large when compared to the overall increase in floorage. However, in Yunnan Agricultural University, for example, which has developed its school buildings most among the universities in this project, would not have been able to fulfill the national standard of floorage without these new buildings. Furthermore, the floorage of Yunnan University of Finance and Economics and Yunnan Arts University would have been below the standard value without the project's buildings. Therefore, it can be considered that this project has prevented the educational environment worsening as the result of student increases.

Table 6: Floorage per student

Unit: m²

	Baseline (2000)	Actual (2011)	
		Floorage per student	Increase of the floorage per student through the project
Yunnan University	37.3	39.00	1.50
Kunming University of Science and Technology	27.7	35.88	0.46
Yunnan Normal University	47.2	35.70	0.49
Yunnan Agricultural University	32.5	31.65	2.97
Kunming Medical College	21.8	56.77	—
Yunnan University of Finance and Economics	22.5	28.57	About 2.76
Southwest Forestry University	41.4	32.42	2.02
Yunnan Nationalities University	31.8	29.45	About 0.67

	Baseline (2000)	Actual (2011)	
		Floorage per student	Increase of the floorage per student through the project
Yunnan Arts University	44.1	26.11	1.42
Yunnan University of Traditional Chinese Medicine	39.2	26.23	—
Dali University	20.7	34.60	0.43

Source: Responses to the questionnaire

In regards to the monetary value of educational equipment per student, all have fulfilled the standard value as seen in *Table 3*. Moreover, discussed in 3.2.1.1 Quantitative improvement (3), Changes in the monetary value of educational equipment, this project has contributed to increases in the value of educational equipment.

From the above, it can be seen that there were improvements in the educational environment as the overall floorage per student and the monetary value of educational equipment showed a trend toward some improvement. Building construction and equipment procurement under this project have contributed to the improvement of such values.

(2) Change in number of key faculties and key laboratories

In China, since “The opinion of some, concerning the development of higher education institutions and key faculties” by the State Education Commission in 1993, the state or provincial government has designated faculties and laboratories which closely relate to national development strategies and public welfare. These are labeled key faculties and key laboratories and funds are intensively supported by the government in order to raise education and research to an international level (see *Table 7* and *Table 8*)⁹.

Table 7: Number of key faculties

	Baseline	Target	Actual	
	2000	2005	2005	2011
Yunnan University	NL: 0, PML: 10	NL: 3, PML: 20	NL: 2, PML: 27	NL: 4, PML: 37
Kunming University of Science and Technology	NL: 0, PML: 14	NL: 5, PML: 25	NL: 1, PML: 18	NL: 2, PML: 23
Yunnan Normal University	NL: 0, PML: 8	NL: 2, PML: 18	NL: 0, PML: 11	NL: 0, PML: 20
Yunnan Agricultural University	NL: 0, PML: 8	NL: 2, PML: 13	NL: 0, PML: 13	NL: 0, PML: 25
Kunming Medical College	NL: 0, PML: 8	NL: 0, PML: 16	NL: 0, PML: 8	NL: 0, PML: 19
Yunnan University of Finance and Economics	NL: 0, PML: 3	NL: 0, PML: 6	NL: 0, PML: 7	NL: 0, PML: 14
Southwest Forestry University	NL: 0, PML: 4	NL: 0, PML: 9	NL: 0, PML: 5	NL: 0, PML: 9
Yunnan Nationalities University	NL: 0, PML: 4	NL: 0, PML: 8	NL: 0, PML: 8	NL: 0, PML: 13
Yunnan Arts University	NL: 0, PML: 3	NL: 0, PML: 5	NL: 0, PML: 4	NL: 0, PML: 4
Yunnan University of Traditional Chinese Medicine	NL: 0, PML: 4	NL: 0, PML: 6	NL: 0, PML: 5	NL: 0, PML: 15
Dali University	NL: 0, PML: 0	NL: 0, PML: 5	NL: 0, PML: 5	NL: 0, PML: 7

Source: Responses to the questionnaire

Note: NL (National Level): National key faculty, PML (Provincial or Ministerial Level): Provincial or ministerial key faculty

⁹ National key faculties are designated by the State government. The provincial or ministerial key faculties are designated by the provincial government, while ministerial key faculties are designated by the provincial government or ministries such as the Ministry of Education.

Table 8: Number of key laboratories

	Baseline	Actual	
	2000	2005	2011
Yunnan University	NL: 0, PML: 0	NL: 1, PML: 4	NL: 1, PML: 13
Kunming University of Science and Technology	NL: 0, PML: 1	NL: 1, PML: 3	NL: 3, PML: 3
Yunnan Normal University	NL: 0, PML: 0	NL: 0, PML: 3	NL: 1, PML: 6
Yunnan Agricultural University	NL: 0, PML: 3	NL: 1, PML: 6	NL: 2, PML: 17
Kunming Medical College	NL: 0, PML: 1	NL: 0, PML: 1	NL: 0, PML: 2
Yunnan University of Finance and Economics	NL: 0, PML: 0	NL: 0, PML: 0	NL: 0, PML: 4
Southwest Forestry University	NL: 0, PML: 0	NL: 0, PML: 0	NL: 0, PML: 3
Yunnan Nationalities University	NL: 0, PML: 0	NL: 0, PML: 0	NL: 0, PML: 1
Yunnan Arts University	NL: 0, PML: 0	NL: 0, PML: 0	NL: 0, PML: 1
Yunnan University of Traditional Chinese Medicine	NL: 0, PML: 0	NL: 0, PML: 2	NL: 3, PML: 8
Dali University	NL: 0, PML: 0	NL: 0, PML: 1	NL: 0, PML: 2

Source: Responses to the questionnaire

Note: NL (National Level): National key laboratory, PML (Provincial or Ministerial Level): Provincial or ministerial key laboratory

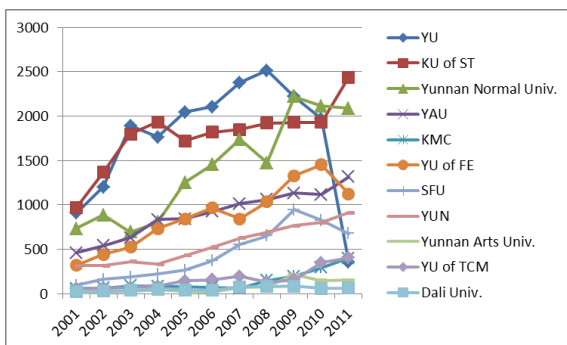
The target universities could not match the target of the number of national key faculties. However, 186 faculties, that exceeded the number of target (131 faculties), were designated as provincial or ministerial key faculties as of 2011. A target is not set for key laboratories. The number of national key laboratories rose to 10 in 2011 from 0 in 2000 and the number of provincial or ministerial key laboratories rose to 60 in 2011 from 10 in 2000. In accrediting key faculties and key laboratories, the enrichment of facilities and equipment (including libraries) is included in the screening criteria. Therefore, some target universities pointed out that the development of buildings and equipment under the project contributed to the accreditation of key faculties and key laboratories.



The Modern Analysis Measurement Center built by this project became a key laboratory. (Yunnan University)

(3) Number of research papers, research projects, patents for inventions etc.

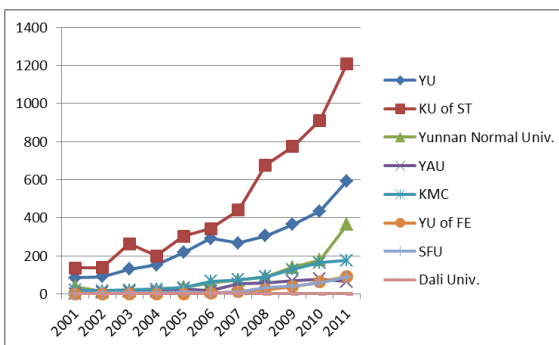
Research papers published in China and articles published in scholarly journals such as Science Citation Indicators (SCI) are increasing at all the target universities. In particular, the number of articles published in international journals such as SCI increased after the completion of equipment procurement under the project.



Source: Responses to the questionnaire

Note: YU: Yunnan University, KU of ST: Kunming University of Science and Technology, YAU: Yunnan Agricultural University, KMC: Kunming Medical College, YU of FE: Yunnan University of Finance and Economics, SFU: Southwest Forestry University, YUN: Yunnan Nationalities University, and YU of TCM: Yunnan University of Traditional Chinese Medicine.

Figure 2: Number of domestic articles



Source: Responses to the questionnaire

Note 1: SCI (Science Citation Indicators), EI (Engineering Index), ISTP (Index to Scientific & Technical Proceedings)

Note 2: YU: Yunnan University, KU of ST: Kunming University of Science and Technology, YAU: Yunnan Agricultural University, KMC: Kunming Medical College, YU of FE: Yunnan University of Finance and Economics, SFU: Southwest Forestry University, YUN: Yunnan Nationalities University, and YU of TCM: Yunnan University of Traditional Chinese Medicine.

Figure 3: Number of articles in SCI, EI, ISTP

There have been many articles related to the project. Especially in Kunming University of Science and Technology (268, of which 13 articles have been published in international journals such as SCI), Yunnan Agricultural University (272, of which 15 articles have been published in international journals such as SCI), and Yunnan Nationalities University (172) there have been a lot of articles related to the project¹⁰. The connections with the project are as follows: 1) it became possible to publish articles because the researchers could make higher-level experiments due to the procured equipment; 2) the researchers took advantage of training in Japan to publish articles. Moreover, some trainees undertook joint research with professors in Japanese universities where they went for training and they then published the articles (see Box 1).

Box 1: Quality Improvements in Education and Research

§ Kunming University of Science and Technology

Students from the College of Mechanical and Electrical Engineering won the national first prize and third prize in the “Wisdom fish”(or Huiyu) group competition in the third national competition in mechanics innovation design for undergraduate students and the fifth “wisdom fish” national competition in engineering technological innovation design. They used equipment procured by this project and this performance is a contributing factor to the quality improvements in the level of education and research. In Kunming University of Science and Technology, the number of research papers, many of which were published in SCI or EI, together with the number of patents significantly increased after project implementation. Although this project may not be the only reason for these improvements in the level of education and research, there were definitely some impacts by the project, either direct or indirect.

¹⁰ The number within the brackets is total number of articles related to the project.

§ Kunming Medical College

This university plays a major role in the field of medical education and research in Yunnan Province and it has improved its experimental environment using equipment procured by this project. For example, the DNA sequencing system and GC/MS purchased by this project are some of the most advanced examination and analysis equipment available in current forensic medicine. The use of such equipment has relevance to society and contributes to the higher level hardware perspectives of human resources development in forensic medicine, science research and social services, thus meeting the needs of the market. Teachers who participated in training in Japan introduced the situation of Japanese hospitals and medical education through lectures and training for care staff after they returned to China. In addition to this, some presented Japanese culture or brought back experimental methods that they learned in Japan, teaching them to their laboratory staff. Such advanced experimental equipment, methods, expertise and supervision principles have had positive effects on the human resources development of the schools as well as on the improvement of scientific research skills.

Most universities showed a significant increase in the number of research projects. Of these projects, at least 211 projects in total from the target universities, including some national projects such as “Research on the Economic Growth Model in Shangri-La District (2006-2010)” conducted by Yunnan Nationalities University, have involved a use of the projects buildings, equipment or teaching staff who participated in the training in Japan. The project thus had direct or indirect influences.

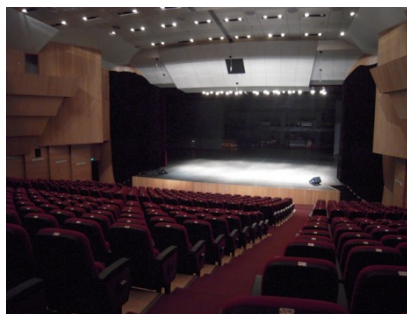
Table 9: Number of research projects

	Baseline (2000)	Actual (2005)	Actual (2011)
Yunnan University	341	787	1,443
Kunming University of Science and Technology	200	355	853
Yunnan Normal University	120	202	280
Yunnan Agricultural University	90	190	494
Kunming Medical College	17	200	282
Yunnan University of Finance and Economics	90	126	306
Southwest Forestry University	N/A	218	342
Yunnan Nationalities University	0	0	0
Yunnan Arts University	N/A	6	47
Yunnan University of Traditional Chinese Medicine	16	45	89
Dali University	27	76	113

Source: Responses to the questionnaire

Box 2: Example of Social Contribution —Yunnan Arts University—

The education buildings of Yunnan Arts University constructed by this project include a training hall, museum, art gallery, and an ethnic artwork showroom. They were officially opened in March 2003. Currently, the training hall, museum and art gallery are actually in use. From March 2009 to December 2012, 313 performances were given in the training hall. In the museum, 200 exhibitions and student graduation product shows were conducted. There were both international and domestic exhibitions including ones from the art, design and art-culture departments from Lucerne Design School in Switzerland, from Yunnan Artists Association, and others. There was a total of 64,500 visitors.



Inside of the Training Hall

Because of such distinguished domestic/international programs, the university has become an important center for art education, and the achievements by the teachers and students have also been presented. The hall and the museum have contributed to human resource development, scientific research and social culture as places of artistic communication within and outside the institute. They have also acted as a bridge for artworks and artists leading to the world.

Although some universities claim to have no social services, the number has rapidly increased in those universities with records. For example, the DNA sequencing system and GC/MS at Kunming Medical College that were purchased by this project have contributed to the hardware perspectives of social services as seen in *Box 1*. Furthermore, the social services of Yunnan Arts University (189 cases: Table 10) have contributed to social services in the field of social culture using the hall constructed by this project; a direct effect of the project (See Box 2).

Table 10: Number of social services

	Baseline (2000)	Actual (2005)	Actual (2011)
Kunming University of Science and Technology	96	205	366
Yunnan Normal University	32	0	2
Yunnan Agricultural University	29	39	84
Kunming Medical College	4	58	85
Yunnan University of Finance and Economics	100	160	200
Southwest Forestry University	N/A	110	170
Yunnan Arts University	0	0	189

Source: Responses to the questionnaire

Note: this table includes only universities which have records of social services.

Many of the award winning research projects related to this project have involved either the participation of teaching staff trained in Japan or the utilization of equipment and facilities provided by this project. These projects include “Technical Assistance for Highway Construction in Plateau Mountainous Areas” by Kunming University of Science and Technology (National Science and Technology Advancement Awards Second Prize in 2010) or “Study on the vividness and creativity of the adaptation of “Ah Q—The Real Story” by Baichen Chen” (National First Prize Award in 2009). Moreover, the number of patents for invention is rapidly increasing in science universities.

Table 11: Number of patents for invention

	Baseline (2000)	Actual (2005)	Actual (2011)
Kunming University of Science and Technology	6	40	485
Yunnan Normal University	0	2	6
Yunnan Agricultural University	2	4	91
Kunming Medical College	0	0	1
Yunnan University of Finance and Economics	0	0	6
Southwest Forestry University	N/A	3	45
Yunnan University of Traditional Chinese Medicine	0	1	5

Source: Responses to the questionnaire

Note: this table includes only universities which have records of patents for inventions.

Faculties at undergraduate schools and courses at graduate schools have also demonstrated an upward trend at all the target universities (see Table 12). As seen in southwest Forestry University, the establishment of three doctoral courses was approved in 2013 since the requirement was fulfilled by this project, hence the project gave a direct impact on the increase in the establishment of faculties and courses in some universities (Box 3).

Table 12: Number of faculties and courses

	Baseline	Target	Actual	
	2000	2005	2005	2011
Yunnan University	Undergrad.: 52 Master: 55 Doctor: 1	Undergrad.: 77 Master: 95 Doctor: 3	Undergrad.: 80 Master: 105 Doctor: 3	Undergrad.: 86 Master: 208 Doctor: 103
Kunming University of Science and Technology	Undergrad.: 67 Master: 38 Doctor: 8	Undergrad.: 68 Master: 90 Doctor: 23	Undergrad.: 73 Master: 100 Doctor: 27	Undergrad.: 83 Master: 163 Doctor: 43
Yunnan Normal University	Undergrad.: 30 Master: 15 Doctor: 0	Undergrad.: 40 Master: 30 Doctor: 0	Undergrad.: 53 Master: 41 Doctor: 0	Undergrad.: 70 Master: 98 Doctor: 1
Yunnan Agricultural University	Undergrad.: 24 Master: 93 Doctor: 0	Undergrad.: 47 Master: 20 Doctor: 2	Undergrad.: 45 Master: 214 Doctor: 15	Undergrad.: 56 Master: 276 Doctor: 22
Kunming Medical College	Undergrad.: 9 Master: 24 Doctor: 1	Undergrad.: 10 Master: 25 Doctor: 1	Undergrad.: 13 Master: 28 Doctor: 1	Undergrad.: 22 Master: 42 Doctor: 17
Yunnan University of Finance and Economics	Undergrad.: 12 Master: 2 Doctor: 0	Undergrad.: 30 Master: 30 Doctor: 0	Undergrad.: 29 Master: 29 Doctor: 0	Undergrad.: 37 Master: 67 Doctor: 0
Southwest Forestry University	Undergrad.: 27 Master: 11 Doctor: 0	Undergrad.: 40 Master: 13 Doctor: 0	Undergrad.: 42 Master: 13 Doctor: 0	Undergrad.: 60 Master: 23 Doctor: 0
Yunnan Nationalities University	Undergrad.: 22 Master: 0 Doctor: 0	Undergrad.: 39 Master: 0 Doctor: 0	Undergrad.: 39 Master: 0 Doctor: 0	Undergrad.: 69 Master: 77 Doctor: 0
Yunnan Arts University	Undergrad.: 8 Master: 0 Doctor: 0	Undergrad.: 0 Master: 0 Doctor: 0	Undergrad.: 21 Master: 3 Doctor: 0	Undergrad.: 25 Master: 6 Doctor: 0
Yunnan University of Traditional Chinese Medicine	Undergrad.: 4 Master: 2 Doctor: 0	Undergrad.: 6 Master: 0 Doctor: 0	Undergrad.: 5 Master: 14 Doctor: 0	Undergrad.: 15 Master: 36 Doctor: 0

	Baseline	Target	Actual	
	2000	2005	2005	2011
Dali University	Undergrad.: 3 Master: N/A Doctor: N/A	Undergrad.: - Master: - Doctor: -	Undergrad.: 29 Master: 8 Doctor: 0	Undergrad.: 43 Master: 28 Doctor: 0

Source: Responses to the questionnaire

Box3: A Case in which a contribution was made to the establishment of Doctorial Courses —Southwest Forestry University—

This project played an important role in the development of Southwest Forestry University. Prior to the implementation of the project, the university was a higher education institution without doctorial courses called Southwest Forestry College. However, the construction of herbarium, an engineering experimental building and forestry buildings as well as other facilities provided by this project, has played a fundamental role in the raising of the college to a university and in the establishment of its doctorial courses (2013). Teachers and students from the Transportation, Machinery and Civil Engineering Faculty have won an award in a domestic robot contest using some equipment procured by this project and have made both educational and research accomplishments. The university is eager to promote academic and research exchange with Japanese educational institutions in many fields such as plateau wetland research, also using this equipment.



The Contest Award Shield

From the above, regarding project qualitative improvement, it can be said that there has been an improvement in the educational environment such as in floorage, which the monetary value of educational equipment per student has demonstrated an upward trend. The construction of buildings and procurement of equipment such as experimental machinery by this project has contributed to such improvements.

In addition, more major faculties and laboratories are being appointed in the target universities. Since there are educational/research requirements (for the maintenance status of school buildings and equipment) on the evaluation for the appointment of major faculties and laboratories, the project can be said to have had some impact. The overall number of research papers and invention patents show an upward trend. Some research papers have included experiments and analysis using equipment provided by the project, while others have been written by faculty members who received training in Japan which was organized by this project. For these reasons, the project is said to have had some impact on the improvement of the quality of education and research.

(4) Impact of Campus Relocation on Effectiveness

As seen in Table 4 and Table 5, the utilization rate of major buildings and equipment was significantly high once the construction had been completed and the buildings were ready to be used. The equipment supplied by this project has been used and maintained by the universities that possessed the original equipment even after campus relocation and therefore there is no impact on project effectiveness. Kunming University, which bought the Yunnan

University campus, has used its educational and research buildings for the original purpose from the time of project appraisal. The Bailong Campus of Kunming University of Science and Technology, and Longquan Road Campus of Yunnan Normal University were transferred to Southwest Forestry University and Yunnan University of Finance and Economics, respectively, with compensation. Both transferees were target universities of this project and the campuses were used for their original purpose of education and research with a high utilization rate, as seen in Table 4. In addition, many research papers have been published and awards given based on the research projects conducted in these buildings and laboratories.

From the above, it can be considered that there was no negative impact on the effectiveness of this project due to campus relocation.

3.2.2 Qualitative Effects

According to responses to the questionnaire, many target universities provide the opinion that they have perceived some changes in education and research and/or students' job hunting as a qualitative effect of the project, although it cannot be quantitatively indicated.

(1) Changes in Education and Research

As a main effect of the training component, there are many teachers who are using Japanese methods of research and education as they have believed that they help improve educational methods. In particular, there are many cases where the seminar method has been introduced although traditionally a lecture style in a big classroom is common in China. (see Box 4)

Box 4: Application of Japanese Methods of Research and Education —Dali University—

The case of Dali University shows that the project benefit is not only limited to the target universities. There are indeed many cases where the target universities have received benefits from this project, such where teachers have introduced the seminar method after participating in training in Japan. However, the teachers in Dali University conducted further training on Japanese teaching methods and education for junior high school teachers after their return to China, and played a role in spreading Japanese culture. Moreover, the Institute for Ethnic Culture, Faculty of Arts, and the Japanese Association of Asia Ethnic Culture held the *China and Japan' Workshop on the Culture of Bai Minority Chanson* during a Poetry Reading at Shibao Mountain in Jianchuan in 2006. Participating in the workshop were 18 researchers from Japan and 44 researchers from China. They first conducted fieldwork of the Poetry Reading, followed by active speech and discussion on the chanson culture of the Bai Minority after they returned to Dali University.

(2) Changes in Students' Job Hunting

There are cases where teachers who have participated in University Administration Management Training have introduced job hunting support systems for senior students and have adopted practical learning and boosted the students' employment rate (See Box 5).

Box 5: A Positive Case of Job Hunting Support —Yunnan Nationalities University—

The teachers from Yunnan Nationalities University have participated in the University Administration Management Training in Japan. For those participants, the job hunting support that Japanese universities offered their students was extremely impressive. At that time, there were no Chinese universities that promoted Japanese style job hunting guidance. Yunnan Nationalities University applied their experience following the training in Japan by opening a job hunting guidance room in a building (building 4) built by this project and this has become highly successful.

3.3 Impact

3.3.1 Intended Impacts

(1) Impact on higher education at provincial level

The quantitative indicators for the whole of higher education in Yunnan province have demonstrated an upward trend. However, it is difficult to say that construction of school buildings under the project had an impact to the entire province as the floorage per student became nearly flat or slightly deteriorated after the great improvement.

Table 13: Impact on higher education at provincial level

Purpose	Indicators	Baseline (2000)	Target (2005)	Actual (2005)	Actual (2009)	Actual (2011)
Quantitative improvement	Number of higher education institution	34	44	44	61	64
	Number of students at higher education institutions	189,000	318,000	268,057	415,792	515,594
	Higher education enrollment ratio (%) (=Appropriate age enrollment/ Appropriate age population)	4.9	8.0	12.65	17.57	23
Qualitative improvement	Floorage per student (m ² /student) (=floorage/number of students)	22.00	32.70	28.22	25.23	26.27

Source: Responses to the questionnaire

(2) Impact on Market-oriented Economic Reform

Although the number of graduates from faculties of accounting, law and finance is increasing, many universities responded that there is no correlation between this project and the increased number of students from these fields. An exception is Yunnan Normal University where a building developed by this project is used as a MBA education center.

Table 14: Number of graduates from faculties of accounting, law and finance

	Baseline	Actual	
	2000	2005	2011
Yunnan University	246	348	298
Kunming University of Science and Technology	accounting: 53 law: 0 finance: 0	accounting: 50 law: 82 finance: 0	accounting: 51 law: 92 finance: 129
Yunnan Normal University	N/A	140	295
Kunming Medical College	0	0	30
Yunnan University of Finance and Economics	513	513	699
Southwest Forestry University	36	104	160

	Baseline	Actual	
	2000	2005	2011
Yunnan Nationalities University	100	109	183
Dali University	Merged in 2001	—	72 (First graduating class)

Source: Responses to the questionnaire

Note: this table includes only universities which have records of graduates from faculties of accounting, law and finance.

(3) Impact on Improvement of Disparities

This project had the purpose of developing human resources in provincial key industries¹¹ in order to improve disparities. Although the supply of human resources for key industries from the target universities is increasing yearly, most universities responded that there is a zero or no clear correlation with this project. However, in the case of Yunnan University of Finance and Economics, which promoted human resource development according to the needs of society along with this project, graduates were assigned to different provincial institutes of Yunnan to develop and promote the province.

Table 15: Graduates working in the Key Industries

	Baseline	Actual	
	2000	2005	2011
Yunnan University	80	132	171
Kunming University of Science and Technology	639	930	1100
Yunnan Normal University	N/A	263	584
Yunnan Agricultural University	250	342	484
Kunming Medical College	0	0	0
Yunnan University of Finance and Economics	200	513	699
Southwest Forestry University	N/A	98	106
Yunnan Nationalities University	N/A	N/A	N/A
Yunnan Arts University	0	0	5
Yunnan University of Traditional Chinese Medicine	30	130	280
Dali University	207	319	464

Source: Responses to the questionnaire

(4) Impact on Rural Development

There is no clear trend in graduates' employment in rural districts as the number fluctuates. In addition, each university has an existing system of sending teachers and doctors to rural districts and therefore it is difficult to state that there is a clear correlation with this project. However, Yunnan Normal University has implemented teacher's training for students in rural districts using equipment supplied by this project. Thus, there is a correlation with the project to some extent.

¹¹ Tobacco industry, bioresource industry, mining industry, tourism industry and electric industry

Table 16: Contribution in Rural District Promotion

	Baseline	Actual	
	2000	2005	2011
Yunnan University	50	63	82
Kunming University of Science and Technology	140	0	0
Yunnan Normal University	429	2,267	1,755
Yunnan Agricultural University	50	91	77
Kunming Medical College	35	0	0
Yunnan University of Finance and Economics	10	10	8
Southwest Forestry University	30	See below Note	
Yunnan Nationalities University	60	0	0
Yunnan Arts University	87	0	12
Yunnan University of Traditional Chinese Medicine	4	220	186
Dali University	8	0	0

Source: Responses to the questionnaire

Note: There are many, but no statistics. They send many instructors to rural villages for short-terms. In addition, 5 teachers and 8 technical instructors are sent to rural districts for a year annually.

(5) Support for State Enterprise Reform

While an upward trend can be seen in universities with actual records such as Yunnan University, Kunming University of Science and Technology, and Southwest Forestry University, most universities say that there is no clear correlation with this project in the field of state enterprise reform. However, one university has pointed out that some of the computers in Yunnan Normal University supplied by this project were used for reemployment training and helped those who had lost jobs to find new careers. Yunnan Arts University also pointed out that using the hall built by this project led to the hiring of some unemployed persons.

3.3.2 Other Impacts

(1) Impacts on the natural environment

The Environmental Impact Assessment (hereinafter referred to as EIA) was conducted prior to the project implementation in accordance with Chinese regulations. “Three-Stage Simultaneous” implementation (i.e. regulation that environmental protection facilities shall be designed, constructed and put into production simultaneously with main the construction structures) was envisioned.

Based on this regulation, noise-abatement measures, appropriate sewage treatment and waste disposal were conducted by each university during the implementation period. Environmental facilities such as a waste water treatment plant were constructed before the project completion, as necessary, and the environmental facilities were operated at the same time as the buildings and equipment were put into use. All the target universities took necessary environmental protection measures including environmental monitoring at each stage, namely the design, construction and operation stages. In this way, “Three-Stage Simultaneous” was smoothly implemented.

At the time of the ex-post evaluation, no negative impact on the environment was observed, according to responses by the universities to the questionnaire, to interviews with the persons in charge, and visual confirmation at the sites by the evaluator.

(2) Land Acquisition and Resettlement

The project was carried out on existing university properties, so there was no land acquisition or relocation of residents.

(3) Mutual understanding between Japan and China

It can be said that participants in the training in Japan have been able to understand Japan deeply. It was the first visit to Japan for many of the training participants. They were stimulated by aspects of Japan's education and research, and renewed their interest in Japan through Japanese culture, customs and people.

Box 6: Cooperation with Japanese Universities 1 —Yunnan Agricultural University—

Yunnan Agricultural University, which already had an active academic exchange in Pu-erh tea research with Kagoshima University prior to the implementation of the project, has made a cooperative agreement with Kyoto Prefectural University through the project.

Although Kyoto Prefectural University had opened a course specializing in regional vitalization, they were unable to continue it due to the large financial burden in preparing and running the course. However, because they deepened their relationship with Yunnan Agricultural University during the preparation stage of the course, they are currently able to accept two graduate students from Yunnan Agricultural University every year, waiving the admission test. These two universities also exchange about ten students annually to promote international friendship between Japan and China. Kyoto Prefectural University has also established "Yunnan Center" in Yunnan Agricultural University as a research base.

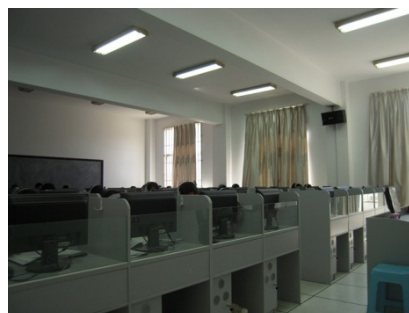


Yunnan Center of Kyoto Prefectural University

There are several cases where target universities continuously carry out academic exchange with their training sites through the project. The cooperative agreement between Yunnan Agricultural University and Kyoto Prefectural University was even mentioned in a Japanese newspaper. However, cooperative relationships within the province including the target universities are not shared by all, and such academic exchanges remain shared between certain universities only.

Box 7: Cooperation with Japanese Universities 2
—Yunnan Normal University—

Yunnan Normal University has courses open to the public and it is assigned by the United Nation as a Chinese language education center. It has made cooperative agreements with two universities. One of these is Chuo University which conducts human resource development for Japan and China friendship through the establishment of an exchange program between Japanese major students of Yunnan Normal University and Chinese major students from Chuo University. In addition, those who went to Japanese universities for training were promoted after their return and therefore the project has had an active role in the construction of the teaching team at Yunnan Normal University.



Language Laboratory Provided by This Project

The outcome of training is rather limited in terms of the production of research results. However, there is an impact of the training in a broader sense as most researchers and teachers generally absorb Japanese style research methods, attitudes and educational methods during their training and apply their knowledge when they return to China. In particular, the project has greatly contributed to the understanding of Japan on the Chinese side and vice versa.

In regards to the project's impact on market-oriented economic reform and disparity rectification, which was the project's original purpose, it was difficult to find any direct correlation. However, there are some individual cases that have shown positive impacts brought by this project. As for other impacts, there has been no negative impact on environment and the project has promoted friendship between Japan and China. From the above it can be seen that there were impacts as planned through the implementation of this project. Therefore the effects and impacts can be said to be high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The project is composed of the construction of school buildings, the enhancement of educational and research equipment, and the training of higher education personnel. The outputs of each component are as follows:

Table 17: Comparison of Outputs (planned and actual)

Items	Planned	Actual (achievement rate)
Building	11 universities total: 211,610 m ²	9 universities total: 231,883.6 m ² (109.6%)
Equipment	11 universities	11 universities: mostly as planned
Training	11 universities total: 342 staff	11 universities total: 591 staff (172.8%)

Source: JICA appraisal documents, Responses to the questionnaire

As for the building construction, there were some adjustments between the target universities in order that the budget should be distributed to those with higher needs. As a result, the target universities, except Kunming Medical College and Yunnan University of Traditional Chinese Medicine, constructed buildings. Instead, these funds were applied to the building construction in Yunnan Agricultural University and Southwest Forestry University. The actual construction areas were 109.6% of the original plan, which was almost in accordance with the plan. In addition, the quality of the constructed buildings was acknowledged to be high in at least some of the universities (See Box 8).

Box 8: A Positive Case of Buildings and Equipment Development
—Yunnan University of Finance and Economics—

The library in Yunnan University of Finance and Economics, which was built using a Japanese ODA loan, was designed by Tsinghua University. It has received the National Architectural Construction Quality Silver Stone Award (*See the picture at the beginning of this report*). The utilization rate of this library is increasing and there are more opportunities for educational activities and practice. Moreover, a language laboratory and multimedia room were fitted in the education and learning experiment building, also through a Japanese ODA loan, and these have contributed to improvement in the quality of the university's basic education.

It is not possible to simply compare numbers of supplied educational equipment as each unit price varies. According to interviews with the executing agency and the target universities, adjustments were made with the necessary equipment and the amount at the point of delivery in order not to interfere with the project effects. Therefore the overall supply of educational equipment was in accordance with the plan. The main reasons for these adjustments were: 1) The supplier had reduced the items of equipment within the range of the bidding amount due to a change of government policy for ODA projects (mainly on tax return expenses and customs tax), 2) Some machinery did not meet the project needs due to obsolescence during the time of SARS (Severe Acute Respiratory Syndrome) and the Sichuan earthquake, 3) Some items were no longer produced and for this reason a change in order was necessary, etc.

In regards to the training component, the number of participants increased as the training period was shifted from long-term to short term. The decision to do this was based on the fact that universities needed people in charge of administration and management as they were going through university reform. Other reasons for the decision were the effects seen in the short-term special course on university administration and management and the increase in prospective beneficiaries. Some universities pointed out that such special courses promoted cooperation and friendship between Japanese and Chinese universities outside of the course and its contents (*See Box 9*).

Box 9: A Positive Case of Implementation of the Training Component —Yunnan University —

Yunnan University made smooth progress in the training component by assigning a teacher to communicate with Japanese universities. It has sent 105 teachers and staff for training in Japan in order to improve their quality. The person in charge of communicating with the Japanese universities has studied in Japan and is able to understand Japanese.

Originally, the university considered promoting the training as a way to obtain academic degrees in Japan. However they have shifted towards taking short-term special courses on university administration and management at Japanese universities. This is due to the issue of the language barrier, as well as the high level of need. The Xi'an workshop (matching event between Japanese and the project target universities) organized by JICA in 2005 provided the opportunity for Chuo University and Tokyo Keizai University to sign cooperation agreements..

3.4.2 Project Inputs

3.4.2.1 Project Cost

Actual project costs amounted to 7,381 million yen (of this, the actual loan disbursement amounted to 4,328 million yen) against the estimated costs of 7,520 million yen (of this, the planned loan amounted to 4,540 million yen). The actual costs were lower than planned (98.2%).

3.4.2.2 Project Period

The project period planned at the time of appraisal was 36 months, or from March 2002 to March 2005. The actual project period was 122 months, or from March 2002 to May 2012, which was equivalent to 338.9% of the original plan, and was significantly longer than planned.

The loan period was extended for two years by two extensions of project implementation period. The main reason for the delays was to take more time for the procurement procedures than expected regarding equipment. As described earlier, 1) The supplier reduced the items of equipment within the range of the bidding amount due to a change in government policy for ODA projects (mainly on tax return expenses and customs tax), 2) Some machinery did not meet the project needs due to obsolescence during the time of SARS and the Sichuan earthquake, 3) Some items were no longer produced and therefore a change in order was necessary. These were the main reasons for the delay. The fundamental reasons behind these were: 1) Too many parties were involved in machinery supply and the procedure was complicated, and 2) The packages were sorted by machinery, not university, and thus, if there was a change in one university, it has caused a delay in all the other universities.

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Due to the nature of the project, a quantitative analysis of the internal rate of return was not possible.

As mentioned earlier, the actual overall project cost was within the range of the estimate taking into consideration the output fluctuations. Although it was seen that some contingencies,

such as SARS and the earthquake, had a direct influence on the significant delay, in accordance with the definition of project completion, there was a project delay of 338.9%.

In the light of the above, although the project cost was within the plan, the project period significantly exceeded the plan, and therefore the efficiency of the project is fair.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

The institutional aspects of operation and management were developed as planned at the time of project appraisal. Yunnan provincial government was in charge of the overall project supervision as well as the sub-project supervision of the actual administration maintenance organization and the target universities.

Each target university operates the project with the establishment of a Japan ODA project office together with a faculty office, finance section, infrastructure construction section and human resource section, and with related executives and managers as its members. For maintenance, each faculty and laboratory using the buildings and equipment selects someone in charge and conducts daily management. All equipment is under school regulations for tools and equipment management. And a special department such as an equipment section of the school educational affairs department is responsible for routine management. Most universities have similar management systems, but there are some universities like Southwest Forestry University which have set regulations such as the Environmental Influence of Construction Project Evaluation Report, Laboratory Usage Management Method, Herbarium Management Regulation, and Engineering Laboratory Usage Management Method, etc.

3.5.2 Technical Aspects of Operation and Maintenance

All the target universities set regulations and conduct maintenance and inspection periodically. If necessary, they get suppliers or makers to perform maintenance for the faulty equipment. There is no particular problem on the technical aspects. Many of the universities send their staff to maintenance and operation training organized by suppliers in order to maintain their technical standards. Yunnan Arts University sent their teachers to similar halls and museums to gain management experience or invited specialists from overseas to give training for better hall operation, maintenance and management.

3.5.3 Financial Aspects of Operation and Maintenance

The cost of operation and maintenance is generally paid by each university. There is no specific subsidiary aid from the Yunnan provincial government for the cost of operation and maintenance. Therefore, these costs are covered by the university's general subsidiary aid and the revenue of each university.

There is no evidence that the equipment lies neglected without maintenance and therefore, it is thought that the necessary resources for operation and maintenance are provided.

Table 18: Operation and maintenance costs at each target university (annual)

Unit: RMB ten thousand

	2009	2010	2011
Yunnan University	—	—	—
Kunming University of Science and Technology	402.7	530.3	917.7
Yunnan Normal University	100	100	100
Yunnan Agricultural University	Approx. 160~200 annually		
Kunming Medical College	50	50	50
Yunnan University of Finance and Economics	45	45	45
Southwest Forestry University	130.3	168.0	165.1
Yunnan Nationalities University	40	0	13 (Repainting of outer walls)
Yunnan Arts University	Almost none	5	7
Yunnan University of Traditional Chinese Medicine	N/A	2.51	5.82
Dali University	40.4	257	527

Source: Responses to the questionnaire

Note 1: The data from Yunnan Nationalities University and Yunnan Arts University is limited to the equipment cost related to Japan's ODA loan.

Note 2: For Yunnan University it was not possible to show the operation and maintenance cost as it is not separated from other expenses.

3.5.4 Current Status of Operation and Maintenance

At all the target universities, the buildings and equipment are well maintained. All the universities have inventory books and maintenance logs for the major equipment.

End-of-life equipment, such as PCs, has been updated already. However, valuable equipment is well maintained and the utilization ratio is high. In order to raise the utilization ratio, the department of education has established a platform for sharing equipment and this is open to other universities.

Box10: Initiative to Increase the Equipment Utilization Rate

In China, there is a platform in each province for equipment sharing between higher education institutions, and it is actively in use in Yunnan province. The equipment procured by this project at Yunnan University of Traditional Chinese Medicine is available to teachers and graduate students from other universities for research purposes. For example, teaching staff from The First Affiliated Hospital of Kunming Medical College used a molecular measuring machine procured by this project and conducted a molecular bioassay of a sample in 2008-2009. The resulting research paper was published in *The Heart Surgery Forum* 13 (5). In 2010, equipment from the Yunnan University of Traditional Chinese Medicine was used for the graduate thesis of a graduate student from The Third Affiliated Hospital of Kunming Medical College. As seen from the above, the utilization rate of the equipment procured by the project is maintained at a high level with existing systems. This contributes to improvements in the quality of education and research in Yunnan province.

No major problems have been observed in the operation and maintenance system, therefore the sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project objective was to improve higher education in Yunnan Province quantitatively and qualitatively by supporting the construction of buildings, the procurement of equipment and the training of teachers in the target universities. This objective has been highly relevant to the country's development plan and development needs as well as to Japan's ODA policy; therefore its relevance is high. Despite a significant increase in students from the project commencement to the ex-post evaluation, the effectiveness and impact of the project was high because quantitative indicators on education and research (building areas, amount of educational equipment) and qualitative indicators (number of key faculties and laboratories, number of research papers etc.) have been improving. The outputs were essentially completed in line with the initial plans, and the project cost was within the plan. The project period, however, significantly exceeded the plan; therefore efficiency of the project is fair. No major problems have been observed in the operation and maintenance system; therefore the sustainability of the project effects is high.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

The network between researchers and knowledge obtained from training in Japan are shared internally in each university. However, the information is not sufficiently shared with other universities. It is suggested that an information sharing platform is created for participants in training visiting Japan. By doing so, it is hoped that a more effective partnership will be established among universities in the field of education and research between Japan and China, through this project.

4.2.2 Recommendations to JICA

It is desirable that JICA continuously cooperates with efforts to establish the above mentioned platform. For example, one idea is to post the characteristics of the target universities and the research themes (especially those of the participants in long-term training in Japan) on the existing website, the "Higher Education Project in China" and in so doing, another idea is to enhance functions of the website for the benefit of academic exchanges between Japanese universities and Chinese universities.

4.3 Lessons Learned

There are two major factors that caused a significant delay in the project period.

- 1) There were too many parties involved in machinery supply and the process was complicated.
- 2) The package was sorted by machinery but not by university. Generally, most of the equipment and machinery placed in higher education institutions require correspondence according to the detailed needs of each individual research lab. For this reason, it is necessary that a more flexible delivery packaging method is considered. For example, sorting could take place by university or there could be an alternate supporting system.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs		
(1) Building Construction	11 universities: 211,610 m ²	9 universities: 231,883.6 m ²
(2) Equipment Procurement	11 universities	Almost as planned
(3) Training	11 universities: 342 staff	11 universities: 591 staff
2. Project Period	March 2002 - March 2005 (36 months)	March 2002 – May 2012 (122 months)
3. Project Cost		
Amount paid in foreign currency	4,540 million yen	4,328 million yen
Amount paid in local currency	2,980 million yen (198.7 million RMB)	3,052.5 million yen (199 million RMB)
Total	7,520 million yen	7,381 million yen
Japanese ODA loan portion	4,540 million yen	4,328 million yen
Exchange rate	1 RMB = 15 yen (As of September 2001)	1 RMB = 15 yen 1 USD = 8.3 RMB (As of September 2001)

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan

Inland Higher Education Project (Guizhou)

External Evaluator: Naomi Murayama, OPMAC Corporation

0. Summary

The project objective was to improve higher education in Guizhou Province quantitatively and qualitatively by supporting the construction of buildings, the procurement of equipment and the training of teachers in the target universities. This objective has been highly relevant to the country's development plan and development needs as well as to Japan's ODA policy; therefore its relevance is high. Despite a significant increase in students from the project commencement to the ex-post evaluation, the effectiveness and impact of the project was high because quantitative indicators on education and research (building areas, amount of educational equipment) and qualitative indicators (number of key faculties and laboratories, number of research papers, etc.) have been improving. The output increased responding to the needs of each university. The project cost exceeded the plan, but this was relevant due to the increase of output. Severe Acute Respiratory Syndrome (SARS) and the Wenchuan earthquake affected the project, and the project period significantly exceeded the plan; therefore the efficiency of the project is fair. No major problems have been observed in the operation and maintenance system; therefore the sustainability of the project effects is high.

In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Location



Guizhou University of Finance and Economics, Academic Exchange Center

1.1 Background

Guizhou Province ranked as one of the poorest provinces in China as the GDP per capita (RMB 2,865 in 2001) was substantially below the national average (RMB 7,543 in 2001)

although GDP grew by an average of around 9.6% per year during the 9th Five-Year Plan period (1996 – 2000). The 10th Guizhou Province Five-Year Plan (2001 – 2005) targeted a GDP growth rate of about 9%, a GDP per capita of RMB 3,844 in 2005. In the fields of economic growth and industrial structural adjustment, the energy, the mining of raw materials and the high-tech industry were specified as key industries. Provincial government recognized the necessity of expanding higher education in order to attain its objectives and announced a policy to raise the higher education enrollment rate from 7.3% in 2001 to 9% and the number of higher education students to around 331,000 (out of this total, 150,000 ordinary higher education students) by 2005.

1.2 Project Outline

The objective of this project was to improve higher education in Guizhou Province quantitatively and qualitatively by developing educational infrastructure such as university buildings and equipment and by enhancing human resources through teacher training in 8 universities¹ that play an important role in regional development. The aim was to strengthen the local market economy and the environmental conservation, thereby contributing to market oriented economic reform and disparity rectification in China.

Loan Approved Amount/ Disbursed Amount	4,593 million yen/ 4,526 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March, 2003/ March, 2003
Terms and Conditions	Interest Rate: 2.2% Repayment Period: 30 years (Grace Period: 10 years) For training component; Interest rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: General untied
Borrower/ Executing Agency	The Government of the People's Republic of China/ Guizhou Provincial People's Government
Final Disbursement Date	July, 2010
Main Contractor (Over 1 billion yen)	—
Main Consultant (Over 100 million yen)	—

¹ The target universities at the time of appraisal were 1) Guizhou University, 2) Guizhou University of Technology, 3) Guizhou Normal University, 4) Guiyang Medical College, 5) Zunyi Medical College, 6) Guiyang College of Traditional Chinese Medicine, 7) Guizhou University of Finance and Economics, and 8) Guizhou University for Ethnic Minorities. However, the target universities at the time of ex-post evaluation dropped to seven due to the merger between Guizhou University and Guizhou University of Technology in 2010.

Feasibility Studies, etc.	<ol style="list-style-type: none"> 1. F/S: “Feasibility Study Report, Japanese Yen Loans for the Guizhou Province Personnel Training Program” (China Investment and Consultancy Company, Guizhou Branch, May 2002) 2. JICA report: <ol style="list-style-type: none"> 1) “FY 2001 Special Assistance for Project Implementation (SAPI) for the Higher Education Project in China” (August 2003) 2) “SAPI for a Higher Education Project in the People’s Republic of China” (March 2004) 3) “SAPI for a Higher Education Project in China” (May 2005)
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2. Outline of the Evaluation Study

2.1 External Evaluator

Naomi Murayama, OPMAC Corporation

2.2 Duration of Evaluation Study

Duration of the Study: August, 2012 – September 2013

Duration of the Field Study: March 15, 2013 – April 3, 2013, May 27, 2013 – June 3, 2013

3. Results of the Evaluation (Overall Rating: A²)

3.1 Relevance (Rating: ③³)

3.1.1 Relevance to the Development Plan of China

China was admitted to the World Trade Organization (hereinafter referred to as WTO) in December 2001 and was aiming at high rates of economic growth, openness and reform through industrial structural adjustment. Disparities between coastal and inland areas, and between urban and rural areas were issues in China. To address increasing environmental issues, not only the government approaches but also more comprehensive approaches were needed, such as human development and research on environmental conservation in higher educational institutions.

This project sought 1) to tackle industrial structural adjustment through the development of highly-skilled human resources in key industries in Guizhou Province, 2) to respond flexibly to market needs and international competition after becoming a WTO member state through the development of high-quality human resources in the fields of law, finance and trade, and 3) to rectify the disparities between coastal and inland areas and between urban and rural areas. It also sought to respond to the varied needs for environmental protection through the

² A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

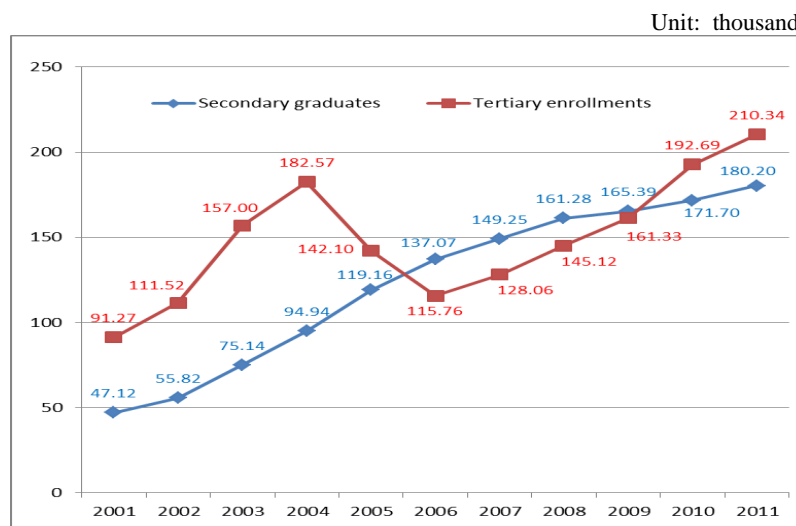
³ ③: High, ②: Fair, ①: Low

development of human resources in the field of environmental problems such as dealing with air and water pollution and the promotion of research on environmental conservation. These project objectives were in line with “10th Five-Year Plan for National Economic and Social Development (2001-2005)”, “10th Five-Year Plan for Education”, “China Western Development” and “Guizhou Province 10th Five-Year Plan” at the time of the appraisal.

At the time of the ex-post evaluation, the “National Mid- and Long-Term Reform and Development Plan for the Education Sector (2010-2020)” had been formulated in addition to the “12th Five-Year Plan for National Economic and Social Development (2011-2015)”, “12th Five-Year Plan for Education”, “China Western Development” and “Guizhou Province 12th Five-Year Plan” and China had been promoting human resource development and regional disparity rectification for further economic growth, openness and reform.

3.1.2 Relevance to the Development Needs of China

At the time of the appraisal, the quantitative demand for higher education was growing along with the increase in the number of secondary graduates. However, the lack of facilities and teaching staff of universities was an issue. It was necessary to strengthen facilities, human resources and the financial aspects in order to address this issue. This project supported the strengthening of facilities and human resources; therefore it was consistent with the development needs of China.



Source: Guizhou Provincial People’s Government

Note: Higher education institutions (Tertiary) include vocational technical schools, short-term higher education, four-year universities, and graduate schools. In this chart, these indicate institutions excluding graduate schools.

Figure 1: Number of Postsecondary Students and Tertiary Enrollments

The number of tertiary enrollments had steadily been increasing in Guizhou Province since project commencement. Although there was a temporary stagnant period in the mid-2000s,

recently they increased drastically again (see Figure 1). The temporary stagnation is attributed to restrictions on applicants for institutions. The reason why they restricted is that the improvement of educational infrastructure has not kept up with the drastic increases in tertiary enrollments. The number of enrollments began to increase again with completion of the construction of buildings and the procurement of equipment at each university. At the time of the ex-post evaluation, the numbers of graduates from high schools and enrollments in higher education had been increasing at a higher rate than the 2006 forecast (numbers of graduates from high schools: 141,700 enrollments in higher education: 116,200) at appraisal time. This indicates a growing need for higher education. The need for higher education in Guizhou Province in particular drastically increased with the implementation of the “9+3 plan”⁴.

Although the income level in Guizhou Province exponentially improved from GDP per capita RMB 2,865 in 2001 to RMB 16,413 in 2011, it still fell much below the national average of RMB 29,992 in 2011⁵. At the time of the ex-post evaluation, the need for higher education was still growing quantitatively and qualitatively in the light of 1) regional development, 2) strengthening market rule and 3) environment conservation.

During project implementation, the number of applicants to universities was expanded and the placement and structures were optimized. It shows that the timing of financial support has been very good. The higher education reform is still continuing. Thus, the project objectives are consistent with the development needs of universities.

3.1.3 Relevance to Japan’s ODA Policy

Japan’s ODA Charter at the time of appraisal placed importance on assistance in the Asian region and assistance in human resource development; therefore the project objectives were consistent with Japan’s ODA policy.

Furthermore, the Country Assistance Policy for China, the Medium-Term Strategy for Overseas Economic Cooperation Operations and the Country Assistance Strategy at the time of appraisal made human resource development a priority from the viewpoint of support for openness and reform (market rules), environmental conservation, and regional development (including progress in Japan-China exchanges). The project objectives were consistent with Japan’s aid policies.

This project has been highly relevant to China’s development plan and development needs, as well as to Japan’s ODA policy; therefore its relevance is high.

⁴ Guizhou Province Education “9+3” Plan: to ensure the enforcement of nine-years of compulsory education and to provide a free three-year secondary vocational education service.

⁵ National GDP: <http://www.stats.gov.cn/tjsj/ndsj/2011/indexeh.htm>, as of April 12, 2013. Guizhou Province GDP: Guizhou Province Statistical Year Book 2012.

3.2 Effectiveness⁶ (Rating: ③)

This project aimed at quantitative and qualitative improvement of higher education in Guizhou Province by supporting the construction of buildings, the procurement of equipment and training of teachers in the target universities. To identify the effectiveness of the project, the indicators showing the improvement of project objectives was usually utilized. There were 48 universities in Guizhou Province as of 2011. Only eight out of these 48 were target universities (seven target universities at the time of the ex-post evaluation due to the merger between Guizhou University and Guizhou University of Technology). It is difficult for the project to directly contribute to quantitative and qualitative improvement of all the higher education institutions in Guizhou Province. Therefore, only quantitative and qualitative improvement in the target universities was analyzed in this section.

3.2.1 Quantitative Effects (Operation and Effect Indicators)

In this ex-post evaluation study, the evaluator analyzed the quantitative effects using the indicators directly related to the three project components, i.e. building construction, educational equipment and training. Specifically, contributions (effects) to increasing the number of students were evaluated by analyzing school building area (floorage), the monetary value per student of educational equipment and the utilization rate of school buildings and educational equipment for quantitative improvement.

For qualitative improvements, educational environment by floorage per student and the monetary value per student of educational equipment were analyzed. Then, the project's contributions to aspects of education and research were evaluated based on the number of key faculties, key laboratories, research papers, research projects, patents for invention and so forth.

3.2.1.1 Quantitative improvement

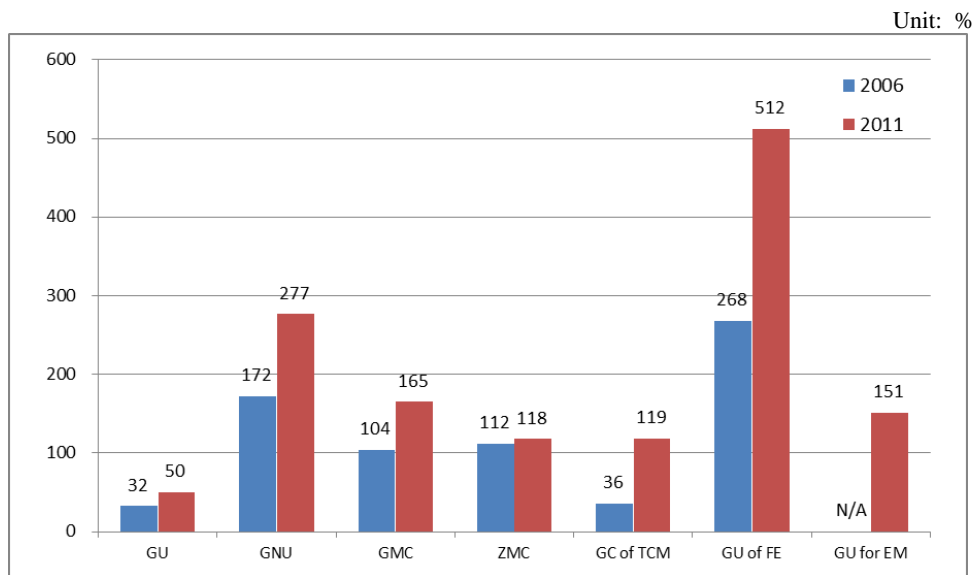
(1) Change in the number of students

In China, the number of university students has sharply increased since the release of the "Action Plan for Educational Vitalization Facing the 21st Century" in 1998, which aimed to increase the university enrollment rate from 9.8% in 1998 to 15% in 2010. In the meantime, the number of universities in Guizhou Province increased from 37 in 2001 to 48 in 2011. The number of students also increased from 190.8 thousand in 2001 to 423.7 thousand in 2011 (a rise of 222%).

Although the increase in students at the target universities was not the same as the increase in the entire province, it was still more than double. The following bar chart illustrates the growth rates of students in 2006 and 2011 by a comparison with the number of students in the base year (2001). The total number of students at the target universities increased by 79,150 in

⁶ To be rated in judging effectiveness by taking impact into account.

the decade, from 56,928 in 2001 to 136,078 in 2011 (a rise of 139%).



Source: Responses to the questionnaire

Note: GU: Guizhou University, GNU: Guizhou Normal University, GMC: Guiyang Medical College, ZMC: Zunyi Medical College, GC of TCM: Guiyang College of Traditional Chinese Medicine, GU of FE: Guizhou University of Finance and Economics, GU for EM: Guizhou University for Ethnic Minorities.

Figure 2: Growth rate of students in the target universities

(2) Change in school building areas

To meet the increase in university students mentioned in the above (1), each target school constructed education and laboratory buildings, libraries, gymnasiums and so on. Academic cities have been constructed in many regions in China. In Guizhou, the provincial government has been constructing Huaxi academic city and many universities in Guiyang are on the way to relocating their campuses. Depending on relocating the campuses or not, the actual building area, growth rate or proportion to this project as of 2012 is different. Building area at all universities, however, has increased and future increases are also expected. The buildings constructed by this project account for 4.3% to 21.5% of the total school building area (see Table 1). The buildings constructed by this project do not necessarily account for a large proportion. In the case of Guizhou province, universities that have not yet moved their campus to the suburbs but which are still located downtown show a tendency to have a large share of Project building.

However, most universities answered in the questionnaire that this project had contributed to alleviating a shortage in buildings and facilities by its implementation at a time when the size of universities was expanding. Therefore, the project have contributed to a mitigation of the shortage of buildings and facilities to some extent.

Table 1: Change in school building area at the target universities

Unit: m²

	Baseline (2001)	Actual (2011)	Growth rate (%)	Project area	Share of the project (%)
Guizhou University (Guizhou University of Technology)	187,149 (115,569)	538,718	78	36,000	6.7
Guizhou Normal University	196,100	609,886	211	26,138	4.3
Guiyang Medical College	45,424	537,460	1,083	29,876	5.6
Zunyi Medical College	54,443	126,547	132	16,132	12.7
Guiyang College of Traditional Chinese Medicine	73,310	93,331	27	20,070	21.5
Guizhou University of Finance and Economics	68,801	318,289	263	32,704	10.3
Guizhou University for Ethnic Minorities	46,432	150,828	225	25,000	16.6

Source: JICA appraisal documents, Responses to the questionnaire

(3) Change in the monetary value of educational equipment

In Guizhou Province, not only the floorage of school buildings but also the monetary value of educational equipment has increased annually responding to the increase in the number of university students. The Undergraduate University Establishment Standards of China by the Ministry of Education of the People's Republic of China has the following requirements: the monetary value of educational equipment per student for science faculties is not less than RMB 5,000; for literature and social faculties, not less than RMB 3,000; for gymnastic and art faculties, not less than RMB 4,000. None of the target universities met this requirement before the project implementation. After the project completion, however, all the target universities met this requirement. The total amount of the educational equipment procured by the project was JPY 3,063 million and the total number of students at the target universities in 2011 was 136,078. The benefit as of 2011 for the equipment procured by the project per student was about JPY 22,510 (RMB 1,500, if RMB 1 = JPY 15) shown by simple arithmetic⁷ and it accounts for a substantial portion on the monetary value of educational equipment. It can be said that the project has been quite important regarding the monetary value of educational equipment at the target universities. In light of the above, this project can be said to have largely contributed to increases in the monetary value of educational equipment at the target universities.

Table 2: Monetary value of educational equipment per student

Unit: RMB

	Baseline (2001)	Actual (2006)	Actual (2011)
Guizhou University (Guizhou University of Technology)	4,080 (4,320)	9,310	9,605
Guizhou Normal University	3,379	4,700	9,400
Guiyang Medical College	4,370	7,073	21,400
Zunyi Medical College	3,000	6,550	7,299

⁷ As it was difficult to collect detailed data, the evaluator simply divided the total amount of educational equipment procured under the project by the number of students as of 2011. However, if the amount at the time of procurement completion at each university was divided by the number of students at that time, the benefit per student would have been more than the evaluator's calculation.

	Baseline (2001)	Actual (2006)	Actual (2011)
Guiyang College of Traditional Chinese Medicine	4,375	5,867	6,750
Guizhou University of Finance and Economics	3,236	7,045	7,853
Guizhou University for Ethnic Minorities	4,281	5,076	6,269

Source: Responses to the questionnaire

In the “Undergraduate University Teaching Level Evaluation” conducted by the Ministry of Education of the People's Republic of China in 2007, all the target universities won the honorary title “*Excellent University*” due to improvements in school buildings and equipment⁸. These improvements are the result not only of the project but also of the efforts of the universities themselves. However, each university has insisted that the project has played an important role in improving the university operating environment through school buildings and educational equipment developed under the project.

(4) Utilization rate of school buildings and educational equipment

As mentioned above, the school building area and the monetary value of educational equipment per student increased as each target school quantitatively responded to the increase of students. However, effectiveness cannot be discussed if these buildings and equipment are not actually utilized.

Table 3 shows the utilization rate of major school buildings. In every university, the utilization rate is more than 90 % since the buildings are constructed and completed. This rate is very high.

Table 3: Utilization rate of major school buildings

	Unit: %			
	2005	2006	2009	2011
Guizhou University	—	85	95	100
Guizhou Normal University	—	100	100	100
Guiyang Medical College	100	100	100	100
Zunyi Medical College	0	100	100	100
Guiyang College of Traditional Chinese Medicine	Not completed	90	More than 90	95
Guizhou University of Finance and Economics	More than 90	More than 90	More than 90	More than 90
Guizhou University for Ethnic Minorities	100	100	100	100

Source: Responses to the questionnaire

Table 4: Utilization rate of major equipment

	Unit: %		
	2005	2009	2011
Guizhou University	60	95	98
Guizhou Normal University	100	95	96
Guiyang Medical College	90	90	92
Zunyi Medical College	85	90	90
Guiyang College of Traditional Chinese Medicine	75	More than 90	95
Guizhou University of Finance and Economics	More than 90	More than 90	More than 90
Guizhou University for Ethnic Minorities	100	90	70

Source: Responses to the questionnaire

⁸ The evaluation system on higher education introduced by the Ministry of Education of the People's Republic of China. Once every five years, school operations and the quality of education are evaluated. The first phase of the evaluation was conducted from 2003 to 2008. The results are evaluated on a five-point scale. “Excellent” is the top rating.

Table 4 shows the utilization rate of major equipment at the target universities. This is also a very high ratio. At Guizhou University for Ethnic Minorities, the utilization rate has been declining recently. It was caused by not gradually utilizing end-of-life equipment such as PCs for undergraduate students. However, since these are already past their estimated service life, there is no particular problem if they have been not in use already. Some of the end-of life equipment is recycled and reused (see Box 1).

As seen above, regarding quantitative improvement, the number of students at the target schools drastically increased, in the lowest case this growth rate was 50% (Guizhou University) and in the highest case it was 512% (Guizhou University of Finance and Economics). Despite this, however, the monetary value of educational equipment per student increased at all the target universities. In addition, the school building area also increased at all the target universities. The utilization rate of school buildings and equipment was also very high. Regarding building construction, as mentioned above, it cannot be said that this project necessarily accounted for a large proportion. However, most universities said in the questionnaire that they thought this project had contributed to alleviating a shortage of buildings and facilities at a time when the size of universities was being expanded. In light of the above, this project contributed largely to quantitative improvement against a drastic increase of university students.

Box 1: Recycling and reuse of computers procured under the project

At Guizhou University for Ethnic Minorities and Guizhou University of Finance and Economics, the utilization rate of school buildings and equipment developed under the project was high, but as it is necessary to update PCs frequently, PCs procured by the project have already been replaced by new ones using the universities' own funds. However, some lectures from the faculty of "learn-by-doing" at the universities collected the available parts from end-of-life PCs procured under the project, reassembled them and donated them to elementary and junior high schools in mountainous rural areas. Because of this, the benefit from the project has expanded to these elementary and junior high schools.

3.2.1.2 Qualitative improvement

(1) Floorage and monetary value of educational equipment per student

The Undergraduate University Establishment Standards of China required that the 2006 national standard of floorage per student was more than 30 m². Most target universities did not meet this standard as of 2011. Moreover, the floorage per student at some universities had deteriorated compared to 2001. The main reason for this was the rapid increase in students. All the target universities except Guizhou University for Ethnic Minorities plan to construct new campuses in other places and some universities have already started construction. Therefore, the issues of floorage per student will be resolved. However, it is difficult to say whether this project has contributed to increases in the floorage per student because the increase of the floorage per student through the project is not necessarily large.

Table 5: Floorage per student

Unit: m²

	Baseline (2001)	Actual (2011)	
		Floorage per student	Increase of the floorage per student through the project
Guizhou University (Guizhou University of Technology)	10.9 (10.7)	13.7	0.92
Guizhou Normal University	24.0	19.5	0.83
Guiyang Medical College	7.6	36.9	2.05
Zunyi Medical College	7.9	13.1	1.67
Guiyang College of Traditional Chinese Medicine	11.6	9.2	1.97
Guizhou University of Finance and Economics	13.4	16.6	1.71
Guizhou University for Ethnic Minorities	7.5	12.6	2.10

Source: Responses to the questionnaire

The monetary value of equipment per student, as confirmed in the Table 2, has improved and was greatly affected by this project. Should evaluation be comprehensively made in view of further increases in floorage, the entire trend is toward improvement while there may only have been a temporary worsening of the educational environment.

(2) Change in number of key faculties and key laboratories

In China, since “The opinion of some, concerning the development of higher education institutions and key faculties” by the State Education Commission in 1993, the state or provincial government has designated faculties and laboratories which closely relate to national development strategies and public welfare. These are labeled key faculties and key laboratories and funds are intensively supported by the government in order to raise education and research to an international level (see Table 6 and Table 7)⁹.

Table 6: Number of key faculties

	Baseline	Target	Actual	
	2001	2006	2006	2011
Guizhou University (Guizhou University of Technology)	NL:0, PML:11 NL:0, PML:9	NL:3, PML:20 NL4, PML: 17	NL:1, PML:23	NL:1, PML:33
Guizhou Normal University	NL:0, PML:5	NL:0, PML:8	NL:0, PML:8	NL:0, PML:13
Guiyang Medical College	NL:0, PML:6	NL:2, PML:10	NL:0, PML:7	NL:0, PML:7
Zunyi Medical College	NL:0, PML:4	NL:2, PML:7	NL:0, PML: 3	NL:0,PML: 5
Guiyang College of Traditional Chinese Medicine	NL:0, PML:4	NL:6, PML:8	NL:0, PML:5	NL:1, PML:27
Guizhou University of Finance and Economics	NL:0, PML:3	NL:0, PML:6	NL:0, PML:4	NL:0, PML:7
Guizhou University for Ethnic Minorities	NL:0, PML:4	NL:0, PML:10	NL:0, PML:6	NL:0, PML:6

Source: Responses to the questionnaire

Note: NL (National Level): National key faculty, PML (Provincial or Ministerial Level): Provincial or ministerial key faculty

⁹ National key faculties are designated by the State government. The provincial or ministerial key faculties are designated by the provincial government, while ministerial key faculties are designated by the provincial government or ministries such as the Ministry of Education.

The target universities could not match the target of the number of national key faculties. However, 98 faculties, that exceeded the number of target (86 faculties), were designated as provincial or ministerial key faculties as of 2011. The project especially encouraged the development of the faculty of agrochemicals in Guizhou University, which is designated as a national key faculty and which contributed to development of related laboratories.

Table 7: Number of key laboratories

	Baseline	Actual	
	2001	2006	2011
Guizhou University (Guizhou University of Technology)	NL:0, PML:10 NL:0, PML:8	NL:0, PML:25	NL:0, PML:35
Guizhou Normal University	NL:0, PML:0	NL:0, PML:1	NL:1, PML:5
Guiyang Medical College	NL:0, PML:0	NL:0, PML:0	NL:3, PML:4
Zunyi Medical College	NL:0, PML:0	NL:0, PML:2	NL:0, PML:3
Guiyang College of Traditional Chinese Medicine	NL:0, PML:0	NL:0, PML:1	NL:0, PML:5
Guizhou University of Finance and Economics	NL:0, PML:0	NL:0, PML:1	NL:0, PML:3
Guizhou University for Ethnic Minorities	NL:0, PML:0	NL:0, PML:0	NL:0, PML:2

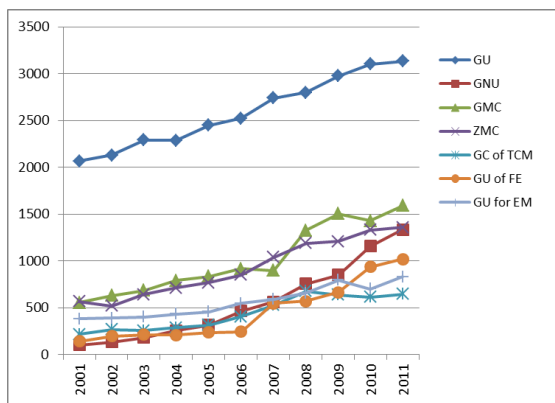
Source: Responses to the questionnaire

Note: NL (National Level): National key laboratory, PML (Provincial or Ministerial Level): Provincial or ministerial key laboratory

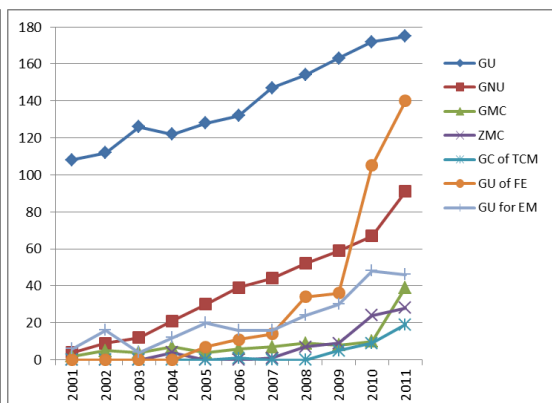
A target was not set for key laboratories. As of 2001, only Guizhou University, including the former Guizhou University of Technology, had 18 provincial or ministerial key laboratories. However, key laboratories were established in all the target universities in 2011. The number of national key laboratories rose to 4 and the number of provincial or ministerial key laboratories rose to 57. In accrediting key faculties and key laboratories, the enrichment of facilities and equipment (including libraries) is included in the screening criteria. Therefore, many target universities pointed out in the questionnaire that the development of buildings and equipment under the project contributed to the accreditation of key faculties and key laboratories.

(3) Number of research papers, research projects, patents for inventions etc.

Research papers published in China and articles published in scholarly journals such as Science Citation Indicators (SCI) are increasing (see Figure 3 and Figure 4). Although in Guizhou University there have long been many articles produced, the number has increased constantly. In the other target universities there has been a drastic increase in articles since around 2007 or 2008. In particular, the number of articles published in international journals such as SCI increased after the completion of equipment procurement under the project.



Source: Responses to the questionnaire
 Note: GU: Guizhou University, GNU: Guizhou Normal University, GMC: Guiyang Medical College, ZMC: Zunyi Medical College, GC of TCM: Guiyang College of Traditional Chinese Medicine , GU of FE: Guizhou University of Finance and Economics, GU for EM: Guizhou University for Ethnic Minorities.



Source: Responses to the questionnaire
 Note 1: SCI (Science Citation Indicators), EI (Engineering Index),ISTP (Index to Scientific & Technical Proceedings)
 Note 2: GU: Guizhou University, GNU: Guizhou Normal University, GMC: Guiyang Medical College, ZMC: Zunyi Medical College, GC of TCM: Guiyang College of Traditional Chinese Medicine , GU of FE: Guizhou University of Finance and Economics, GU for EM: Guizhou University for Ethnic Minorities.

Figure 3: Number of domestic articles

Figure 4: Number of articles in SCI, EI, ISTP

There have been many articles related to the project. Especially in Guizhou University for Ethnic Minorities (78), Guiyang College of Traditional Chinese Medicine (54, of which 4 articles have been published in international journals such as SCI), and Zunyi Medical College (21, of which 2 articles have been published in international journals such as SCI), there have been a lot of articles related to the project¹⁰. The connections with the project are as follows: 1) it became possible to publish articles because the researchers could make higher-level experiments due to the procured equipment; 2) the researchers took advantage of training in Japan to publish articles. Moreover, some trainees undertook joint research with professors in Japanese universities where they went for training during their half-year stay and they then published the articles in SCI-level journals (see Box 2).

¹⁰ The number within the brackets is total number of articles related to the project.

Box 2: A case of how training contributed to research articles and projects
— Guiyang College of Traditional Chinese Medicine —

Some teachers dispatched from Guiyang College of Traditional Chinese Medicine to Japanese universities for relatively long terms have been attempting to fuse various oriental medicines with western medicine.

For example, a teacher who conducted research on the electrophysiological activity of a cell (research on nerves) received research funds from the provincial government and is a member of a national level research project after one year and a half of training at Fukushima Medical University. Currently the teacher is adopting the viewpoint of nerves in western medicine into acupuncture and moxibustion therapy and is conducting research on the curative effects of a combination of acupuncture, moxibustion therapy and Chinese herbal medicine. Furthermore, the teacher is making use of the results of this research in education in the graduate school so that the students can study the combined medicine of the orient and the west.

Another teacher who studied oriental medicine at Toyama University researched about cures for type B hepatitis and acquired immune deficiency syndrome (AIDS) using traditional medicines used by Chinese minorities. The teacher published the research results in authoritative journals and presented them to the academy in Japan. Moreover, the teacher is applying for a patent for new medicine. In 2010, the teacher invited the preceptor in Toyama University to Guiyang College of Traditional Chinese Medicine for lectures. The teacher continues academic exchanges with the Japanese preceptor.

The number of research projects is dramatically increasing at all the target universities (see Table 8). For instance, Guiyang Medical College acquired a total of 81 research projects such as the “National Natural Science Foundation of China” and the “Guizhou Science and Technology Issues Breakthrough Project” by using equipment procured under the project. As a result of these projects, the university was awarded the first prize for Guizhou Province Scientific and Technological Achievements, the first prize for Guiyang City Scientific and Technological Achievements, the second prize for Guiyang Science and Technology, the third prize for the Guiyang City Science Progress Award and the second prize for the Guizhou Medical Society Science and Technology Award. In light of these, the project can be seen to have contributed to improving the level of research at the target universities to some extent.

Table 8: Number of research projects

	Baseline (2001)	Actual (2006)	Actual (2011)
Guizhou University	18 (National level)	46 (National level)	83 (National level)
Guizhou Normal University	56	79	216
Guiyang Medical College	101	212	270
Zunyi Medical College	67	197	251
Guiyang College of Traditional Chinese Medicine	76	196	314
Guizhou University of Finance and Economics	17	52	128
Guizhou University for Ethnic Minorities	51	80	302

Source: Responses to the questionnaire

Note: the data of Guizhou University includes only national level research projects. The data for other universities is a sum of national and provincial/ ministerial level research projects.

The number of social services also increased at all the target universities (see Table 9). For example, Guizhou University of Finance and Economics constructed a library and the Guizhou Province provincial information reference room. Following this, the professors have actively

made policy proposals to Guiyang municipal government and Guizhou provincial government using the large amount of information available. Proposal acceptances are increasing year by year. Some professors have become government advisors and Guizhou University of Finance and Economics is of increasing importance in the financial management of Guizhou province.

Equipment procured under the project in the analysis and measurement inspection center, Guizhou Normal University, has provided more than 3,000 measurement inspection services annually to universities, colleges, science institutes, public security departments, investigations into criminal cases, judicial branches, legislative committees of the Regional People’s Congress and individuals in Guizhou province. It has also provided product quality improvement services to more than 50 pharmaceutical companies. In addition, the university provided medical measurement test services to more than 100 companies annually and necessary technical assistance for the purchase of materials and quality control of products.

Guizhou Normal University, as mentioned in Box 3, has digitalized literature data for research and shared the data through the Guizhou province science technology database platform. This platform utilizes information network equipment procured under the project and symbolizes project impacts in the field of social services.

Table 9: Number of social services

	Baseline (2001)	Actual (2006)	Actual (2011)
Guizhou University	N/A	45	91
Guizhou Normal University	2	23	149
Guiyang Medical College	1	2	2
Zunyi Medical College	1	2	3
Guiyang College of Traditional Chinese Medicine	4	6	7
Guizhou University of Finance and Economics	3	7	38
Guizhou University for Ethnic Minorities	23	45	85

Source: Responses to the questionnaire

Box 3: Guizhou province science technology database platform —Guizhou Normal University—

The library of Guizhou Normal University has participated in the establishment of the “Guizhou province science technology database platform” by utilizing information network equipment procured under the project. It provides digital information resource services at no charge to higher education institutes, science institutes, new materials research centers etc. in Guizhou province, and participates in data sharing beyond the research area.

Many research prizes have been awarded related to the project such as the “Research and Application of a Medicament for Preventing Pests through Soil among Crops” (Guizhou University, second prize of the National Science and Technology Progress Award, 2007). In many cases, the teachers participated in the projects after training in Japan and they used facilities and equipment procured under the project. The number of patents for inventions has increased, especially at universities which have faculties of medicine and faculties of science

and engineering (see Table 10).

Table 10: Number of patents for invention

	Baseline (2001)	Actual (2006)	Actual (2011)
Guizhou University	13	20	28
Guizhou Normal University	0	10	13
Guiyang Medical College	5	17	32
Zunyi Medical College	0	1	2
Guiyang College of Traditional Chinese Medicine	0	4	6

Source: Responses to the questionnaire

Note: this table includes only universities which have records of patents for inventions.

Faculties at undergraduate schools and courses at graduate schools have also demonstrated an upward trend at all the target universities (see Table 11). According to the following table, Guizhou University for Ethnic Minorities did not have a graduate school. However, the establishment of courses was approved in 2012 and now there are master courses. Guizhou University of Finance and Economics created some courses such as one in international accounting based on the international exchange experiences of teachers participating in training in Japan. In addition, Guizhou University of Finance and Economics established a Japanese language course and the “Society of Japanese Language Education, Guizhou Province”. In some universities, the project exerted a direct influence on the establishment of new faculties and courses.

Table 11: Number of faculties and courses

	Baseline	Actual	
	2001	2006	2011
Guizhou University	Undergrad.: 91 Master: 86 Doctor: 4	Undergrad.: 122 Master: 213 Doctor: 36	Undergrad.: 137 Master: 241 Doctor: 56
Guizhou Normal University	Undergrad.: 38 Master: 15 Doctor: 0	Undergrad.: 49 Master: 40 Doctor: 0	Undergrad.: 56 Master: 92 Doctor: 0
Guiyang Medical College	Undergrad.: 11 Master: 26 Doctor: 0	Undergrad.: 16 Master: 34 Doctor: 1	Undergrad.: 30 Master: 43 Doctor: 6
Zunyi Medical College	Undergrad.: 12 Master: 14 Doctor: 0	Undergrad.: 19 Master: 17 Doctor: 0	Undergrad.: 24 Master: 13 Doctor: 0
Guiyang College of Traditional Chinese Medicine	Undergrad.: 4 Master: 11 Doctor: 0	Undergrad.: 8 Master: 15 Doctor: 0	Undergrad.: 9 Master: 21 Doctor: 0
Guizhou University of Finance and Economics	Undergrad.: 17 Master: 0 Doctor: 0	Undergrad.: 32 Master: 21 Doctor: 0	Undergrad.: 49 Master: 40 Doctor: 0
Guizhou University for Ethnic Minorities	Undergrad.: 17 Master: 0 Doctor: 0	Undergrad.: 37 Master: 0 Doctor: 0	Undergrad.: 72 Master: 0 Doctor: 0

Source: Responses to the questionnaire

In light of the above, regarding qualitative improvement, the educational environment is gradually getting better as floorage and the monetary value of equipment per student show a trend toward improvement. Regarding the development of school buildings and experimental equipment, there has been a substantial improvement especially in educational equipment while the project has contributed to the improvement of floorage to some extent.

The project has had a great effect on the increase in the designation of key faculties and laboratories. The project contributed also to the increase in the number of research papers, patents, etc. as many of these used equipment procured under the project or were achieved by participants in training in Japan. Therefore, the project has played a significant role in improving the quality of education and research.

3.2.2 Qualitative Effects

Qualitative effects of the project are (1) improvement in the results of the “Undergraduate University Teaching Level Evaluation” through upgrading of the educational environment, (2) increased numbers of holders of a doctorate degree, and (3) improvement in teaching methods as qualitative effects of the project.

(1) Improvement in the results of the “Undergraduate University Teaching Level Evaluation” through upgrading of the educational environment

According to the Education Department of Guizhou, all of the seven target universities, as mentioned above, won the honorary title “Excellent University” in the “Undergraduate University Teaching Level Evaluation” conducted by the Ministry of Education of the People's Republic of China in 2007. The practical education of Guizhou University of Finance and Economics was evaluated as B in the 2006 evaluation. Thereafter, they focused on the development of laboratories using the project, later receiving straight As in all the evaluation items and winning “Excellent University”. They took the opportunity afforded by this achievement for developing other buildings, facilities and equipment at an accelerated pace. In the end, building constructed under the project was designated as a “State Educational Model Center of Economic Management”¹¹. Therefore, this project provided the university with an opportunity for further development.

When Guizhou University was designated as one of the universities of “Project 211”¹², the project indirectly contributed to the development of facilities.

¹¹ Established by the Ministry of Education of the People’s Republic of China in order to promote the reform of experimental education in higher education and to enhance the quality of higher education. For the designation of “State experimental education model center”, universities have to pass the following assessment process: application, government approvals and licenses, development, assessment and acceptance inspection. Guizhou University of Finance and Economics “state educational model center of economic management” passed the inspection in 2013.

¹² Project 211 is a national project, named from an abbreviation of “the 21st century and approximately 100 universities respectively”. To be designated as Project 211 by the Ministry of Education of the People’s Republic of

In addition, there is the opinion that the employment rate of students has been boosted by the increasing social recognition of universities such as the Excellent Universities and designated Project 211 universities

(2) Increase in holders of doctorate degrees

The participants in training in Japan increased significantly due to a reduction in staff dispatched for long-term training and an increase in staff dispatched for short-term “university management courses”. Having said that, there were a lot of participants in mid-term or long-term visits for research purposes. Most of these are characterized by belonging to laboratories at Japanese universities and by using the project for about half a year or one year and before going on to doctoral courses appropriate for exploring their research themes in more detail and continuing their research using their own funds or scholarships provided by the universities. Although the concrete number is unknown, there are some cases like this at each university. In light of this, the project has contributed to an increase in the number of holders of a doctorate degree to some extent.

(3) Improvement of teaching methods

As a main effect of the training component, there are many teachers who are using Japanese methods of research and education as they have believed that they help improve educational methods. In particular, there are many cases where the seminar method has been introduced although traditionally a lecture style in a big classroom is common in China. One teacher won the provincial or ministerial level prize in 2011 with research on “Application of the Seminar Educational Model in a Music Master Course” after training in Japan (see Box 4).

Box 4: Application to research and education after training — Zunyi Medical College —

A professor from the immunology lab in the school of basic medicine, Zunyi Medical College, participated in training for half a year in Japan through the project. The professor himself made a contact with Kumamoto University and conducted his research project using the winter break. The research was in “Molecular systems produced by high affinity antibodies”. After training in Japan, he became a core professor in the education of basic medicine and has played an important role in both education and research. Another lecturer from a school of languages underwent training at Yamaguchi University for half a year. During her stay in Yamaguchi, the lecturer assisted in the development of software for the International Japanese Language Aptitude Test and she collected and analyzed data. After training, she introduced the advanced Japanese educational ideas and methods into Japanese language education at the school.

China means that the university is a top level in education, research and management. (Source: Japan Science and Technology Agency China Research Center, 2011, “2010 Current Situation and Trend of Higher Education in China”)

3.3 Impact

3.3.1 Intended Impacts

(1) Impact on higher education at provincial level

The quantitative indicators for the whole of higher education in Guizhou province have demonstrated an upward trend. However, it is difficult to say that construction of school buildings under the project had an impact to the entire province as the floorage per student became nearly flat or slightly deteriorated after the great improvement.

Table 12: Impact on higher education at provincial level

Purpose	Indicators	Baseline (2001)	Target (2006)	Actual (2006)	Actual (2009)	Actual (2011)
Quantitative improvement	Number of higher education institution	27	—	37	47	48
	Number of students at higher education institutions	192,225	259,000	221,546	299,072	344,100
	Higher education enrollment ratio (%) (=Appropriate age enrollment/ Appropriate age population)	7.3	9.3	11.0	18.4	23.2
Qualitative improvement	Floorage per student (m ² /student) (=floorage/number of students)	11.8	12.2	34.11	30.29	28.50

Source: Responses to the questionnaire

(2) Impact on regional development

At the time of appraisal, there was an expected impact on regional development through dispatching school teachers and doctors to rural areas, providing human resources to key industries, and by collaboration between Chinese universities and Japanese universities. Regarding the dispatch of human resources, a system of dispatch to rural areas has been in place since the commencement of the project. Therefore, there have been a lot of cases of dispatching teachers and doctors for some time. However, the evaluator could not confirm a relationship between the dispatches and the project. Moreover, some universities, such as normal universities, and some medical colleges do not have data on whether or not graduates got jobs in rural areas.

As for providing human resources to key industries, statistical data also only exists at a few institutes. However, according to responses to the questionnaire from the target universities, many universities said that the employment rate to key industries had been raised to enhance students' practical abilities through the procurement of equipment by the project.

Collaboration between Chinese universities and Japanese universities will be mentioned later in other impacts. There are noteworthy cases like Guizhou University of Finance and Economics as mentioned in Box 5. This project has had some impact on regional development.

Table 13: Providing human resources to key industries

	Baseline	Actual	
	2001	2006	2011
Guizhou University	1,923	2,531	2,716
Guiyang Medical College	35	72	120
Guizhou University of Finance and Economics	60	388	548

Source: Responses to the questionnaire

Note: there is no data if universities are not listed in the above table.

Box 5: Good practice of regional development — Guizhou University of Finance and Economics —

Guizhou University of Finance and Economics has constructed a library (including the Guizhou province provincial information reference room), a laboratory building and an academic exchange center, has developed related facilities and equipment, and dispatched 65 trainees to Japan. Many things have been improved through the project.

Through the construction of the laboratory building and the procurement of related equipment, the building became the one and only “State educational model center of economic management”. Due to the advanced facilities and management principles the building and the MBA course was also designated as a Guizhou province model modernization experimental base and professional education base.

This laboratory building became not only a facility for fostering the practical abilities of students but also a bridge or matching function between business and academia, and among business, though business training. Thus it expanded the project impact socially. The project contributed to improvements in the quality of education by supplementing equipment shortages in experimental education and thus the competitiveness of graduates in employment improved. Moreover, the project also contributed to the changing of the name from college to university (upgraded in 2012).

In the academic exchange center (see the photo at the beginning of this report), the university jointly hosts academic exchange activities several times at every year. In addition, the university has built a collaborative relationship for long-term training with many institutes in Guizhou province and provides adult education. For example, the academic exchange center is designated as a training center for the executives of Guizhou province tax authorities. The center gathers executives from all tax authorities in the province and provides capacity-building training courses.

(3) Impact on the strengthening of market rule

The number of graduates from faculties in accounting, law and finance shows a substantial increase in all except medical schools (see Table 14). Although most of the target universities do not see a direct link between the increase of graduates and the implementation of the project, the universities where student numbers have increased drastically such as Guizhou University, Guizhou University of Finance and Economics, and Guizhou University for Ethnic Minorities, have pointed out a relationship between this and the project.

In the case of Guizhou University, most of the lectures who participated in training in Japan are now in charge of faculties of accounting, law and financial management. They have utilized the student advice and teaching methods that they learned in Japan. As a result, the students choosing these courses have increased. In the light of this, the training has contributed to increasing students’ interest in these fields. In the case of Guizhou University of Finance and Economics, the project has provided students with practical facilities such as a mock court, an accounting process simulation lab, a practical training room for the soft aspects of finance etc. These are in the laboratory building constructed under the project because these faculties have the strong character of practical studies. Through the practical training, students become high

skilled human resources and are active as work-ready recruits after their graduation.

Table 14: Number of graduates from faculties of accounting, law and finance

	Baseline	Actual	
	2001	2006	2011
Guizhou University	1,683	1,850	2,058
Guizhou Normal University	48	428	1,501
Guiyang Medical College	0	63	72
Zunyi Medical College	0	0	0
Guiyang College of Traditional Chinese Medicine	0	0	0
Guizhou University of Finance and Economics	60	413	1,117
Guizhou University for Ethnic Minorities	N/A	198	540

Source: Responses to the questionnaire

(4) Impact on environmental conservation

At the universities which have faculties or courses related to the environment, the number of graduates who go to environmental related companies is increasing (see Table 15). Most of these universities suggested that the project had some impact on the graduates in the field of the environment. For example, some universities pointed out that devices such as apparatus for analysis and measurement provide a good experimental environment for students who study engineering and agriculture. Such students can learn environmental conservation and environmental monitoring and the project have contributed to their interest in working in the field of the environment. Some lecturers have pointed out that students were able to recognize that all humans share the responsibility for environmental conservation and students' willingness to embrace environmentalism has been encouraged by a lecturer conveying his experience of water resources conservation and water treatment equipment in Japan (see Box 6). Furthermore, there is an opinion that this project has contributed to not only improving the level of research at universities in this field but also to the social recognition of graduates through the development of special equipment for the environment and the training of lecturers.

Table 15: Graduates working in the environmental field

	Baseline	Actual	
	2001	2006	2011
Guizhou University	458	563	769
Guizhou Normal University	347	345	391
Guiyang Medical College	0	22	35
Zunyi Medical College	0	0	0
Guiyang College of Traditional Chinese Medicine	0	0	0
Guizhou University of Finance and Economics	25	101	324
Guizhou University for Ethnic Minorities	N/A	0	59

Source: Responses to the questionnaire

Box 6: Impact on environmental conservation — Guizhou University for Ethnic Minorities —

Guizhou University for Ethnic Minorities developed some facilities related to environment through this project. The experimental equipment for sewage treatment and experimental apparatus for liquids and gas have contributed to improving research abilities on environmental conservation. Since 2007, the university has monitored the quality of water and air in Huaxi District, Guiyang, by utilizing the facilities developed under the project. In 2008, the university concluded a cooperation agreement with Guizhou Kei Yue environmental conservation company and started to cooperate on more than 100 projects such as monitoring the quality of air and water and wastewater treatment. The university also conducts some joint research with related governmental offices and companies. The university's lecturers publish the results of the research as many research papers.

3.3.2 Other Impacts

(1) Impacts on the natural environment

The Environmental Impact Assessment (hereinafter referred to as EIA) was conducted prior to project implementation in accordance with Chinese regulations. "Three-Stage Simultaneous" implementation (i.e. regulation that environmental protection facilities shall be designed, constructed and put into production simultaneously with main the construction structures) was envisioned.

Based on this regulation, noise-abatement measures, appropriate sewage treatment and waste disposal were conducted by each university during the implementation period. Environmental facilities such as a waste water treatment plant were constructed before project completion, as necessary, and the environmental facilities were operated at the same time as the buildings and equipment were put into use. All the target universities took necessary environmental protection measures including environmental monitoring at each stage, namely the design, construction and operation stages. In this way, "Three-Stage Simultaneous" was smoothly implemented.

At the time of the ex-post evaluation, no negative impact on the environment was observed, according to responses by the universities to the questionnaire, interviews with the persons in charge, and visual confirmation at the sites by the evaluator.

(2) Land Acquisition and Resettlement

The project was carried out on existing university properties, hence there was no land acquisition or relocation of residents.

(3) Mutual understanding between Japan and China

It can be said that participants in the training in Japan could understand Japan deeply. They renewed their perception of Japan through not only research and education but also small events in daily life. Regarding research and education, many lecturers were impressed with Japanese educational methods, philosophy, and attitudes toward research and put them into practice. At the daily-life level, many trainees renewed their perception of the Japanese as they were really touched by Japanese tender-heartedness; for example, a stranger on the street took a trainee who

do not understand Japanese all the way to their destination when he asked for directions.

Moreover, there are many examples of the development of relationships between Japanese universities and Chinese universities for academic exchange and the dispatch of students during training period as seen in Box 7. However, these relationships, which include academic exchange, are systematically and continuously conducted at each university and they are not necessarily shared among the universities, including the target universities in Guizhou province. Especially academic exchanges were not active in some universities.

Box 7: Mutual understanding between Japan and China — Guizhou University —

Collaboration between Guizhou University and Japanese universities has been strengthened by the project. As of 2001, the university had concluded agreements with two Japanese universities. This increased to 7 Japanese universities as of 2011. In particular, cooperation with Saga University started after a trainee studied at Saga University for research on supermolecular chemistry. This developed into academic exchange and the dispatch of students.

In the academic aspect, after a lecturer comes back to China, he maintains contact with his academic supervisor at Saga University. The university has invited the supervisor to Guizhou for lectures three times and the trainee has published about 10 articles jointly with the supervisor. Among these articles, some were published in authoritative European journals. Regarding the dispatch of students, four students have already been dispatched to Saga University to take doctoral degrees. One of them completed a doctoral degree and came back to China. In dispatching, Guizhou University finances but Saga University offers scholarships, too.

This project has largely achieved its objectives, therefore its effectiveness and impact is high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The project is composed of the construction of school buildings, the enhancement of educational and research equipment, and the training of higher education personnel. The outputs of each component are as follows:

Table 16: Comparison of Outputs (planned and actual)

Items	Planned	Actual (achievement rate)
Buildings	8 universities total: 144,000 m ²	7 universities total: 185,92 m ² (129.1%)
Equipment	8 universities	7 universities: mostly as planned (101.14%)
Training	8 universities total: 184 staff	7 universities total: 319 staff (173.4%)

Source: JICA appraisal documents, Responses to the questionnaire

There was no drastic re-examination of the plan for building construction although floorage was expanded depending on the needs of each university.

Educational equipment was procured in three phases. At the first phase, the arrival of procured equipment was enormously delayed. Thereafter, the education department exercised strong leadership and analyzed the problems. As a result, the main factor of delay was found out

to be that the imported equipment had got caught up in Customs and stayed there for a long time. On the basis of this experience, the education department supervised the project appropriately from the second phase by dispatching an officer to Customs to procure the necessary equipment at an appropriate time. As a result, the output of educational equipment was almost as planned.

As for the training component, as mentioned above, participants in the training in Japan increased significantly due to reductions in staff dispatched for long-term training and increases in staff dispatched for short-term courses instead. The main reason was that the education department made a comprehensive judgment with a nod to the following: the necessity of human resources for university management, and the high effectiveness of the “university management course” etc. According to the Guizhou education department, the lecturers’ capacities were strengthened and the comprehensive level of the target universities was increased through training in Japan. The number of participants in training who improved educational methods and applied for research projects is not negligible.

3.4.2 Project Inputs

3.4.2.1 Project Cost

Actual project costs amounted to 7,822 million yen (of this, the actual loan disbursement amounted to 4,526 million yen) against the estimated costs of 6,772 million yen (of this, the planned loan amounted to 4,593 million yen). The actual costs were higher than planned (115.5%) but this was reasonable considering the increase in the outputs.

3.4.2.2 Project Period

The project period planned at the time of appraisal was 36 months, or from March 2003 to March 2006. The actual project period was 78 months, or from March 2003 to September 2009 which was equivalent to 216.7% of the original plan, and was significantly longer than planned due to the increase of the output.

However, it is particularly worth noting that Guizhou province completed the project¹³ by the planned final disbursement date without an extension of deadline as procurement was completed as planned through the strong leadership of the education department (although there was confusion at the beginning of the project). The reasons why the project was not completed within the planned project period are 1) the planned project period was too short, 2) the project was temporarily stopped due to the merger between Guizhou University and Guizhou University of Technology, 3) the project was affected by accidental forces such as SARS and the Wenchuan earthquake.

¹³ The completion of the project was defined as completion of three components: teaching and /or research buildings, educational and/ or research equipment, and personnel training at the time of appraisal.

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Due to the nature of the project, a quantitative analysis of the internal rate of return was not possible.

As mentioned above, The actual costs were higher than planned (115.7 %) but this was reasonable considering the increase of the outputs. On the other hand, the project period was affected by SARS and the Wenchuan earthquake. This was a 216.7% delay in accordance with the definition of the project completion.

In light of the above, although the project cost slightly exceeded the plan, this was reasonable considering the increase of the outputs. On the other hand, the project period significantly exceeded the plan, and therefore the efficiency of the project is fair.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

The hard assets such as buildings constructed and equipment procured under the project are managed by each target university and supervised periodically by the provincial government (the education department). The audit office, which is equivalent to the Board of Audit of Japan, conducts the annual inspections for the management at each university and the supervision of department of education.

A maintenance plan is made at the beginning of each school year. These are submitted to the president of the target university in charge of the project for approval. At each target university, necessary personnel from the personnel affairs department, the equipment management department, the security department, the building management department and the audit department are assigned and they conduct operation and maintenance. In general, the operation and maintenance team consists of 5 director level personnel, 2 engineers, and 7 operational staff. All the target universities evaluate that the number of team members is adequate.

3.5.2 Technical Aspects of Operation and Maintenance

All the target universities set regulations and conduct maintenance and inspection periodically. If necessary, they get suppliers or makers to perform maintenance for them. There is no particular problem on the technical aspects.

3.5.3 Financial Aspects of Operation and Maintenance

The budget for operation and maintenance at each university is allocated annually from the provincial financial budget. If there is a shortage in the budget for operation and maintenance, the shortage is borne using the revenue of the universities.

Regarding discharge, Guizhou provincial government covers 70% of the loan amount and

the universities cover 30%. The provincial government collects payments from each university and repays the total amount to the central government.

Table 17: Operation and maintenance costs at each target university (annual)

Unit: RMB ten thousand

	2009	2010	2011
Guizhou University	500	500	500
Guizhou Normal University	1,232	1,487	1,037
Guiyang Medical College	30~40	30~40	30~40
Zunyi Medical College	283	454	587
Guiyang College of Traditional Chinese Medicine	32	38	42
Guizhou University of Finance and Economics	70	70	70
Guizhou University for Ethnic Minorities	228	351	625

Source: Responses to the questionnaire

Note: The costs of Guizhou University, Guiyang College of Traditional Chinese Medicine and Guizhou University of Finance and Economics are limited to the facilities related to the project.

There is no evidence that the equipment lies neglected without maintenance and therefore, it is thought that the necessary resources for operation and maintenance are provided.

3.5.4 Current Status of Operation and Maintenance

At all the target universities, the buildings and equipment are well maintained. All the universities have inventory books and maintenance logs for the major equipment.

End-of-life equipment, such as PCs, has been updated already. However, valuable equipment is well maintained and the utilization ratio is high. In order to raise the utilization ratio, the education department has established a platform for sharing equipment and this is open to other universities.

No major problems have been observed in the operation and maintenance system, therefore the sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project objective was to improve higher education in Guizhou Province quantitatively and qualitatively by supporting the construction of buildings, the procurement of equipment and the training of teachers in the target universities. This objective has been highly relevant to the country's development plan and its development needs, as well as to Japan's ODA policy; therefore its relevance is high. Despite a significant increase of students between project commencement and ex-post evaluation, the effectiveness and impact of the project remained high as quantitative indicators on education and research (building areas, amount of educational

equipment) and qualitative indicators (number of key faculties and laboratories, number of research papers etc.) have been improving. The output increased responding to the needs of each university. Project cost exceeded the plan, but this was relevant in view of the increase of the outputs. While SARS and the Wenchuan earthquake affected the project, the project period significantly exceeded the plan; therefore efficiency of the project is fair. No major problems have been observed in the operation and maintenance system; therefore sustainability of the project effects is high.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

In order to deepen exchanges with Japanese universities structured by the project, it is recommended that a platform is established for sharing collaborative projects among the target universities and utilizing academic exchanges with Japanese universities. This would make it possible to enhance the sustainability and effectiveness of the training component.

4.2.2 Recommendations to JICA

It is desirable that JICA continuously cooperates with efforts to establish the above mentioned platform. For example, one idea is to post the characteristics of the target universities and the research themes (especially those of the participants in long-term training in Japan) on the existing website, the “Higher Education Project in China” and in so doing, another idea is to enhance functions of the website for the benefit of academic exchanges between Japanese universities and Chinese universities.

4.3 Lessons Learned

- In Guizhou province, equipment procurement was conducted relatively smoothly in comparison to other provinces. The factor behind this success was the analysis of problems at the first stage and to take effective steps to solve the problems. In concrete terms, the main reason for delay in the first stage, or delay in the installment of equipment, was that the imported equipment was stopped in Customs. To solve this problem, the education department allocated an officer to Customs, which avoided the procedure being disrupted. Especially in a project where equipment is procured, the project often gets delayed. Therefore, it is a good practice to analyze the problem at an early stage and implement the solution.
- In planning an education project, it is necessary to set the project period bearing in mind its components and objectives. For instance, this project was planned at 3 years. However, if the training component were to include as one of its aims, taking of a

doctoral degree, the project period should be set at least for seven years on the assumption that several batches of trainees would be dispatched. The project period is set at seven years in similar ongoing projects in other provinces.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs		
(1) Building Construction	8 universities: 144,000 m ²	7 universities: 185,920 m ²
(2) Equipment Procurement	8 universities	As planned
(3) Training	8 universities: 184 staff	7 universities: 319 staff
2. Project Period	March 2003 - March 2006 (36 months)	March 2003 – Sep. 2009 (78 months)
3. Project Cost		
Amount paid in foreign currency	4,292 million yen	4,526 million yen
Amount paid in local currency	2,180 million yen (145.3 million RMB)	3,296 million yen (219.7 million RMB)
Total	6,772 million yen	7,832 million yen
Japanese ODA loan portion	4,593 million yen	4,526 million yen
Exchange rate	1 RMB = 15 yen (As of March 2003)	1 RMB = 15 yen (As of March 2003)

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan

Shaanxi Loess Plateau Afforestation Project

External Evaluator: Nobuyuki Kobayashi, OPMAC Corporation

0. Summary

The 1998 Yangtze River Floods raised awareness of the necessity to improve the water holding capacity of the major rivers in the area by expanding forest areas in the upper and middle river basins and as such form the background of this project. Based on the voluntary participation of Shaanxi province farmers located in 34 counties/county-level cities/city districts¹ of Loess Plateau area, the purpose of this project is to prepare economic, timber and protection forests.

The implementation of this project was in line with Chinese forestry sector's policy and development needs as well as Japan's ODA policy on China to support activities in the environmental field, therefore its relevance is high. From the time of project appraisal to the ex-post evaluation, the area afforested by this project accounted for approximately 30% of the total increase in forest areas, and the project's contribution towards the improved percentage of forest cover is prominent. The questionnaire survey results indicated that farmers expect an increase in incomes generated from economic and timber forests and are eager for further investment. The survey also surmised that the forest management is satisfactory. For the reasons above, the project's effectiveness and impact are high. As for the project's efficiency, the project period was significantly exceeded the plan because severe growth conditions necessitated supplemental planting and replanting. The project cost also exceeded the plan due to the lower exchange rate (Japanese yen to Chinese RMB) from the time of project appraisal. In regards to the project's sustainability, neither the county-level local government forestry department nor the local farmers responsible for activities relevant to forest maintenance, showed any significant problem.

In light of the above, this project is evaluated to be satisfactory.

¹ Within Chinese administrative divisions, there are counties, county-level cities and city districts under provinces. In this report, the local government of the counties, county-level cities and city districts is mentioned as county-level local government.

1. Project Description



Project Location



Chinese Pine in Protected Forest

1.1 Background

At the time when the People's Republic of China was established (1949), the country's forest coverage rate was less than 10%. Ever since then, the Chinese government has been promoting improvement in afforestation. At the beginning of 2000, although China possessed one of the world's largest forest areas, its forest coverage rate was below 20% and China has yet to reach the forest coverage rate of other vast countries (with various natural environments) such as the United States, Canada and Russia. China's low forest coverage had caused many natural disasters including the 1998 Yangtze River Floods. Such large-scale floods had resulted in 1,300 deaths and 2,300 million victims. Excessive disafforestation resulting in the weakened capacity of water holding was considered one of the primary causes of such disasters. In addition, more floods are now more likely to occur during rainy season as the river bottoms have been raised by the inflow of sand at the Loess Plateau basin. This has caused a phenomenon in which a river has dried up (shear flow) during dry seasons. In addition, sandstorms occurring in areas affected by desertification were increasing, including a severe sand storm in March 2000 which caused fatal damage in the northwest region.

After the Yangtze River Floods in 1998, the Chinese government introduced a forestry sector policy that focused more on environmental aspects, and set a major policy goal of expanding the forest areas in the upper and middle river basins of major rivers. This project was based on farmers' voluntary participation in the forestation activities at Loess Plateau in the upper and middle river basins of Huanghe River to improve forest cover and it was positioned to support the Chinese government's activities to improve natural environments. With this background, the loan agreement for this project was signed in 2001. During the same period, JICA has provided ODA loan projects to expand the forest areas of Loess Plateau including the "Shanxi Loess Plateau Afforestation Project" and the "Inner Mongolia Loess Plateau Forestation Project".

1.2 Project Outline

The objective of this project is to increase forest cover, prevent soil erosion, and improve the incomes of farmers through the afforestation of the Loess Plateau area within Shaanxi province in 34 counties/county-level cities/city districts, thereby contributing to the improvement of the social and economic stability of the said regions, and the living environments of the local residents and those in the lower river basin of Huanghe River, as well as China's natural environment².

Loan Approved Amount/ Disbursed Amount	4,200 million yen / 4,199 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2001 / March 2001
Terms and Conditions	Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: Bilateral tied
Borrower / Executing Agency	The Government of the People's Republic of China / Shaanxi Provincial People's Government
Final Disbursement Date	July 2010
Feasibility Studies, etc.	Shaanxi Provincial Forest Survey and Design Institute, "Shaanxi Afforestation Project Feasibility Study", June 2000
Related Projects	- JICA "Shanxi Loess Plateau Afforestation Project" (ODA loan, 2000) and "Inner-Mongolia Loess Plateau Afforestation Project" (ODA loan, 2000) - World Bank "Loess Plateau Watershed Rehabilitation II" (1999) - KfW "Afforestation Shaanxi I & II" (1993 and 2000)

2. Outline of the Evaluation Study

2.1 External Evaluator

Nobuyuki Kobayashi, OPMAC Corp.

2.2 Duration of Evaluation Study

The ex-post evaluation was administered as follows;

² Although the project sites were expediently divided into 8 regions in the appraisal document, this ex-post evaluation report does not use the same 8 region division because the Chinese project related documents did not use the same divisions which could be confused with administrative divisions.

Duration of the Study: August 2012-September 2013

Duration of the Field Study: March 3-March 19, 2013 and June 4-June 21, 2013

2.3 Constraints during the Evaluation Study

Because the project sites were widely dispersed, many government agencies were involved in the project, and some information could not be directly obtained by those who were in charge at the time of project implementation due to personnel relocation. For this reason, details on the project costs (reasons for cost fluctuations for each category, payment period, etc.) could not be obtained, and it was difficult to carry out sufficient analysis on the fluctuations of the project cost.

3. Results of the Evaluation (Overall Rating: B³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Relevance to the Development Plan of China

At the time of project appraisal (2001), the National Program for the Construction of an Ecological Environment (approved in 1999) was the long-term plan for the recovery and protection of the environment. The plan pursued the protection of an ecological environment and aimed at a forest coverage rate of more than 26% by 2050. At the time of ex-post evaluation (2013), the National Program for the Construction of an Ecological Environment remained an important policy in the forestry sector and a long term view has been taken in terms of forestry rehabilitation. Another long-term plan, the National Afforestation Plan (2011-2020) was also established. Within the policy of Loess Plateau regions, (1) expansion of the forest areas through plantation, regeneration by enclosures and aerial sowing (tree species to include black locusts, Manchurian black pines, etc.), and (2) afforestation of economic forests specializing in certain species such as apple and Sichuan pepper trees.

At the time of the project appraisal, the 10th Five Year Plan and the mid-to long- term plan for the forestry sector (2001-2005) aimed at a forestry coverage rate of 18.2% by 2005 and 19.4% by 2010. For the economic and timber forests, the policy focused on fast growing tree species in the state forests of northeast and inner Mongolian regions as well as the mid river basin of Huanghe River and the southern regions and emphasized the afforestation of timber forests for industrial raw materials (plywood and wood pulp manufacturing). For the protection forest, the upper stream of the Yangtze River and upper/middle stream of the Huanghe River were designated as the primary target regions. At the time of ex-post evaluation, the 12th Five Year Plan for the forestry sector (2011-2015) was a mid-term sector plan. During the planned period, this mid-term sector plan proposed planting trees over an area of approximately 30

³ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁴ ③: High, ②: Fair, ①: Low

million ha to achieve a forest coverage rate of 21.7% by 2015. Projects to accelerate harvesting as well as to construct a base for plywood and wood pulp manufacturing are an on-going part of the forestry sector's promotion policy, and there is no significant change in the focus of the policy. The sector policy of the 12th Five Year Plan for the forestry sector of Shaanxi province is to improve the environments of the target areas including those regions suffering from severe soil erosion and sand storms and aims at a 43% forestry coverage rate by 2015.

During the period of project implementation, new regulations for natural environment protection were enacted. In 2002, for example, the Law on Prevention and Control of Desertification was put into effect. The Law stipulated that the local government would now be in charge of establishing a soil erosion control plan, implementing afforestation according to the plan, and carrying out forestry management to regulate logging. The Law on Water and Soil Conservation to prevent or control soil erosion was revised in 2010, and the roles of the government have been broadened to include appraisal, selection of target regions, establishment of a soil erosion control plan and development of regulations, protection construction, and planting.

Afforestation implemented by this project is in line with the forest rehabilitation policy objectives and its relevance remains intact. Some of the tree species used in this project (black locusts, Manchurian pine trees, apple and Sichuan pepper trees, etc.) are the same species that are emphasized in the National Afforestation Plan. The needs for nurturing and protecting forests to improve the natural environment have been strongly reflected in the laws and regulations.

3.1.2 Relevance to the Development Needs of China

Although the forest coverage rate in China has improved from 8.6% in 1949 (immediately after the establishment of the People's Republic of China) to 13.9% in 1999, insufficient forestry resources has been the cause for various environmental issues. At the time of the project appraisal, the Loess Plateau regions, in particular, had some of the lowest forest coverage rates in China (6%), and showed significantly poor forestry resources.

Shaanxi province, the project site of this project, was exposed to the menace of soil erosion and desertification while the Loess Plateau lies in the northern half of the province and the Huanghe River lies on the northern and eastern provincial borders. Intensive rain combined with soil that has little tolerance to erosion has caused severe drain off of surface soil in Loess Plateau, and is one of the main causes of soil runoff into the Huanghe River. At the time of appraisal, the amount of soil runoff into Loess Plateau was 14 billion tons and it was estimated that approximately 0.2-2 cm of Loess Plateau surface soil was lost annually. Although vegetation could contribute to the formation of more erosion resistant soil, Loess Plateau (including the northern regions of Shaanxi province) exhibited a low forest coverage rate. For this reason, the needs for expanding forest coverage in order to prevent soil erosion and

desertification were high in Shaanxi province. Such soil erosion and desertification were mostly caused by severe natural conditions, and as such there was no significant change observed from the time of appraisal to the ex-post evaluation.

In regards to forest rehabilitation, it is a crucial challenge that the farmers who are in charge of the forest administration gain sufficient incomes so that they do not carry out exploitative use of the forests. This project adopted an administrative scheme in which the farmers that afforested economic and timber forests could harvest from woodland. In 1998, prior to the project implementation, an average net income of a farmer in a rural area of Shaanxi province was approximately 35% lower (RMB 1,406) than the national average (RMB 2,161). In 2010, the average net income of a farmer in a rural area of Shaanxi province remained 28% lower (RMB 5,027.87) than the national average (RMB 6,977.29). At the time of the ex-post evaluation, rural Shaanxi farmer's incomes are still below national average, and its necessary to improve their incomes by introducing value-added farm products.

3.1.3 Relevance to Japan's ODA Policy

Japan's former Official Development Assistance Charter (former ODA charter), which had been approved by the cabinet in 1992, referred to the close relationship between Japan and East Asia and emphasized assistance to the Asian region. In addition, the charter had a policy for supporting the effort of developing countries in the field of environmental protection. Japan's ODA White Paper in 1999 regarded the environmental sector as a priority for China's loan assistance, and in particular, pointed out the inland areas where non-governmental financial support is hard to reach. Furthermore, the Japan Bank for International Cooperation's (at that time) Medium-Term Strategy for Overseas Cooperation Operations (approved in 1999) stated solving global issues including environmental issues as one of its basic policies, and assistance for China in such field was considered to have a higher priority.

Through assistance for Shaanxi province's afforestation, this project contributed to forestry development located in the inland part of China, and thus it was consistent with Japan's ODA policy.

This project has been highly relevant to the country's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness⁵ (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Forest Cover Ratio

Analysis of effectiveness/impact was based on the forest cover ratio for the following reasons: (1) It was the basis for the project appraisal decision and the target ratio was clearly set at the time of appraisal, and (2) Project's attribution to the project effect was clearly shown by this indicator. At the time of ex-post evaluation, the forest cover ratio has achieved its target (See Table 1). Based on the data in 2011, of all the increased forestry areas (approximately 328,000 ha) within project site from the time of appraisal to ex-post evaluation, the afforestation areas of this project (approximately 101,000 ha) took up about 30%. From the above, this project's contribution to the target regions to increase the forest cover ratio is evident.

Table 1: Increase of a Ratio in the Project Site

	Basis (At Project Appraisal)	Target (At Project Completion)	Actual (At Ex-post Evaluation)
Forest Area	957,344 ha	1,129,928 ha	1,285,162 ha
Forest Cover Ratio	26.1%*	30.8%**	35.0%***

Source: Appraisal documents, Shaanxi Forestry Department

Note: * (Forest + Shrubbery) ÷ Total area of countries/county-level cities/districts under the project

** (Forest + Shrubbery + Young Afforested Land) ÷ Total area of countries/county-level cities/districts under the project⁶

*** (Forest + Shrubbery) ÷ Total area of countries/county-level cities/districts under the project

(2) Survival Rate

Since the project site was located in an arid region with harsh growing conditions, constant monitoring of the plantation was conducted and supplemental planting was implemented as needed. At the time of project appraisal, the Chinese afforestation standard required supplemental planting and replanting in the areas with under 70% of survival rate. The areas with a survival rate over 70% of this project had decreased by approximately 3% over the period from the first to the third growing seasons (see Table 2), and the area's harsh climate was one of the factors. The damaged area from the floods in 2003 was 5,271.3 ha in total. Since the survival rates in 5 out of the 34 counties/city-districts were unfavorable during the September to December 2006 inspection, supplemental planting was conducted in 2,480 ha. Furthermore, additional afforestation and supplemental planting was conducted in 3,745 ha due to frost damage and a drought at the beginning of 2008.

⁵ Sub-rating for Effectiveness is to be put with consideration of Impact.

⁶ As young afforested land at the time of appraisal was expected to be forest land at post-implementation period, the area of young afforested land was included in the target forest land area at project completion.

Table 2: Area of Survival Rate above 70% of by Forest Type

Unit: ha

	Designed Plantation Area	*Survival rate after 1 growing season (>70%)	** Survival rate after 3 growing season (>70%)
Economic Forest	24,536.3	23,452.2	22,755.1
Timber Forest	8,167.0	8,884.4	8,726.4
Protection Forest	12,379.6	12,728.4	12,268.9
Total	45,082.9	45,065.0	43,750.4

Source Shaanxi Provincial Forestry Survey and Design Institute, Shaanxi Forestry Department

Note: * Planted in spring and inspected in autumn or winter of the same year

** Inspected in autumn or winter after three growing seasons after plantation

Insufficient rooting was observed in Zhouzui and Pucheng Counties where aerial sowing was implemented and additional plantation was conducted. According to the Province Forestry Department, insufficient rooting was due to inappropriate access control in the plantation areas after aerial sowing. After the Province Forestry Department directed the forestry departments of both counties to improve their process, appropriate access control was put into effect after the plantation.

(3) Area of Grain For Green Project

Since cultivation of inclined land causes soil erosion, the project by the Shaanxi Forestry Department to make farmers abandon cultivation and convert the farmland into planted forest (Grain for Green Project) was implemented at the time of project appraisal. Although this project did not directly support the Grain for Green Project, a 6,800 ha target area was set for afforestation of land with an incline greater than 25 degree. As the implementation of this project may have interfered with the Grain for Green Project area and furthermore the counties/county-level cities/districts may have included this project's afforestation area in achievement of the Grain for Green Project, the target area for the Grain for Green Project was set and monitored. In the counties/county-level cities/city districts under the project, the Grain for Green Project converted 27,447 ha from cultivated land to forest land during the project implementation, and the above target was achieved. From above, it can be concluded that implementation of this project did not negatively affect the Grain for Green Project implementation areas. The achievement was contributed partly by the fact that the Grain for Green Project implementation areas increased during the same period that this project was extended and that the Grain for Green Project gave sufficient economic incentives to participating farmers.

(4) Decline of Soil Erosion Amount

In order to observe environmental effects of this project, environmental monitoring was outsourced to the North West Agriculture and Forestry University. The university set one monitoring site with gauging weir, four monitoring sites (in four counties) with a concrete frame

to monitor soil erosion, and eight monitoring points (in eight counties/county-level cities) to observe vegetation (forest density, tree height and diameter, etc.). Environmental monitoring was conducted between January 2002 and December 2012. Based on such environmental monitoring, soil erosion into one river on the project site in Lantian County declined from 1,100 tons/ km² in 2000 to 950 tons/km² in 2008. At the Lantian County project site, soil erosion improved as tree-age increased and tree crown became dense.

3.2.2 Qualitative Effects

(1) Harvesting of Economic and Timber Forests

This project adopted a scheme in which farmers carried out voluntary afforestation in return for receiving financial support, and eventually those who owned the economic and timber forests could harvest. The ex-post evaluation conducted a questionnaire survey to the farmers in order to confirm the beneficiary's actual benefit⁷. For the economic forests, most of the participating farmers have obtained harvests. This shows that the harvests from the economic forests is fully materialized



Photo 1: Economic forest (Cherry orchard)

at the time of the ex-post evaluation(See Table 3). According to the interview with farmers who made the economic forests, before plantation in this project they used to grow lower earnings per area unit grains (corn, wheat, etc.) so this project's economic forest has contributed to an increase in their income. In some cases, since the former orchards had aged and the crop yields had declined before plantation, the project introduced new varieties. On the other hand, about 50% of the participating farmers responded that they had "Some Income" or "Little Income". It should be noted that even though no actual harvest had yet materialized from the timber forest, some respondents answered positively to the question on income increase in expectation of future harvests from the forest planted by this project.

Table 3: Harvesting of Plantation (Results of Questionnaire Survey)

Type of Forest	"Some Income"		"Little Income"		"No Income"		No Answer		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Economic	80	88.9%	7	7.8%	0	0.0%	3	3.3%	90	100.0%
Timber	4	23.5%	4	23.5%	9	52.9%	0	0.0%	17	100.0%

⁷ The questionnaire survey was conducted on the 138 project participating farmers from Liquan County, Hancheng County, Zhouzhi County, Linyou County, Qishan County, Changwu County and Huangling County (17 participants for Timber Forest, 90 participants for Economic Forest, 31 participants for Protection Forest). The Survey period was from March to April 2013.

Also the Shaanxi Forestry Exploration and Design Institute studied the impact of this project with 146 households within 26 counties in 2010 and observed the following impacts:

- Revenues had been made in about 80% of all economic forest areas (19,405 ha out of 22,755.1 ha).
- Revenue per 1 ha is approximately RMB 60,000 (approximately JPY 960,000).
- Based on the above results, the total project's economic forest is estimated to generate RMB 1,164 million in income.

At the time of the ex-post evaluation, harvests from the timber forest had not been fully materialized, and hence data regarding sales quantity and price could not be obtained. According to the data from the Shaanxi Forestry Department, the project's growing stock of forest⁸ was estimated to be 311,482.56 m³ (0.1% of the total stock in the Shaanxi province) as of 2010.

(2) Farmers' Use of Knowledge from Training

At the time of project implementation, training sessions for participating farmers were conducted on subjects such as pruning, fertilizing, and seedling pruning in all types of forests. According to the questionnaire survey, 84.8% of respondents (117 farmers) participated in the training. About 90% of these training participants actually utilized the knowledge from the training at the time of both time of afforestation and ex-post evaluation (See Table 4 and 5). As both product yields and product quality should improve through the knowledge gained from training in fertilizing and pruning methods, the farmers are eager to further utilize knowledge gained during the training.

Table 4: Use of Knowledge from Training at Plantation (Results of Questionnaire Survey)

Answer	Number	%
"Utilized knowledge"	93	79.5%
"Utilized knowledge to some extents"	20	17.1%
"Utilize knowledge very little "	3	2.6%
"Did not utilize knowledge"	0	0.0%
No answer	1	0.9%
Total	117	100.0%

⁸ The standing tree volume of the afforestation site.

Table 5: Use of Knowledge from Training at Ex-post Evaluation
(Results of Questionnaire Survey)

Answer	Number	%
“Utilize knowledge”	92	78.6%
“Utilize knowledge to some extents”	22	18.8%
“Utilize knowledge very little ”	2	1.7%
“Do not utilize knowledge”	0	0.0%
No answer	1	0.9%
Total	117	100.0%

3.3 Impact

3.3.1 Intended Impacts

(1) Environmental Improvement Effects within Project sites

The project sites were located in the inland area of arid regions where severe damage is caused by strong wind and dust. The questionnaire survey to the participating farmers assessed the decrease in damage caused by strong wind and dust as a result of the project’s afforestation. Most of the respondents felt that there was some improvement (See Table 6 and 7). In addition to decreased damage from strong wind and dust, survey respondents also noted decreased sand erosion and increased green areas as impacts on the environment. Some said that the afforestation project has made a more favorable living environment, noting that there had been many abandoned areas with scattered plants prior to the project’s afforestation.

Table 6: Damage Caused by Strong Wind (Results of Questionnaire Survey)

Answer	Number	%
“Decrease”	49	35.5%
“Decrease to some extents”	87	63.0%
“Decrease very little”	0	0.0%
“Do not decrease”	1	0.7%
No Answer	1	0.7%
Total	138	100.0%

Table 7: Damage Caused by Dust (Results of Questionnaire Survey)

Answer	Number	%
“Decrease”	62	44.9%
“Decrease to some extents”	75	54.3%
“Decrease very little”	1	0.7%
“Do not decrease”	0	0.0%
No Answer	0	0.0%
Total	138	100.0%

(2) Other Environmental Improvement Effects

Trees solidify CO₂ in their growing process and in the long-term will lead to a decline in the greenhouse gas effect. According to the estimate of the North West Agriculture and Forestry University, the annual CO₂ absorption of mature forest is 1,593 t/ hm² based on each tree species' afforestation area and CO₂ absorption. Based on those estimates, the annual CO₂ absorption of this project's total plantation is calculated to approximately 73,000 t.

(3) Prospective Harvest and Intention for Expansion of Forest Area

Of the farmers who responded to the questionnaire survey, more than 90% of farmers who participated in the economic forest (90 households) expect income over the next 10 years. 90% of respondents also said that they would "expand" or "expand much" of their economic forest (See Table 8 and 9). As aforementioned, although harvest from timber forest is relatively slow, 60% of the farmers (17 households) that possess timber forest expect incomes over the next 10 years. A total of 70% of those who have participated in the timber forest would "expand much" or "expand" their timber forest. Although harvests from timber forests take longer than harvests from economic forests, respondent's expectations for future harvests is high and the waiting time does not interfere with their intention to invest. The results of the questionnaire survey showed that farmers who own economic forest or timber forest have expectations of future income and intentions for investment, and therefore their forestry businesses are satisfactory.

Table 8: Income Outlook over the Next 10 Years (Results of Questionnaire Survey)

Type of Forest	"Some Income"		"Little Income"		"No Income"		No Answer		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Economic	84	93.3%	2	2.2%	4	4.4%	0	0.0%	90	100.0%
Timber	11	64.7%	5	29.4%	1	5.9%	0	0.0%	17	100.0%

Table 9: Expansion of Forest Land (Results of Questionnaire Survey)

Type of Forest	"Expand Much"		"Expand"		"Do not Expand"		No Answer		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Economic	7	7.8%	73	81.1%	6	6.7%	4	4.4%	90	100.0%
Timber	8	47.1%	4	23.5%	5	29.4%	0	0.0%	17	100.0%

3.3.2 Other Impacts

(1) Impacts on the Shaanxi Province Forestry Sector and Overall Agricultural Sector

The National Forestry Department Forest Survey and Design Institute was commissioned by the Japan Bank for International Cooperation (at that time) to conduct a study⁹. The output of

⁹ Upon implementation of this project, a project supervision manual on a forestry sector for those who are in charge at both JICA and the project executing agency was established, and a close inspection was conducted by the National

this project in Shaanxi province accounted for about 4% of the afforestation area, 2% of the plantation, 6% of the aerial sowing and 5% of the regeneration by enclosure. The project's investment amount approximately equals to 5% of the forestry's fixed asset investment of the said province. The study stated that the scale of the project was relatively large and it was complementary to other afforestation projects.

At the time of ex-post evaluation, of all of the techniques introduced by this project, the Shaanxi province forestry administration was continuing with two of them: (1) farmers get paid based on the afforestation areas that passed a test, and (2) providing training for farmers simultaneously with afforestation. During the implementation period, project personnel paid visits to Oita prefecture in Japan three times in order to see its One Village One Product movement. Based on their visits, the project introduced new varieties, purchased nursery trees, and conducted technical training and management guidance, focusing on specific forest products (Sichuan pepper, apple, cherry, etc.) at 30 project sites. Similar attempts were seen in agricultural products in the Shaanxi province at the time of the ex-post evaluation. Narrowing down the tree species has enabled the county-level forestry department which suffers from insufficient resources to work more efficiently and intensively and achieve enough scale of afforestation to ship products with low cost.

(2) Negative Impacts on the Natural Environment

During the ex-post evaluation site survey, no significant negative impact on the natural environment was observed. According to the Shaanxi Forestry Department, there was no disafforestation during the project implementation. Although the project constructed 90 km of forest road for the transportation of materials, the work involved was mainly limited to repairing existing trails by adding sand and gravel, hence it was considered that the impacts on the natural environments were minimal.

(3) Land Acquisition and Resettlement

According to the Shanxi Forestry Department, there was no land acquisition and resettlement. Neither land acquisition nor resettlement was necessary because farmers' participation was voluntary and the possession of land to be afforested was required in advance as a criterion for participation in the project. As described above, the construction of forest roads did not require land acquisition. The interview with the project's personnel during the site visit at the time of ex-post evaluation confirmed that no land acquisition or resettlement was undertaken.

Forestry Department Forest Survey and Design Institute during project implementation in order to confirm the validity of the manual.

This project has largely achieved its objectives, therefore its effectiveness and impact is high.

3.4 Efficiency (Rating: ①)

3.4.1 Project Outputs

The project output was “To carry out afforestation activities in 34 counties/county-level cities/city districts within the Loess Plateau region of Shaanxi province” or, to put it concretely, afforestation or equipment used for afforestation. This project has achieved most of the outputs as they were originally planned (See Table 10). Although there were some changes in the administrative divisions after the project was launched, there was no change in the project sites. In order to maintain outputs, supplemental planting and additional afforestation of 6,225 ha were implemented. There was an increase in the number of training participants; however, the interview with the Provincial Forestry Department stated that there was no change in the training policy and contents. Because government officials and neighborhood farmers could freely participate in the open-air training sessions there were more participants than originally planned which resulted in the large increase in the number of the training participants.

Table 10: Comparison of Outputs (Plan and Actual)

Plan	Actual
Afforestation total 100,000 ha	Afforestation total 100,676 ha
- plantation 45,000 ha (economic forest 30,000 ha, timber forest 8,000 ha, protection forest 7,000 ha)	- plantation 45,065 ha (economic forest 23,452.2 ha, timber forest 8,884.4 ha, protection forest 12,748.4 ha)
- Regeneration by Enclosures* 20,000 ha	- Regeneration by Enclosures 20,241 ha
- Aerial Sowing 35,000 ha	- Aerial Sowing 35,314 ha
Rebuilding/Expansion of Nurseries: 34 places	Rebuilding/Expansion of Nurseries: 34 places
Rehabilitation/Construction of Forest Road 90 km	Rehabilitation/Construction of Forest Road 90 km
Forest Protection (construction of fire tower, etc.)	Forest Protection (construction of fire tower, etc.)
Environmental Monitoring (Monitoring equipment, etc.)	Environmental Monitoring (Monitoring equipment, etc.)
Vehicles (4WD: 42 units, Trucks: 34 units)	Vehicles (4WD: 43 units, Trucks: 34 units)
Others (PC, office facilities)	Others (PC, office facilities)
Training (participating farmers: 30,300, employees of forestry departments of province/cities/prefectures /districts: 8,160)	Training (participating farmers: 58,346, employees of forestry departments of province/cities/prefectures /districts: 9,204)

Source: Appraisal documents, Shaanxi Forestry Department

Note: * Regeneration by Enclosures built fence to control access to forest land but did not carry out plantation.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The project cost was slightly higher than planned (114% of the original plan). Although the planned project cost was JPY 5,874 million, its actual cost was JPY 6,704 million. For the total loan amount, the actual loan amount was JPY 4,199 million whereas the planned amount was JPY 4,200 million. The project’s main output, afforestation, was almost as planned, and the

increase in the project cost was largely due to the lower exchange rate (Japanese yen to Chinese RMB) as the Japanese yen depreciated against RMB from the time of project appraisal by 13%.

At the time of the project appraisal, unpaid mandatory labor at properties with no usufruct was converted into a monetary value and counted as part of the project cost. According to the Shaanxi Forestry Department, such unpaid mandatory labor at the properties with no usufruct was abolished, and compensation is now paid for work for collectively-owned forests.

Table 11: Comparison of Project Cost (Plan and Actual)

Unit: JPY million

	Plan			Actual		
	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total
Total cost of the project	270	5,604	5,874	356	6,348	6,704
for afforestation	0	3,459	3,459	0	3,853	3,853
for nurseries	0	221	221	0	438	438
for forest roads	0	117	117	0	124	124
for facilities and vehicles	257	49	306	343	0	343
for training	0	123	123	0	113	113

Source: Shaanxi Finance Department

3.4.2.2 Project Period

The project period was significantly longer than planned (183% of the original plan). The original project period was 58 months from March 2001 to December 2005, however the actual project period was 106 months from March 2001 to December 2009¹⁰.

At the time of the appraisal, the project was to be completed after the completion of planting by spring 2003 followed by the final inspection of the third growth period in 2005 to confirm the approval of its designated area (100,000 ha). However, during the actual project implementation, the completion of planting work was extended until 2004 since some areas needed replanting due to the floods in 2003, and supplemental planting and replanting was also conducted in regions that did not pass the inspection after the third growing seasons¹¹. Another supplemental replanting was done in response to the frost damage incurred at the beginning of 2008. Because of such supplemental planting and replanting, the project period was extended and the project was completed in December 2009 upon confirmation of the completion of the supplemental plantings.

¹⁰ The relevant agency in China recognized that the project completion date was December 2005. Supplemental planting and replanting were carried out due to incidents (such as natural conditions) which the project could not directly control and the ODA loan was disbursed for these activities. For this reason, it is concluded that the project completion date is December 2009 when the completion of these activities was confirmed.

¹¹ Supplemental planting and replanting were carried out in the areas with under 70% of survival rate according to the Chinese afforestation standard.

In regards to the Statement of Expenditure (SOE) method of loan disbursement¹², adjusting the format of the SOE form and auditing scheme was required and therefore it took four months from the loan agreement signing (March 2001) to its activation (July 2001). As a result, the first disbursement was made in March 2002. As described above, the end of the loan disbursement period was extended from July 2008 to July 2010 to accommodate the need for supplemental planting and replanting due to harsh growth environments.

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) were not utilized for the appraisal of the project as no common method was established to estimate the economic benefits of environmental improvement among the afforestation projects. In addition, sufficient data on the amount of harvested forest products attributed to the project has not been collected, and it is difficult to accurately estimate the benefit which was necessary for recalculation. Thus, the internal rate of return was not calculated. Reliable data for estimating economic benefits could not be obtained and therefore calculating IRR with high accuracy was not possible.

The project period was exceeded the plan while the project cost slightly exceeded the plan, therefore efficiency of the project is low.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

No factor was found that could interfere with the project impacts from an institutional point of view. On forestry management, the Provincial Forestry Department is responsible for establishing forestry management policies, plans and goals, the county-level local government forestry departments for pest control, forest fire prevention, setting countermeasures for illegal disafforestation and arranging training sessions targeting farmers, and the local farmers for routine maintenance activities (pruning, mowing and fertilization). In the Shaanxi province, forest tenure reform, which allocated forestland tenure of collectively-owned forest to farmers, started in 2008, and farmers took on the maintenance activity roles. The allocation of the collectively-owned forest to the farmers was completed by the end of 2010 in the Shaanxi province. For protection forests, if the forest was owned by a state-owned forest farm, a forestry department of the local government which owned the forest would be responsible for maintenance activities. There were some changes seen before and after the project implementation and each farmer has both forest usufruct and responsibilities for maintenance, therefore it is clearer who is responsible for the maintenance of forestland.

¹² A method that accepts a payment list (SOE table) as an evidence document for loan disbursement

For the timber and protection forests, state-owned forest farms also participated in afforestation, and especially for the protection forests, state-owned forest farms conduct both afforestation and forest maintenance in many areas.

Upon implementation of pest control, forest fire prevention and setting countermeasures for illegal logging by the forestry departments of county-level local governments, forest rangers are hired to patrol protection forests and inspect the entry of vehicles into the forests. Within the counties/county-level cities/city districts of the project sites, there were 1,606 forest rangers in 2009 and 1,576 in 2011, and no major change has been made.

In the areas covered by the site survey, forest departments of county-level governments maintained facilities and infrastructure such as fire towers and forest roads. At the time of the ex-post evaluation, North West Agriculture and Forestry University, which was commissioned to conduct the environmental monitoring, stored the equipment. However, the environmental monitoring ended and the equipment for environmental monitoring is not currently in use.

3.5.2 Technical Aspects of Operation and Maintenance

While the project was implemented based on the project area's technical level, there were training opportunities for both government officials and farmers to maintain and improve their skills at the time of the ex-post evaluation. Most of the tree species introduced by this project have been cultivated in the past, and both the government officials and farmers had accumulated relevant experiences. Materials in use that could be obtained domestically included; ground film, humectant, rooting stimulant, manure, and fertilizer.

From the interviews with the afforestation department staff, there were trainings for governmental officials during the project implementation on; project administration (fund management, account statement, etc.); and afforestation techniques (site preparation, cultivation, fertilization, fruit quality improvement, etc.). At the time of the ex-post evaluation, officials had several opportunities every year to participate in such trainings. Trainings which addressed needs in terms of forest law (and its related regulations), forest fire prevention and afforestation techniques (soil improvement in arid regions, selection of tree species, etc.) were especially strong. Based on the interview with the project's participating farmers, farmers participated in training (in cultivation techniques and fertilization, etc.) held by the forestry department of the county-level local government.

Providing trainings is a main task of the county-level local government's forestry department, and such trainings were continued



Photo 2 Fertilization (Apple orchard)

during the ex-post evaluation. The training needs of the farmers on pruning and fertilization in the economic forest are especially strong and the forestry department provides guidance periodically. Some orchard owners were interested in the mending of old trees since harvests have decreased due to the aging of the trees.

3.5.3 Financial Aspects of Operation and Maintenance

As described in 3.5.1. *Institutional Aspects of Operation and Maintenance*, the forestry department of the counties/county-level cities/city districts and the farmers are responsible for the works related to forestry management. At the time of the ex-post evaluation, there were no severe issues that may have interfered with the financial durability of both parties. The forestry department budget of the target county level local government has increased from 2009 (RMB 204,731,600 in 2009 to RMB 309,593,000 in 2011).

For the selection of participating farmers, there were certain requirements (voluntary participation, property usufruct of owned forests) to account for the necessary burden for forestry management in the future. At the point of ex-post evaluation, there were an increased number of farmers with forest usufruct due to the forestry tenure reform, and they could harvest from the forest in which they have property usufruct. Harvesting statuses are as follows:

- (1) Economic Forest: Although the area per household is small, income per area unit is high and harvesting for the main tree species (Sichuan pepper, apple, cherry, etc.) have started. Mending of the trees can influence harvests and therefore the incentive for maintenance of the forest is high.
- (2) Timber Forest: As with economic forests, mending of the trees can also influence the harvest; therefore the incentive for maintenance is high. Since large-scaled forests are necessary in order to gain revenue from timber forests, there is a tendency that farmers with a higher financial-burden potential participate more in timber forests (as compared to farmers in economic forests).
- (3) Protection Forest: Although there is no harvest from this type of forest, at the time of ex-post evaluation, the forest management cost and the work volume was relatively low. There is also a regulation on pruning and disafforestation for the purpose of nature protection and a scheme in which an appointed farmer can obtain a subsidy when a forest is designated as a national forest for public-purpose (appointments are renewed every 5 years). There is penalty for illegal disafforestation and accidental fire.

From the result of interview with the farmers, 60% answered that the expenses for maintaining forest land was “Enough” or “Almost Enough” (See Table 12). A breakdown of

those who answered “Insufficient” (42 farmers) was: 8 farmers in the timber forest, 16 farmers in the economic forest and 18 farmers in the protection forest. Compared to timber and protection forests, relatively few of the farmers who owned economic forests answered that the expenses for maintaining their forest were insufficient. A higher percentage of people who owned timber and protection forests, felt that there was a fund shortage. It should be taken into consideration that harvests had not yet materialized, which could help explain why farmers felt that there was a fund shortage. However, given that there are both penalties and incentives provided for forest maintenance and given that farmers who can bear higher financial costs were selected (as compared to economic forest farmers), it was surmised that there would be no severe influence on forest maintenance in the short-term.

Table 12: Expenses for Maintaining Forest Land (Results of Questionnaire Survey)

“Enough”		“Almost Enough”		“Often Insufficient”		“Insufficient”		Total	
Number	%	Number	%	Number	%	Number	%	Number	%
21	15.2%	59	42.8%	16	11.6%	42	30.4%	138	100.0%

In this project, the cost of seedling and materials was loaned by the province to the finance departments of the county-level local governments, and then farmers made payments to the financial departments. The local government decided whether to make the payments claimed by its finance department for the farmers. There are several counties where the county-level local governments bear all the expenses but receive no payment from the farmers. The questionnaire survey result revealed that about 70% of the farmers responded that their repayment burden was “Little” or “Very Little” (See Table 13). Most farmers do not feel the loan burden.

Table 13: Repayment of Seedlings and Materials (Results of Questionnaire Survey)

Very Heavy		Heavy		Little		Very Little		No Answer		Total	
Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
24	17.4%	3	2.2%	84	60.9%	9	6.5%	18	13.0%	138	100.0%

3.5.4 Current Status of Operation and Maintenance

In the project site where the site survey was conducted during the ex-post evaluation, the afforested areas were maintained appropriately. Within the inspected afforestation sites (6 economic forests, 1 timber forest and 5 protection forests in Hancheng city, Huangling county, Liquan county, Sanyuan county, Long county and Baquiao district), there were no sites in which dying seedling and thin density over a wide area was observed. For the economic forest in particular, the farmers with property usufruct continuously prune and fertilize because mending of the trees could influence the harvests. Feeding damage caused by wild rabbits did occur during the project implementation and some traps and chemicals were used to avoid such

damage, however the need for such damage control has decreased because as the forest has grown, it has become less likely to be influenced by the feeding damage of rabbits. In the area with many protection forests, the forest rangers controlled the entry of vehicles and conducted patrol activities to prevent forest fires and illegal disafforestation. During springtime when the weather becomes arid, the forestry departments of the county-class local governments spend most of their working hours undertaking fire prevention and fire extinguishing.

Among the inspected forest roads and fire towers, no severe infrastructure damage existed which would prevent project effects. According to the Shaanxi Forestry Department, devices such as film cameras, digital cameras and computers had been purchased a long time ago and some of them had become obsolete. However, substitution devices have been purchased and their work was not impeded.

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The 1998 Yangtze River Floods raised awareness of the necessity to improve the water holding capacity of the major rivers in the area by expanding forest areas in the upper and middle river basins and as such form the background of this project. Based on the voluntary participation of Shaanxi province farmers located in 34 counties/county-level cities/city districts of Loess Plateau area, the purpose of this project is to prepare economic, timber and protection forests.

The implementation of this project was in line with Chinese forestry sector's policy and development needs as well as Japan's ODA policy on China to support activities in the environmental field, therefore its relevance is high. From the time of project appraisal to the ex-post evaluation, the area afforested by this project accounted for approximately 30% of the total increase in forest areas, and the project's contribution towards the improved percentage of forest cover is prominent. The questionnaire survey results indicated that farmers expect an increase in incomes generated from economic and timber forests and are eager for further investment. The survey also surmised that the forest management is satisfactory. For the reasons above, the project's effectiveness and impact are high. As for the project's efficiency, the project period was significantly exceeded the plan because severe growth conditions necessitated supplemental planting and replanting. The project cost also exceeded the plan due to the lower exchange rate (Japanese yen to Chinese RMB) from the time of project appraisal. In regards to the project's sustainability, neither the county-level local government forestry

department nor the local farmers responsible for activities relevant to forest maintenance, showed any significant problem.

In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Since the project sites are located in arid regions, more efficient forest fire prevention and extinguishing are the most important issues for forestry management. Forest fires not only destroy the forest, but may also be fatal to humans. It is desirable to create simple hazard maps (mapping the place of the past fire outbreaks, frequency, time and difficult areas for fire extinguishing), to identify and prioritize the points and seasons for prevention activities, and share the hazard maps with local residents to promote better understanding of such prioritized regions and seek cooperation in prevention activities.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

(1) Scheduling the Project Period in a Severe Growth Environment

The project was implemented in a severe growth environment for trees, therefore there was a need for attentive care in order to maintain the afforestation area. From the sustainability point of view, a project period extension was needed for supplemental planting.

Upon scheduling the project period, it is desirable to examine the growth conditions as well as the needs for supplemental planting, the estimated supplemental planting area and the workloads for supplemental planting. If necessary these considerations should be reflected in the project period at the time of appraisal.

(2) Establishing a Project Supervision Manual and Interim Appraisal

In the implementation of this project, a project supervision manual in the forestry sector for those in charge at both JICA and the project executing agency was prepared because the executing agency did not have enough experience with ODA projects. In order to prove the validity of the aforementioned manual, an extensive assessment was conducted by the National Forestry Department Forest Survey and Design Institute during project implementation. The project carried out systematic and comprehensive project supervision, and information on project implementation and the incidence of effects were collected.

For a similar case in which an executing agency does not have sufficient ODA loan project experience, especially when project supervision is difficult due to a vast project area, it is

desirable to prepare a project supervision manual in advance and conduct an extensive assessment through interim review work in order to objectively review the project status.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	See Table 10	See Table 10
2. Project Period	March 2001 – December 2005 (58 months)	March 2001 – December 2009 (106 months)
3. Project Cost		
Amount paid in Foreign currency	270 million yen	356 million yen
Amount paid in Local currency	5,604 million yen (RMB 431 million)	6,348 million yen (RMB 433 million)
Total	5,874 million yen	6,704 million yen
Japanese ODA loan portion	4,200 million yen	4,199 million yen
Exchange rate	1 RMB = 13.0 yen (As of July 2000)	1 RMB = 14.7 yen (Weight average of disbursement between March 2002 and February 2010)

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan

Shanxi Loess Plateau Afforestation Project

External Evaluator: Nobuyuki Kobayashi, OPMAC Corporation

0. Summary

Based on farmers' voluntary participation, the purpose of this project is to prepare economic, timber and protection forests in 30 counties/county-level cities/city districts¹ of the Loess Plateau area within the Shanxi province. The background of this project originates from the 1998 Yangtze River Floods, which raised awareness for improving the water holding capacity in the upper and middle river basins of major rivers by expanding forest areas.

The implementation of this project was in line with Chinese forestry sector's policy and development needs as well as Japan's ODA policy on China to support activities in the environmental field, therefore its relevance is high. As the area afforested by this project from the time of appraisal to ex-post evaluation accounts for an approximately 20% increase in forest land in the project area, this project has contributed to the improvement of the forest coverage ratio. After afforestation, soil erosion was improved as the age of forest increased. For the above reasons, the project's effectiveness and impact are high. As for the project's efficiency, severe growth conditions necessitated supplemental planting and replanting and the project's period was significantly exceeded the plan. The project cost also exceeded the plan due to the weakening of the Japanese yen to Chinese RMB from the time of project appraisal. In regards to the project's sustainability, forest maintenance activities are the responsibility of the forestry department of the county-level local government and the farmers, and neither showed any significant problems.

In light of the above, this project is evaluated to be satisfactory.

¹ Within Chinese administrative division, there are counties, county-level cities and city districts under prefecture-level cities. In this report, the local government of the counties, county-level cities and city districts is mentioned as county-level local government.

1. Project Description



Project Location



Chinese Arborvitae and Peking Willow
in Protection Forest

1.1 Background

At the time when the People's Republic of China was established (1949), the country's forest coverage rate was less than 10%. Ever since then, the Chinese government has been promoting improvement in afforestation. At the beginning of 2000, although China possessed one of the world's largest forest areas, its forest coverage rate was below 20% and China has yet to reach the forest coverage rate of other vast countries (with various natural environments) such as the United States, Canada and Russia. China's low forest coverage had caused many natural disasters including the 1998 Yangtze River Floods. Such large-scale floods had resulted in 1,300 deaths and 2,300 million victims. Excessive disafforestation resulting in the weakened capacity of water holding was considered one of the primary causes of such disasters. In addition, more floods are now more likely to occur during rainy season as the river bottoms have been raised by the inflow of sand at the Loess Plateau basin. This has caused a phenomenon in which a river has dried up (shear flow) during dry seasons. In addition, sandstorms occurring in areas affected by desertification were increasing, including a severe sand storm in March 2000 which caused 13 deaths in the Shanxi province.

After the Yangtze River Floods in 1998, the Chinese government introduced a forestry sector policy that focused more on environmental aspects, and set a major policy goal of expanding the forest areas in the upper and middle river basins of major rivers. This project was based on farmers' voluntary participation in the forestation activities at Loess Plateau in the upper and middle river basins of Huanghe River to improve forest cover and it was positioned to support the Chinese government's activities to improve natural environments. With this background, the loan agreement for this project was signed in 2001. During the same period, JICA has provided ODA loan projects to expand the forest areas of Loess Plateau including the "Shaanxi Loess Plateau Afforestation Project" and the "Inner Mongolia Loess Plateau Forestation Project".

1.2 Project Outline

The objective of this project is to increase forest cover, prevent soil erosion, and improve incomes of farmers by afforestation of Loess Plateau area within Shanxi province in 30 counties/county-level cities/city districts, thereby contributing to improve the social and economic stabilities of the said regions, and the living environments of the local residents and those in the lower river basin of Huanghe river, as well as China's natural environments².

Loan Approved Amount/ Disbursed Amount	4,200 million yen / 4,080 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2001 / March 2001
Terms and Conditions	Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: Bilateral tied
Borrower / Executing Agency(ies)	The Government of the People's Republic of China / Shanxi Provincial People's Government
Final Disbursement Date	July 2010
Feasibility Studies, etc.	Shanxi Provincial Forest Survey and Design Institute, "Feasibility Study on Loan Afforestation from Japan Bank of International Cooperation", June 2000
Related Projects	- JICA "Shaanxi Loess Plateau Afforestation Project" (ODA loan, 2000) and "Inner-Mongolia Loess Plateau Afforestation Project" (ODA loan, 2000) - World Bank "Loess Plateau Watershed Rehabilitation II" (1999) - KfW "Afforestation Shanxi" (1995)

2. Outline of the Evaluation Study

2.1 External Evaluator

Nobuyuki Kobayashi, OPMAC Corporation

2.2 Duration of Evaluation Study

Duration of the Study: August 2012 – September 2013

Duration of the Field Study: March 3 – March 19, 2013 and June 4 – June 21, 2013

² Although the project sites were expediently divided into 7 regions in the appraisal document, this ex-post evaluation report does not use the same 7 region division because the Chinese project related documents did not use the same divisions which could be confused with administrative divisions.

2.3 Constraints during the Evaluation Study

The project effects during the project implementation period were not adequately assessed because sufficient detailed information on the inspection of planted areas after three growing seasons could not be obtained. In addition, this project's budget and head count data were not available for the county-level governments' forestry departments related to this project. For this reason, evaluation results regarding "Sustainability" are based on data covering the whole Shanxi province.

3. Results of the Evaluation (Overall Rating: B³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Relevance to the Development Plan of China

At the time of project appraisal (2001), the long-term plan for the recovery and protection of the environment was the National Program for the Construction of an Ecological Environment (approved in 1999). The plan pursued the protection of an ecological environment and aimed for a more than 26% forest coverage rate by 2050. At the time of ex-post evaluation (2013), the National Program for the Construction of an Ecological Environment remained as an important policy in the forestry sector and long term forestry rehabilitation has been undertaken. The National Afforestation Plan (2011-2020) was another long-term plan established within the policy of Loess Plateau regions. The policy goals were: (1) expansion of the forest areas through plantation, regeneration by enclosures and aerial sowing (tree species to include black locusts, Manchurian black pines, etc.), and (2) afforestation of economic forests specializing in certain species such as apple and Sichuan pepper trees.

At the time of the project appraisal, the 10th Five Year Plan and the mid-to long-term plan for the forestry sector (2001-2005) aimed at a forestry coverage rate of 18.2% by 2005 and 19.4% by 2010. For the economic and timber forests, the policy focused on fast growing tree species in the state forests of northeast and inner Mongolian regions as well as the mid river basin of Huanghe River and the southern regions and emphasized the afforestation of timber forests for industrial raw materials (plywood and wood pulp manufacturing). For the protection forest, the upper stream of the Yangtze River and upper/middle stream of the Huanghe River were designated as the primary target regions. At the time of ex-post evaluation, the 12th Five Year Plan for the forestry sector (2011-2015) was a mid-term sector plan. During the planned period, this mid-term sector plan proposed planting trees over an area of approximately 30 million ha to achieve a forest coverage rate of 21.7% by 2015. Projects to accelerate harvesting as well as to construct a base for plywood and wood pulp manufacturing are an on-going part of the forestry sector's promotion policy, and there is no significant change in the focus of the

³ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁴ ③: High, ②: Fair, ①: Low

policy. The Shanxi province 12th Five-year Plan for the Forestry Sector Development regards achievement of two major tasks by 2015 as core of the sector policy. Two major tasks are to raise forest coverage rate to 23% and the growing stock of trees to 130 million m³.

During the period of project implementation, new regulations for natural environment protection were enacted. In 2002, for example, the Law on Prevention and Control of Desertification was put into effect. The Law stipulated that the local government would now be in charge of establishing a soil erosion control plan, implementing afforestation according to the plan, and carrying out forestry management to regulate logging. The Law on Water and Soil Conservation to prevent or control such soil erosion was revised in 2010, and the roles of the government were broadened to include: appraisal, selection of target regions, establishment of a soil erosion control plan and development regulations, protection construction and planting.

Afforestation implemented by this project is in line with the forest rehabilitation policy objectives and its relevance remains intact. Some of the tree species used in this project (black locusts, Manchurian pine trees, apple and Sichuan pepper trees, etc.) are the same species that are emphasized in the National Afforestation Plan. The needs for nurturing and protecting forests to improve the natural environment have been strongly reflected in the laws and regulations.

3.1.2 Relevance to the Development Needs of China

Although the forest coverage rate in China has improved from 8.6% in 1949 (immediately after the establishment of the People's Republic of China) to 13.9% in 1999, insufficient forestry resources has been the cause for various environmental issues. At the time of the project appraisal, the Loess Plateau regions, in particular, had some of the lowest forest coverage rates in China (6%), and showed significantly poor forestry resources.

Shanxi province, the project site of this project, was exposed to the menace of soil erosion and desertification. The Huangje river flows near the province's west and south boundaries and the Loess Plateau is located in the province's western and southern regions. Intensive rain combined with soil that has little tolerance to erosion has caused severe drain off of surface soil in Loess Plateau, and is one of the main causes of soil runoff into the Huanghe River. At the time of appraisal, the amount of soil runoff into Loess Plateau was 14 billion tons and it was estimated that approximately 0.2-2 cm of Loess Plateau surface soil was lost annually. Although vegetation could contribute to the formation of more erosion resistant soil, Loess Plateau (including Shanxi province) exhibited a low forest coverage rate. For this reason, the needs for expanding forest coverage in order to prevent soil erosion and desertification were high in Shanxi province. Such soil erosion and desertification were mostly caused by severe natural conditions, and as such there was no significant change observed from the time of appraisal to the ex-post evaluation.

In regards to forest rehabilitation, it is a crucial challenge that the farmers who are in charge of the forest administration gain sufficient incomes so that they do not carry out exploitative use of the forests. This project adopted a forest administration scheme in which the farmers that afforested economic and timber forests could harvest from their woodland. At the time of the appraisal, net income per capita in the rural area of the Shanxi province (1998: RMB 1,858) was lower than the national average in rural areas by 14%. In 2011, net income per capita in the rural area of the Shanxi province (RMB 5,601.40) remained lower than the national average for rural areas (RMB 6,977.29) by 20%. At the time of ex-post evaluation, the farmer's incomes are still below the national average, and it was still necessary to improve farmer's incomes by introducing value-added farm products.

3.1.3 Relevance to Japan's ODA Policy

Japan's former Official Development Assistance Charter (former ODA charter), which had been approved by the cabinet in 1992, referred to the close relationship between Japan and East Asia and emphasized assistance to the Asian region. In addition, the charter had the policy of supporting the effort of developing countries in the field of environmental protection. The Japan's ODA White Paper in 1999 regarded the environmental sector as a priority for China's loan assistance, and in particular, pointed out the inland areas where non-governmental financial support is hard to reach. Furthermore, the Japan Bank for International Cooperation's (at that time) Medium-Term Strategy for Overseas Cooperation Operations (approved in 1999) stated solving global issues including environmental issues as one of its basic policies, and assistance for China in such field was considered to have a higher priority.

Through assistance for Shanxi province's afforestation, this project contributed to forestry development located in the inland part of China, and thus it was consistent with Japan's ODA policy.

This project has been highly relevant to the country's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness⁵ (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Forest Cover Ratio

Analysis of effectiveness/impact was based on the forest coverage rate for the following reasons: (1) It was basis for the project appraisal decision and the target ratio was clearly set at the time of appraisal, and (2) Project's attribution to the project effect was clearly shown by this indicator. Based on the latest forest data obtainable at the ex-post evaluation, the forest cover

⁵ Sub-rating for Effectiveness is to be put with Impact.

ratio has improved significantly and has achieved its target (see Table 1). As the afforestation area by this project (approximately 100,000 ha) accounts for an approximately 20% of an increase of forest land in the project area (approximately 553,000 ha) from appraisal to ex-post evaluation, this project has contributed to the improvement in the forest cover ratio. In addition to the Grain for Green Project, which is explained in a later section, three national projects (the Natural Forest Protection Project, the Beijing-Tianjin Sandstorm Source Control Project and the Three-North Shelter Forest Project) have significantly contributed to the improvement in the forest cover ratio. Given its percentage of afforested area, this project also played an important role in an increase in forest cover ratio in the project area.

Table 1: Increase of Forest Cover Ratio in the Project Site

	Basis (At Project Appraisal)	Target (At Project Completion)	Actual (At Ex-post Evaluation)
Forest Area	656,133 ha	774,363 ha	1,209,102 ha
Forest Cover Ratio	17.3%*	20.4%**	31.9%***

Source: Appraisal documents, Shanxi Forestry Department

Note: * (Forest + Shrubbery) ÷ Total area of countries/county-level cities/districts under the project

** (Forest + Shrubbery + Young Afforested Land) ÷ Total area of countries/county-level cities/districts under the project⁶

*** (Forest + Shrubbery) ÷ Total area of countries/county-level cities/districts under the project

(2) Survival Rate

At the time of project appraisal, the Chinese afforestation standard required supplemental planting and replanting in areas with a survival rate under 70%. After one growing season, 98% of the planted area passed inspection (see Table 2). The planted area was continuously monitored during the project implementation and, if necessary, supplemental planting was conducted. The project area's climate was arid and had difficult growth conditions. Furthermore, wild rabbits caused feeding damage. It was difficult to completely prevent feeding damage, even though traps and rabbit repellent were used. The data obtained from the Shanxi Forestry Department shows that supplementary planting and replanting were conducted on 7,013.1 ha.

Table 2: Survival Rate by Type of Forest

	70% or More	Below 70% and Above 41%	40% or Less
Economic Forest	24,759.7 ha	0.0 ha	138.7 ha
Timber Forest	10,982.7 ha	0.6 ha	187.0 ha
Protection Forest	34,388.9 ha	0.0 ha	874.6 ha
Total	70,131.3 ha	0.6 ha	1,200.7 ha

Source: Shanxi Forestry Department

Note: Survival rate after one growing season (Planted in spring and inspected in autumn or winter of the same year)

⁶ As young afforested land at the time of appraisal was expected to be forest land at post-implementation period, the area of young afforested land was included in the target forest land area at project completion.

In the monitoring study commissioned to the Shanxi Forest Research Institute, approximately 10% of the project area was chosen and monitored in six counties. In September 2012, the survival rate was 74.4% in the planted area (Economic Forest: 76.7%, Timber Forest: 75.2%, Protection Forest: 72.4%). In all types of forest, the survival rate remained above 70%. A 70% level is considered “passing” inspection and infers that the plantation by this project has at an adequate level of density after the completion of the project.

As low forest coverage and little rainfall resulted in dry soil and prevented germination, areas suitable for aerial sowing was limited in the project site. For this reason, aerial sowing was replaced by artificial sowing (sowing uniformly from standing position or seeding to a small hole on soil) except in Yuci and Guijiao (among the 13 counties/county-level cities/districts). Despite this change, total sowing area was as planned (10,000 ha).

(3) Area of Grain for Green Project

Since cultivation of inclined land causes soil erosion, the project by the Shanxi Forestry Department to make farmers abandon cultivation and convert the farmland into planted forest (Grain for Green Project) was implemented at the time of project appraisal. Although this project did not directly support the Grain for Green Project, a 5,000 ha target area was set for afforestation of land with an incline greater than 25 degree. As the implementation of this project may have interfered with the Grain for Green Project area and furthermore the counties/county-level cities/districts may have included this project’s afforestation area in achievement of the Grain for Green Project, the target area for the Grain for Green Project was set and monitored. In the counties/county-level cities/city districts under this project, the Grain for Green Project converted 50,033 ha from cultivated land to forest land became included in during the project implementation, and the above target was achieved. The Grain for Green Project gave sufficient economic incentives to participating farmers and also contributed to the achievement of the goal.

(4) Prevention of Soil Erosion

Environmental monitoring of this project was commissioned to the Shanxi Forest Research Institute and was carried out in six sites. Monitoring posts were selected so that they covered geographic locations, levels of rainfalls, types of forest (economic, timber, and protection) in an unbiased manner. At each of the monitoring posts, treatment groups (tree species and densities were the same conditions as that of the protection forest planted by this project) and a control group (with the same conditions as that of the treatment group except plantation) were established. To estimate the effects from plantation, soil in tanks from both groups were compared and a decrease of soil erosion was measured. After afforestation, an improvement in soil erosion was confirmed as the age of the forest increased and tree canopy became denser.

Table 3: Amount of Soil Erosion

	2007	2012
(A) Treatment Group	1.385 t/ha	0.664 t/ha
(B) Control Group	1.965 t/ha	1.508 t/ha
(B)-(A) Decrease of Soil Erosion	0.580 t/ha	0.844 t/ha

Source: Shanxi Forest Research Institute

3.2.2 Qualitative Effects

(1) Harvesting of Economic and Timber Forests

This project adopted a scheme in which farmers carried out voluntary afforestation receiving financial support, and eventually those who owned the economic and timber forests could harvest. The ex-post evaluation conducted a questionnaire survey to the farmers in order to confirm the beneficiary’s actual benefit ⁷. On economic forest, approximately 70% of the participating farmers replied “Some Income” and this result suggests that income from the economic



Photo 1: Economic forestry (Jujube orchard)

forest is now materialized (see Table 4). Based on interviews with farmers who made economic forest such as apple and jujube, economic forest made by this project contributes to an increase of income because before plantation these areas had been waste land or cropland generating low income per unit area (i.e. wheat and maize). On timber forest, the farmers replying “Little Income” accounts for a larger portion. Interviews with timber forest farmers shows that harvesting of timber forest is slower than that of economic forest as timber forest requires more growing period. Furthermore, interviews reveals that larger size of forest land resulted in cost reduction of collection and shipping and stimulated purchase by brokers and establishment of processing workshops.

Table 4: Harvesting of Plantation (Results of Questionnaire Survey)

Type of Forest	“Some Income”		“Little Income”		“No Income”		No Answer		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Economic	35	66.0%	18	34.0%	0	0.0%	0	0.0%	53	100.0%
Timber	1	14.3%	4	57.1%	2	28.6%	0	0.0%	7	100.0%

⁷ The questionnaire survey was conducted on the 99 project participating farmers from Xia county, Youyu county, Liulin county, Hongtong county, and Taigu county (7 participants for Timber Forest, 53 participants for Economic Forest, 39 participants for Protection Forest). The Survey period was from March to April 2013.

(2) Farmers' Use of Knowledge from Training

Many of the participating farmers also participated in training for pruning, fertilization, and selection of seedlings. In the questionnaire survey, all of the farmers replied either "Utilized knowledge" or "Utilized knowledge to some extent" at the time of plantation (see Table 5). Similarly, all of the farmers replied either "Utilize knowledge" or "Utilize knowledge to some extent" at the time of ex-post evaluation (see Table 6).

Table 5: Use of Knowledge from Training at Plantation (Results of Questionnaire Survey)

Answer	Number	%
"Utilized knowledge"	59	59.6%
"Utilized knowledge to some extent"	40	40.4%
"Utilized knowledge very little "	0	0.0%
"Did not utilize knowledge"	0	0.0%
No answer	0	0.0%
Total	99	100.0%

Table 6: Use of Knowledge from Training at Ex-post Evaluation
(Results of Questionnaire Survey)

Answer	Number	%
"Utilize knowledge"	63	63.6%
"Utilize knowledge to some extent"	36	36.4%
"Utilize knowledge very little "	0	0.0%
"Do not utilize knowledge"	0	0.0%
No answer	0	0.0%
Total	99	100.0%

3.3 Impact

3.3.1 Intended Impacts

(1) Environmental Improvement Effects within Project Sites

The project sites were located in the inland area of arid regions where severe damages were caused by strong wind and dust. The questionnaire survey to the participating farmers assessed the decrease in damage caused by strong wind and dust as a result of the project's afforestation. All of the respondents felt some improvement in both strong wind and dust (see Table 7 and Table 8). In addition to noting less damage from strong wind and dust, respondents referred to an increase in green coverage, a decrease in soil erosion, and prevention of river erosion as examples of improvement in environmental conditions. Based on an interview with one Qingxu farmer, poplar forest reduced dust and residents could enjoy recreational activities such as walking and jogging.

Table 7: Damage Caused by Strong Wind (Results of Questionnaire Survey)

Answer	Number	%
“Decrease”	56	56.6%
“Decrease to some extent”	43	43.4%
“Decrease very little”	0	0.0%
“Do not decrease”	0	0.0%
No Answer	0	0.0%
Total	99	100.0%

Table 8: Damage Caused by Dust (Results of Questionnaire Survey)

Answer	Number	%
“Decrease”	58	58.6%
“Decrease to some extent”	41	41.4%
“Decrease very little”	0	0.0%
“Do not decrease”	0	0.0%
No Answer	0	0.0%
Total	99	100.0%

(2) Prospective Harvest and Intention for Expansion of Forest Area

This project adopted a scheme in which farmers carried out voluntary afforestation in return for receiving financial support, and eventually those who owned the economic and timber forests could harvest.

Of the farmers who responded to the questionnaire survey: out of the 53 economic forest farmer households approximately 70% expected “Some Income” for the next 10 years and 30% expected “Little Income” (see Table 9 and Table 10). Out of the 7 timber forest farmer households, 70% expected “Some Income” for the next 10 years but at the same time 60% replied that they did not expand forest land. Based on the questionnaire survey, it is presumed that economic forest reached a new phase from harvesting to reinvestment: participating farmers have a more conservative attitude towards investment in timber forest because it requires a longer period before harvesting.

Table 9: Income Outlook over the Next 10 Years (Results of Questionnaire Survey)

Type of Forest	“Some Income”		“Little Income”		“No Income”		No Answer		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Economic	36	69.9%	16	30.2%	0	0.0%	1	1.9%	53	100.0%
Timber	5	71.4%	2	28.6%	0	0.0%	0	0.0%	7	100.0%

Table 10: Expansion of Forest Land (Results of Questionnaire Survey)

Type of Forest	“Expand Much”		“Expand”		“Do not Expand”		No Answer		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Economic	26	49.1%	17	32.1%	10	18.9%	0	0.0%	53	100.0%
Timber	1	14.3%	2	28.6%	4	57.1%	0	0.0%	7	100.0%

3.3.2 Other Impacts

(1) Impact on Investment in the Forestry Sector in the Shanxi Province

The National Forestry Department Forest Survey and Design Institute was commissioned by Japan Bank for International Cooperation (at that time) to conduct a study⁸. According to the survey, in the Shanxi province during the period of afforestation from 2001 to 2005, the output of this project accounted for 5% of afforested land, 3% of plantation, 3% of aerial sowing and 6% of regeneration by enclosure. In terms of investment amount, this project also accounted for 5% of fixed investment in the forestry sector of the province. The study mentioned that the size of this project was relatively large and complementary to other projects and that the implantation methods (such as farmers’ voluntary participants, inspection-based stepwise payment of afforestation costs) could be utilized for afforestation projects in the future. According to the Provincial Forestry Department, this project’s innovative methods (such as clear implementation arrangements before the commencement of afforestation projects and the establishment of a training system to support project implementation) were applied to afforestation projects at the time of the ex-post evaluation.

(2) Negative impacts on the natural environment

During the site survey of the ex-post evaluation, there was no significant negative impact on the natural environment observed. According to the Shanxi Forestry Department, there was no disafforestation during the project implementation. This project constructed forest roads for the delivery of materials for afforestation. Cutting down forest was not required because unpaved roads were constructed in bare lands which were to be afforested. At the time of plantation, methods to preserve natural environments (such as small planting holes and the establishment of areas to prevent rain ditches) were utilized.

(3) Land Acquisition and Resettlement

According to the Shanxi Forestry Department, there was no land acquisition and resettlement. Neither land acquisition nor resettlement was necessary because farmers’ participation was voluntary and the possession of land to be afforested was required in advance

⁸ Upon implementation of this project, a project supervision manual on a forestry sector for those who are in charge at both JICA and the project executing agency was established, and a close inspection was conducted by the National Forestry Department Forest Survey and Design Institute during project implementation in order to confirm the validity of above manual.

as a criterion for participation in the project. As described above, the construction of forest roads did not require land acquisition. The interview with the project’s personnel during the site visit at the time of ex-post evaluation confirmed that no land acquisition or resettlement was undertaken.

This project has largely achieved its objectives, therefore its effectiveness and impact is high.

3.4 Efficiency (Rating: ①)

3.4.1 Project Outputs

The project output was “To carry out afforestation activities in 30 counties/county-level cities/city districts within Loess Plateau region of Shanxi province”, and, to put it concretely, afforestation or equipment used for afforestation. This project has achieved most of the outputs as they were originally planned (See Table 11). Although there were some changes in the administrative divisions after the project was launched, there was no change in the project sites. In order to maintain output, supplemental planting and additional afforestation of 7,013.1 ha was implemented.

As aforementioned in “3.2.1 Quantitative Effects (Operation and Effect Indicators)”, aerial sowing was changed to artificial sowing due to the limitation of suitable land in the project area but the size of sowing area remained as planned.

The construction of forest roads were implemented by other projects and construction costs exceeded the expected amount at the time of the appraisal. For these reasons, the length of forest road was shorten and constructed with higher technical specifications in some sections.

Although there was an increase in the number of training participants, the interview with the Provincial Forestry Department stated that there was no change in the training policy and contents. There were more participants than originally planned, because all government officials and neighborhood farmers could freely participate in the open-air training sessions. Such open participation resulted in the large increase in the number of the training participants.

Table 11: Comparison of Outputs (Plan and Actual)

Plan	Actual
Afforestation total 100,000 ha	Afforestation total 100,060 ha
- Plantation 70,045 ha (economic forest 23,846 ha, timber forest 11,847 ha, protection forest 34,352 ha)	- Plantation 70,102.4 ha (economic forest 24,760.1 ha, timber forest 10,954.2 ha, protection forest 34,388.1 ha)
- Regeneration by Enclosures* 19,955 ha	- Regeneration by Enclosures 19,957.6 ha
- Aerial Sowing 10,000 ha	- Aerial Sowing/Artificial Sowing 10,000 ha
Rebuilding/Expansion of Nurseries: 7 places	Rebuilding/Expansion of Nurseries: 7 places
Construction of Forest Road 8,000 km Rehabilitation of Forest Road 2,000 km	Construction of Forest Road 1,000 km

Plan	Actual
Forest Protection (construction of fire tower, etc.)	Forest Protection (construction of fire tower, etc.)
Environmental Monitoring (Monitoring equipment, etc.)	Environmental Monitoring (Monitoring equipment, etc.)
Vehicles	Vehicles
Others (PC, office facilities)	Others (PC, office facilities)
Training (participating farmers: 44,000, employees of forestry departments of province/cities/prefectures /districts: 7,000)	Training (participating farmers: 114,000, employees of forestry departments of province/cities/prefectures /districts: 11,890)

Source: Appraisal documents, Shanxi Forestry Department

Note: * "Regeneration by Enclosures" entailed building fences to control access to forest land but it did not entail carrying out plantation.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The project cost was slightly higher than planned (108% of the original plan). Although the project's planned cost was JPY 5,863 million, the project's actual cost was JPY 6,327 million. For the total loan amount, the actual loan amount was JPY 4,080 million whereas the planned amount was JPY 4,200 million (97% of the original plan).

Afforestation, which was the project's main output, was almost as planned, the project cost; however, was increased primarily due to the lower Japanese yen exchange rate as the Japanese yen depreciated by 10% against the Chinese RMB from the time of project appraisal.

At the time of the project appraisal, unpaid mandatory labor at property with no usufruct was converted into a monetary value and counted as a part of the project cost. According to the Shanxi Forestry Department, such unpaid mandatory labor at property with no usufruct was abolished, and compensation for labor undertaken at collectively-owned forest was to be provided.

Table 12 Comparison of Project Cost (Plan and Actual)

Unit: JPY million

	Plan			Actual		
	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total
Total cost of the project	241	5,622	5,863	110	6,217	6,327
for afforestation	0	4,565	4,565	0	5,182	5,182
for nurseries-	0	105	105	0	110	110
for forest roads	0	313	313	0	279	279
for facilities and vehicles	241	17	257	110	139	248
for training	0	228	228	0	93	93

Source: Shanxi Forestry Department (Project Progress Report as of March 2012⁹)

⁹ In this ex-post evaluation, project costs data could not be obtained directly from the executing agency. Based on the latest progress report submitted to JICA by the time of the ex-post evaluation, evaluation results were made.

3.4.2.2 Project Period

The project period was significantly longer than planned (183% of the original plan). The original project period was 58 months from March 2001 to December 2005; however the actual project period was 106 months from March 2001 to December 2009¹⁰.

At the time of the appraisal, the project was to be completed by spring 2003 (after the completion of planting) followed by the final inspection of the third growth period in 2005 to confirm the approval of its designated area (100,000 ha). The climate of the project area was very arid and wild rabbits caused feeding damaged. For these reasons, the actual project period was extended to undertake supplementary planting and replanting in order to enhance sustainability¹¹. The project was completed in December 2009 when the completion of supplemental planting was confirmed¹².

For the Statement of Expenditure (SOE) method of loan disbursement¹³, it was required to adjust the format of SOE form and auditing scheme, and it took four month from the loan agreement signing (March 2001) to its activation (July 2001). As a result, the first disbursement was made in March 2002. As described above, the end of the loan disbursement period was extended from July 2008 to July 2010 to accommodate the need for supplemental planting and replanting due to harsh growth environment.

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) were not utilized for the appraisal of the project as no common method was established to estimate the economic benefits of environmental improvement among the afforestation projects. In addition, sufficient data on the amount of harvested forest products attributed to the project has not been collected, and it is difficult to accurately estimate the benefit which was necessary for recalculation. Thus, the internal rate of return was not calculated. Reliable data for estimating economic benefits could not be obtained and therefore calculating IRR with high accuracy was not possible.

The project period was exceeded the plan, while the project cost was slightly exceeded the plan, therefore efficiency of the project is low.

¹⁰ The relevant agency in China recognized that the project completion date was December 2005. Supplemental planting and replanting were carried out due to incidents (such as natural conditions) which the project could not directly control and the ODA loan was disbursed for these activities. For this reason, it is concluded that the project completion date is December 2009 when the completion of these activities was confirmed.

¹¹ Supplemental planting and replanting were carried out in the areas with under 70% of survival rate according to the Chinese afforestation standard.

¹² According to Shanxi Forestry Department, plantation was ended in December 2005 and its inspection was conducted by the end of 2006.

¹³ A method that accepts a payment list (SOE table) as an evidence document for loan disbursement

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

There was no factor found that could interfere with the project impacts from an institutional point of view. On forestry management, establishing the Provincial Forestry Department is responsible for forestry management policies, plans and goals, the county-level local government forestry departments for pest control, forest fire prevention, setting countermeasures for illegal disafforestation and arranging training sessions targeting farmers, and the local farmers for routine maintenance activities (pruning, mowing and fertilization). However, in the case of protection forests, if the forest was owned by a state-owned forest farm, the forestry department of the local government which owned the forest would be responsible for maintenance activities. The Shanxi province started the implementation of forestland tenure reform in 2008 and by the end of 2010, forestland tenure was established in approximately 70% of the province's collectively-owned forestland. There were some changes seen before and after the project implementation and each farmer has both forest usufruct and responsibilities for maintenance, therefore it is clearer who is responsible for the maintenance of forestland.

For the timber and protection forests, state-owned forest farms also participated in afforestation, and especially for the protection forest, state-owned forest farms conduct both afforestation and forest maintenance in many areas.

Upon implementation of pest control, forest fire prevention and setting countermeasures for illegal logging by forestry departments of county-level local governments, forest rangers are hired to patrol protection forest and inspect entry of vehicles into the forests. Staffing in the governmental units relevant to forest maintenance (state-owned forest farms, forestry work stations, and forest pest control stations) was stable after the project completion. The number of staff in these units was 13,746 in 2010 and 13,225 in 2011¹⁴.

In the areas covered by the site survey, the forest departments of the county-level governments maintained facilities and infrastructure such as fire towers and forest roads. Environmental monitoring was commissioned to the Shanxi Forest Research Institute until the end of 2012. Monitoring was discontinued in 2013. For this reason, equipment for environmental monitoring was not used and the Shanxi Forest Research Institute kept the equipment.

3.5.2 Technical Aspects of Operation and Maintenance

While the project was implemented based on the project area's technical level, there were training opportunities for both government officials and farmers to maintain and improve their skills at the time of the ex-post evaluation. Most of the tree species introduced by this project have been cultivated in the past, and both the government officials and farmers had accumulated

¹⁴ Based on State Forestry Administration "China Forestry Statistical Yearbook 2010" and "China Forestry Statistical Yearbook 2011"

relevant experiences. Materials in use that could be obtained domestically included; ground film, humectant, rooting stimulant, manure, and fertilizer.

From the interviews with the afforestation department staff, staff confirmed that during the project implementation there were trainings for the governmental officials on project administration (fund management, account statement, etc.) and afforestation techniques (site preparation, cultivation, fertilization, fruit quality improvement, etc.). Many of the highly-demanded training courses addressed activities to improve the profitability of forestry products such as the classification of fruits, branding, and improving timber quality.

There was no technical difficulty in O&M of the equipment for environmental monitoring as the equipment was manufactured in China, and procured and used in the Shanxi province.

Based on the interview with the project's participating farmers, they participated in the training (in cultivation techniques, fertilization, etc.) held by the forestry departments of the county-level local government. Providing trainings is one of the main tasks of the county-level local government's forestry department, and trainings are continued throughout the ex-post evaluation. The training needs of the farmers on pruning and fertilization in the economic forest are especially high and the forestry department provides guidance periodically.

3.5.3 Financial Aspects of Operation and Maintenance

Forestry departments of county-level governments and farmers are in charge of on actual implementation of forest maintenance and in terms of finance no serious problem to jeopardize sustainability was found on them. In the Shanxi province, the budget on forest maintenance (total of forest nursing, forest fire prevention, and pest control) was increased from RMB 96.5 million in 2009 to RMB 228.56 million in 2011¹⁵.

For the selection of participating farmers, there were certain requirements (voluntary participation, property usufruct of owned forests) to account for the necessary burden for forestry management in the future. At the point of ex-post evaluation, there were increased number of farmers with forest usufruct due to the forestry tenure reform, and they could harvest from the forest in which they have the property usufruct. Harvesting statuses are as follows:

- (1) Economic Forest: Although the area per household is small, income per area unit is high and harvesting for the main tree species (jujube, apple, etc.) have started. Mending of the trees can influence harvests and therefore the incentive for maintenance of the forest is high.
- (2) Timber Forest: As in the case of economic forests, mending of the trees can also influence timber forest harvests; therefore the incentive to maintain a timber forest is also high. As a

¹⁵ Based on State Forestry Administration "China Forestry Statistical Yearbook 2009" and "China Forestry Statistical Yearbook 2011"

timber forest requires a longer period before harvesting than an economic forest, farmers with larger-sized farms who have higher capacities to handle higher maintenance costs tended to participate.

- (3) Protection Forest: Although there is no harvest from this type of forest at the time of ex-post evaluation, the forest management cost and the work volume was relatively low. There is also a regulation on pruning and disafforestation for the purpose of nature protection. The protection forest prepared by this project includes locally-appointed forestland for public purpose and this type of forestland was subsidized at RMB 5 per Chinese acre. There is penalty for illegal disafforestation and accidental fire.

From the results of the questionnaire survey, 60% of the respondents replied that expenses for maintenance of forest land are “Often Insufficient” or “Insufficient”. Of respondents that chose “Insufficient”: 7 were timber forest farmers, 30 were economic forest farmers, and 9 were protection forest farmers. Compared to economic forest farmers, farmers who owned timber forest were more likely to feel that they lacked enough budget, presumably due to the fact that harvests from



Photo 2: Timber forest (Poplar forest)

an economic forest can be procured earlier than harvests from timber forests. However, timber farmers have a greater financial ability to bear maintenance expenses (compared to economic farmers) and they are also motivated by incentives and the possibility for punishment. For these reasons, forest maintenance is not seriously affected in the short run.

As shown in Table 4, economic forest farmers do have harvests and the lack of budget for maintenance of forest land is not chronic. However, economic forest farmers also indicated that they intend to expand forest land and such an aggressive stance on farming might cause working capital shortages in the future.

Both economic forest and timber forest farmers borrow from agricultural credit unions with collateral such as their houses and their rights to use forestland or by having guarantors and as such can deal with periodic shortages of working capital.

Table 13: Expenses for Maintaining Forest Land (Results of Questionnaire Survey)

“Enough”		“Almost Enough”		“Often Insufficient”		“Insufficient”		Total	
Number	%	Number	%	Number	%	Number	%	Number	%
17	17.2%	20	20.2%	16	16.2%	46	46.5%	99	100.0%

In this project, the province loaned the cost of seedling and materials to the finance departments of county-level local governments, then the farmers made payments to the financial departments. Local governments decide whether its finance department claims payments from the farmers. There were several counties where the county-level local governments bore all the expenses and there were no payments from the farmers. In the questionnaire survey, no farmer replied that the repayment is “very heavy” or “heavy” (see Table 14). Most farmers do not feel the burden of the loan.

Table 14: Repayment of Seedlings and Materials (Results of Questionnaire Survey)

Very Heavy		Heavy		Little		Very Little		No Answer		Total	
Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
0	0.0%	0	0.0%	33	33.3%	66	66.7%	0	0.0%	99	100.0%

3.5.4 Current Status of Operation and Maintenance

In the areas of the project site in which the site survey was conducted during the ex-post evaluation, the afforested areas were maintained appropriately. In five economic forests, three timber forests, and five protection forests in five counties/districts (Yuci district, Taigu county, Qingxu county, Liulin county, and Hongtong county), there were no sites in which dying seedling and thin density over a wide area were observed. Particularly in economic forests where farmers have property usufruct, as mending of



Photo 3: Forest patrol

the trees could influence the harvests, farmers continuously work on pruning and fertilization. On protection forest, a county forest department supported supplementary planting in the area with harsh growing conditions. During the project implementation, there was feeding damage caused by wild rabbits, and some traps and chemicals were used to avoid such damage. The need for such measures; however, have decreased as the forests have grown and they have become less likely to be influenced by the feeding damage by rabbits. In the area with many protection forests, the forest rangers controlled entry of vehicles and conducted patrol activities to prevent forestry fires and illegal disafforestation. During the springtime when the weather

becomes arid, the forestry departments of the county-class local governments spend most of their hours in fire prevention and fire extinguishing.

Of all of the inspected forest roads and fire towers, no severe infrastructure damage which could prevent realization of project effects was uncovered.

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Based on farmers' voluntary participation, the purpose of this project is to prepare economic, timber and protection forests in 30 counties/county-level cities/city districts of the Loess Plateau area within the Shanxi province. The background of this project originates from the 1998 Yangtze River Floods, which raised awareness for improving the water holding capacity in the upper and middle river basins of major rivers by expanding forest areas.

The implementation of this project was in line with Chinese forestry sector's policy and development needs as well as Japan's ODA policy on China to support activities in the environmental field, therefore its relevance is high. As the area afforested by this project from the time of appraisal to ex-post evaluation accounts for an approximately 20% increase in forest land in the project area, this project has contributed to the improvement of the forest coverage ratio. After afforestation, soil erosion was improved as the age of forest increased. For the above reasons, the project's effectiveness and impact are high. As for the project's efficiency, severe growth conditions necessitated supplemental planting and replanting and the project's period was significantly exceeded the plan. The project cost also exceeded the plan due to the weakening of the Japanese yen to Chinese RMB from the time of project appraisal. In regards to the project's sustainability, forest maintenance activities are the responsibility of the forestry department of the county-level local government and the farmers, and neither showed any significant problems.

In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Since the project sites are located in arid regions, more efficient forest fire prevention and extinguishing are the most important issues for forestry management. Forest fires not only destroy the forest, but may also be fatal to humans.

Simple hazard maps which show where wildfire occurred were prepared. Nevertheless, it is desirable to enhance such hazard maps by: adding more information (such as place of fire outbreak, frequency, time and areas in which are difficult to extinguish), identifying and prioritizing the points and seasons for prevention activities, and sharing the hazard maps with local residents to promote understanding of such prioritized regions and seek for cooperation in prevention activities.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

(1) Scheduling the Project Period in a Severe Growth Environment

The project was implemented in a severe growth environment for trees, therefore there was a need for attentive care in order to maintain the afforestation area. From the sustainability point of view, a project period extension was needed for supplemental planting.

Upon scheduling the project period, it is desirable to examine the growth conditions as well as the needs for supplemental planting, the estimated supplemental planting area and the workloads for supplemental planting. If necessary these considerations should be reflected in the project period at the time of appraisal.

(2) Establishing a Project Supervision Manual and Interim Appraisal

In the implementation of this project, a project supervision manual in the forestry sector for those who are in charge at both JICA and the project executing agency was prepared because the executing agency did not have enough experience with ODA projects. In order to prove the validity of the aforementioned manual, an extensive assessment was conducted by the National Forestry Department Forest Survey and Design Institute during project implementation. The project carried out systematic and comprehensive project supervision, and information on project implementation and the incidence of effects were collected.

For a similar case in which an executing agency does not have sufficient ODA loan project experience, especially when project supervision is difficult due to a vast project area, it is desirable to prepare a project supervision manual in advance and conduct an extensive assessment through interim review work in order to objectively review the project status.

(3) Support for Marketing and Technical Assistance Focusing on Specific Species

The interviews with timber forest farmers revealed that reaching a certain forest area size stimulated purchases by brokers and establishment of processing workshops. In order to

improve project effects, it is necessary to scale the production of forest products to reach a certain level.

In China, under the guidance of the provincial government, county-level governments support marketing and technical assistance focusing on specific products. When afforestation projects funded by ODA loans expect to obtain economic benefits, it is desirable to select tree species for each area and assess the support for marketing and technical assistance.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	See Table 11	See Table 11
2. Project Period	March 2001 – December 2005 (58 months)	March 2001 – December 2009 (106 months)
3. Project Cost		
Amount paid in Foreign currency	241 million yen	110 million yen
Amount paid in Local currency	5,622 million yen (RMB 433 million)	6,217 million yen (RMB 434 million)
Total	5,863 million yen	6,327 million yen
Japanese ODA loan portion	4,200 million yen	4,080 million yen
Exchange rate	1 RMB = 13.0 yen (As of July 2000)	1 RMB = 14.3 yen (Average of the period between March 2001 and December 2009)

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan Project

Inner-Mongolia Loess Plateau Afforestation Project

External Evaluator: Hiroshi Oita, OPMAC Corporation

0. Summary

The project aimed at the afforestation of 11 districts of 4 major cities¹, i.e. Hohhot, Baotou, Ordos and Bayannur in the Loess Plateau. These were covered with protection forest and economic forest, in order to increase the forest cover ratio, to protect surface soil erosion and to increase farmers' income by selling their products such as fruits from the planted trees. The project was implemented in accordance with national policy of China and is contributing to the improvement of the ecological environment, one of the important policies at present in China. The project is also consistent with Japan's ODA policy to China. In this sense the relevance of this project is evaluated to be high. The project was implemented just as planned and contributed to the improvement of the environment of project areas by increasing the forest cover ratio. It also had a certain protection effect against desertification. Therefore, effectiveness and impact of the project are high. With regard to project cost, although a detailed track record could not be analyzed, the project cost was lower than planned. On the other hand, the implementation period was delayed significantly compared to the original schedule because of the influence of drought, and so forth. This resulted in the extension of the disbursement period by two years. From this point of view, the efficiency of the project is evaluated to be fair. With respect to operation and maintenance after the project completion, farmers are responsible for their own economic forests, and the department of forests, for protection forests. To date, no major problems have been observed in the operation and maintenance system.

In light of the above, this project is evaluated to be very high.

¹ The detailed names are referred to Table 4. Within Chinese administrative divisions, there are counties, county-level cities and city districts under prefecture-level cities. In this report, the local government of the counties, county-level cities and city districts is given as county-level local government.

1. Project Description



Project Location



Protection forest of poplar near the Yellow River

1.1 Background

Although China has set the afforestation of land as a national basic policy, the fast economic development has contributed to increasing the demand for lumber and pulp, which has led to reckless deforestation. Population increases have also brought about disordered expansion of cultivated land. This has kept the forest cover ratio (forest land area/total land area) low, i.e. from 8.6% in 1949 when the People’s Republic of China was founded to 13.9% in 1999. This forest

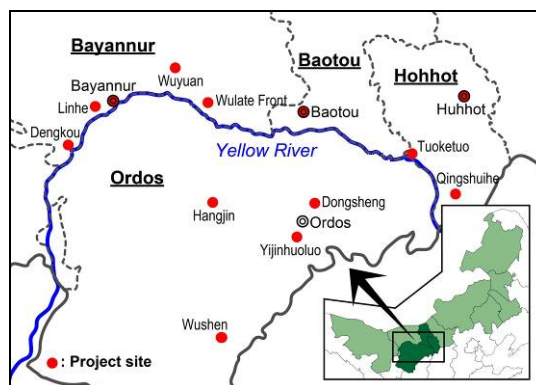


Figure 1: Project site

environment has caused frequent shortages of water in the lower reaches of the Yellow River since the 1970’s due to the current shear flow of the Yellow River and floods have occurred where the riverbed has risen due to inflow sediment flowing into the Yellow River. In addition to this, the situation has deteriorated due to damage inflicted by clouds of sand caused by an acceleration in desertification, which has led to an increase in natural disasters and deterioration of the natural environment. In the summer of 1998 a serious flood, which was said to have been caused by excessive deforestation, occurred in the upper reach of the Yangtze River. It took the lives of about 1,300 people and resulted in over 220 million victims.

With these circumstances in mind, and especially triggered by the 1998 Yangtze River flood, the Chinese government shifted the weight of forest development from its economic aspect to its environmental aspect and set “the National Program for the Construction of an Ecological Environment” in November 1998 to oversee forest development of the nation until 2050. Under this National Plan the government made “the 10th Five Year Plan of National

Forest Development (2001–2005)” in which “Six Key Forestry Projects²” were to be implemented. Loess Plateau Afforestation Projects using Japanese ODA Loans in the Inner-Mongolia Autonomous Region, Shanxi Province and Shaanxi Province were requested by the Chinese government in accordance with the plan and program mentioned above. It was decided to provide the 4th round Japanese ODA Loan package to these eligible projects targeting priority areas for the fiscal year 2000.

The Inner-Mongolia Loess Plateau Afforestation Project was implemented, in accordance with Japanese ODA Loan policy of protection against desertification and the prioritization of the projects in inner areas of China. Its purpose was to place the Loess Plateau where the forest cover ratio was still at the low level of about 6% as a core area, to prevent desertification of the area and to control topsoil outflow so that the environment of the area could be improved.

1.2 Project Outline

The objective of this project was to increase forest cover ratio, to prevent soil erosion, and to generate income for farmers by planting trees in the area of about 106,000 ha of 11 districts in 4 cities on the Inner-Mongolia Loess Plateau i.e. Hohhot, Baotou, Ordos and Bayannur, thereby contributing to social and economic stabilization in the planted areas, improvement of the living environment in the planted area, including in the lower reaches of the Yellow River, and improvement of ecology in the planted area.

Loan Approved Amount / Disbursed Amount	3,600 million yen / 3,599 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March 2001 / March 2001
Terms and Conditions	Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: Bilateral tied
Borrower / Executing Agency	Government of Republic of China / Inner-Mongolia Autonomous Region People's Government
Final Disbursement Date	July, 2010
Feasibility Studies, etc.	Feasibility Report on the Inner Mongolia Afforestation Project for Yen Loan by the Forestry Reconnaissance Designing Institute of the Inner Mongolia Autonomous Region (June 2000)

² The “Six Key Forestry Projects” consolidated the “National Ten Key Forestry Projects” in 2001 and consist of 1) The Natural Forest Conservation Project, 2) The Three Northern Regions and the Yangtze River Basin Protection Forest Project, 3) The Grain for Green Project, 4) The Wildlife Protection and Nature Reserves Construction Project, 5) The Anti-desertification Project around Beijing and 6) The Fast-growing Timber Forest Base Development Project.

Related Projects	<p>[Japanese ODA Loan Projects]</p> <ul style="list-style-type: none"> - Shaanxi Loess Plateau Afforestation Project (Loan Agreement, March 2001) - Shanxi Loess Plateau Afforestation Project (Loan Agreement, March 2001) - Inner-Mongolia Afforestation and Vegetation Cover Project (Loan Agreement, March 2003) <p>[Technical Cooperation]</p> <ul style="list-style-type: none"> - Watershed Management Training Project on Loess Plateau (January 1990 – January 1995) - Forestry Development Project in Fujian Province of China (July 1991– June 1998) - Forest Protection Research Project in Ningxia-Hui Autonomous Region (April 1994 –March 2001) - Hubei Province Forest Tree Improvement Project (January 1996 – January 2000) <p>[Grant Aid]</p> <ul style="list-style-type: none"> - The Project for Improvement of Forestation Equipment for Conservation of Water and Soil in the Upper Stream of the Hanjiang River (FY 1998) <p>[Other Donors]</p> <p><World Bank></p> <ul style="list-style-type: none"> - Forestry Project (June 1985) - National Afforestation Project (May 1990) - Forest Resource Development and Protection Project (June 1994) - Loess Plateau Watershed Rehabilitation Project (June 1994) - Forestry Development in Poor Areas Project (May 1998) - Second Loess Plateau Watershed Rehabilitation Project (May 1999) <p>[Others]</p> <ul style="list-style-type: none"> - Afforestation Projects by Obuchi Fund³
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2. Outline of the Evaluation Study

2.1 External Evaluator

Hiroshi Oita, OPMAC Corporation

³ The Prime Minister, Obuchi, who visited China in July 1999 after the 1998 Yangtze River flood established a support fund of 10 billion yen in order to promote exchange between the people of Japan and China through afforestation activities. These were to be carried out by Japanese private groups in cooperation with their Chinese counterparts. The fund is officially called as Sino-Japan Greening Communication Fund.

2.2 Duration of Evaluation Study

Duration of the Study: September 2012 – September 2013

Duration of the Field Study: March 10, 2013 – March 22, 2013,
May 26, 2013 – June 1, 2013

2.3 Constraints during the Evaluation Study

It took a very long time to collect data and information on the past track records of the project due to the fact that the project location and local forest bureaus are widely scattered. The division of works between the financial sections and technical sections and the personnel changes of the people in charge of the project also hindered efficient collection of data. In particular, since financial data was only available for the limited areas, it was not possible to analyze changes in the cost.

3. Results of the Evaluation (Overall Rating: A⁴)

3.1 Relevance (Rating: ③⁵)

3.1.1 Relevance to the Development Plan of China

The National Plan for Ecological Construction, established in November 1998, is a long term plan covering a period up to 2050 and was the basic policy document for the forestry sector even at the time of this evaluation. The long term afforestation plan within the framework of the National Plan mentioned above, i.e. the “National Afforestation Plan (2011 – 2020)” has aimed at expanding forest areas together with an improvement in the quality of forests. The target forest cover ratio in 2015 is estimated at 21.7% and over and 23% and over in 2020.

At the time of the ex-post evaluation “the 12th Five Year Plan for the forestry sector (2011 – 2015)” has been implemented as the mid-term plan for the forest sector. Under the plan 30 million ha will be afforested and a forest cover ratio of 21.7% will be achieved by 2015, as mentioned in the National Afforestation Plan above.

The 12th Five Year Plan for the forestry sector of the Inner-Mongolia Autonomous Region also has a target afforestation of 60 million mu⁶ (4 million ha) for the purpose of ecological improvement. The Six Key Forestry Projects mentioned above have a close relationship with the Inner-Mongolia Autonomous Region. Among others, the “Grain for Green Project” and the “Natural Forest Conservation Project” have extended their target year of 2010 to date and are still regarded as important projects in the Inner-Mongolia Autonomous Region.

From a legal point of view, the Law on Water and Soil Conservation (enacted in 1991 and amended in 2010) stipulates in its Article 16 that each local government shall take every

⁴ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁵ ③: High, ②: Fair, ①: Low

⁶ “mu” is used in China as a measurement of area. 1 mu is equivalent of 1/15 ha.

measure such as protection with enclosure, natural restoration, etc. together with expansion of afforestation and vegetation cover by individuals and institutions and watershed protection, in order to prevent and lessen soil and water erosion. In addition, the Law on Protect and Control of Desertification was enforced in January 2002 which stipulates the responsibility, area of management, preferential treatments etc. of each local government in order to prevent desertification, to manage deserted land and to maintain ecological security.

As above, the development of the forestry sector, which centers on afforestation, has been regarded as an important policy issue in the Inner-Mongolia Autonomous Region as well as in China, and remains so at the time of this ex-post evaluation.

3.1.2 Relevance to the Development Needs of China

According to the 7th National Forest Inventory (2004 – 2008), the forest coverage area in China was 195 million ha and the forest cover ratio was 20.4%. This forest cover ratio is still low compared to those countries with the same latitude such as the United States of America (33%), Canada (34%) and Russia (49%). As clearly stated in the National Afforestation Plan (2011 – 2020), China has a target of 23% as forest cover ratio by 2020, which means that the needs for afforestation in China are still high.

In the Inner-Mongolia Autonomous Region, the forest coverage area was 23.66 million ha and the forest cover ratio was 20.0% in 2010, as shown in the statistic year book of Inner-Mongolia. The target for the forest cover ratio under the 12th Five Year Plan for the forestry sector (2011 – 2015) is 21.5% by 2015.

3.1.3 Relevance to Japan's ODA Policy

Based on the Japan-China Treaty of Peace and Friendship in 1978, Japanese ODA Loans to China have been provided since 1980 in tandem with the Chinese Five Year Plans to support modernization efforts (Reform and Opening-Up Policy). Under the 4th round Japanese ODA Loan package, which included this project, both governments agreed that the emphasis of support should be attached to the environment, agriculture and inland development in order to ease the disparity between the regions.

In the Medium-Term Strategy for Overseas Economic Cooperation Operations announced by the then Japan Bank for International Cooperation in 1999, one of the basic policies was to tackle global issue including environmental issues. With regard to assistance for China, environmental measures as well as increase in agricultural productivity and improvement of infrastructure in inland areas were important issues.

In light of the above, this project has been highly relevant to the development plan of China, development needs, as well as to Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness⁷ (Rating: ③)

3.2.1 Quantitative Effects

The quantitative effects of this project were represented by the increase of the forest cover ratio in the total area, including the target area of this project. The forest cover ratio as the evaluation indicator was 12.0% before the implementation of the project and was estimated at 15.8% after the implementation of the project at the end of 2005. Judgment of the forest cover ratio was based on the 3rd year survival rate after afforestation. In China, if the survival rate is 60% and over, afforestation is judged to be successful. According to this scale, the actual forest cover ratio at the end of 2005 was 17.4% as against the estimated rate of 15.8%. Based on this result it can be said that the target was achieved. However, this must be counted against the fact that the forest cover ratio includes not only afforestation areas covered by Japanese ODA Loan but those areas covered by the government budget. (the forest cover ratio by region is referred to Attachment 1.) The most recent data of the survival rate provided by the Inner-Mongolia Forest Department in the targeted area shows 66% for protection forest and 62% for areal seeding forest areas.

Table 1: Forest cover ratio Target and Actual

Indicator	Baseline At Appraisal	Target End of 2005	Actual End of 2005	Actual End of 2012
Forest cover ratio	12%	15.8%	17.4%	24.3% estimate

Source: Appraisal documents and data provided by the Inner-Mongolia Forest Department

Note: The actual value of the end of 2012 is the estimation by the Inner-Mongolia Forest Department

With regard to the afforestation area covered by the project, the afforestation work in the target area of 106,465 ha was completed as scheduled. The total incremental area calculated by the forest cover ratio was 346,770 ha. and it is equivalent to 30.7% of the total incremental area. According to the executing agency, the area with a survival rate of 60% and over under the project was estimated at 80% of the total target area⁸. Taking this figure into consideration, afforestation under the project contributed to an increase of the forest cover ratio by 25% (30.7% x 80%) in the total incremental area.

In addition to the above, those farmers who planted apple trees or vine as part of economic forest were able to earn their income directly from the sale of crops⁹. No indicator for income

⁷ The Sub-rating for Effectiveness is to be put with consideration of Impact.

⁸ The project area belongs to an arid zone. The annual precipitation in the Loess Plateau ranges between 200 mm and 500 mm depending on the site. The rainfall is concentrated from July to September and therefore droughts occurs frequently in this area. Even during the afforestation of the project droughts occurred in 2004 and 2005. Due to the drought, there were areas where the survival rate did not reach the acceptable criterion.

⁹ The target area of the project is rich in resources in the Inner-Mongolia where coal, rare earth elements, natural gas, cashmere etc. are produced. The household income from agriculture is supposed to be relatively small. The majority of agricultural household in the target area is supported by nonfarm income which is undertaken by the elderly, mostly parents. Their children who are working in the cities can provide support in the harvest season.

was set under the project, but in the case of apples, a broker will buy apples at 2 yuan per kg. Since the harvest of apples is expected to be 1,000 to 1,500 kg per mu, a farmer can get an additional income of about 2,000 yuan per mu¹⁰.

At the same time, Chinese wolfberry (*Lycium chinense*) and *Salix psammophila*, both of which were planted as economic forest as well as protection forest against wind and sand, also provide farmers with an additional income. Since Chinese wolfberry can grow even in places with a higher salinity and less water, it has become one of the specialties of Inner-Mongolia. The crop is around 200 kg per mu and is traded at 25 to 30 yuan per kg. An income of about 5,000 yuan per mu is expected after deducting labour costs at the time of harvest. The average income of a household in the inspected area is said to be 30,000 yuan and over. The production of Chinese wolfberry has played an important role as a source of income¹¹.



Chinese Wolfberry at Wulate Front County



Salix psammophila for fixing sand areas at Hangjin Banner

Salix psammophila, which was planted to immobilize sandy soil, needs to be cut every 3 to 4 years for better growth and maintenance. In the Ordos area it produces 1 ton per mu and is used as fuel for the thermal power plant. Currently the market price is 400 to 500 yuan per ton. It is said that a stable demand for *Salix psammophila* depends on the development of the wood processing industry.

3.2.2 Qualitative Effects

At the appraisal the qualitative effects were referred to as “improvement of the natural environment at sites”, “indirect contribution to lessen the shear flow of the Yellow river”, “improvement of the living standards of the poor in mountain areas” and “protection effects against global warming through carbon fixation”. Most of these are recognized as impacts and had the effects as stated below.

¹⁰ This information collected at the time of the ex-post evaluation in March 2013.

¹¹ This Information collected at the time of the ex-post evaluation in March 2013.

One of the direct qualitative effects of the project was the change of mind of the part of farmers regarding the ecological environment through afforestation. Afforestation so far had been implemented by the Government of China and was not at the initiative of farmers. This time farmers have afforested areas at their own volition realizing that they are able to increase their income directly and improve their living environment. This was referred in answers to the questionnaire¹² (See the Attachment 2).

In addition, the officials of the Forest Department have also learned detailed supervision methods through the project and this experience will provide the base for successive afforestation activities under government projects.

3.3 Impact

3.3.1 Intended Impacts

The project area is 106,475 ha, which accounts for 1.7% of the total target area of about 6.17 million ha¹³. Out of the total target area, the area available for afforestation was about 2.31 million ha, which includes the one already afforested. Even compared to this area the project area is only 4.6%. The project area is also scattered over 11 sites. This means that the project has had a relatively small influence on the project area. It is also difficult to generalize the impact as each project site has a different climate and vegetation. The following evaluation is based on data and information provided by the Forest Department of the Inner-Mongolia Autonomous Region. The overall result shows favorable effects in the area.

Taking the example of protection against topsoil outflow, the afforestation has shown a certain positive impact. There is no overall data on topsoil outflow but in the case of Dengkou in Bayannur the outflow of soil per year in the early 2000s was estimated at 100 million tons. The person in charge explained that the volume has now decreased to 6,900 tons. According to the survey in Dengkou the number of sandstorms also decreased from 11 in 2002 to 8 in 2011. Table 2 illustrates the number of sandstorms at Tuoketuo in Hohhot and shows that the number decreased dramatically from 20 before afforestation to 2 recently. By comparison, data for Qingshuihe, also in Hohhot, shows that the number of sandstorms has been low from the beginning (Table 3). This seems to be because the forest cover ratio in Qingshuihe was higher than that of Tuoketuo (19.8% in Qingshuihe and 11.9% in Tuoketuo. See the Attachment 1) and topography is different.

¹² Responses to the questionnaire were collected from 106 farmers of which 38 were from Ordos, 37 from Bayannur, 17 from Hohhot, 10 from Baotou and 4 from other places.

¹³ This area is equivalent to an area with a size between Hokkaido (8.35 million ha) and Kyushu (7 prefectures) (4.22 million ha).

Table 2: Number of Sandstorms and Precipitation (Tuoketuo)

Unit: Upper: number of sandstorms. Lower: annual average precipitation (mm)

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
19	21	15	8	5	4	2	1	2	2
n.a	391	418	365	248	408	346	458	492	469

Source: The documents from the Forest Department of the Inner-Mongolia Autonomous Region (Tuoketuo forest bureau)

Table 3: Number of Sandstorms and Precipitation (Qingshuihe)

Unit: Upper: number of sandstorms. Lower: annual average precipitation (mm)

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
3	1	-	1	-	2	-	-	2	2
291	207	331	251	73	184	256	267	172	197

Source: The documents from the Forest Department of the Inner-Mongolia Autonomous Region (Qingshuihe forest bureau)

3.3.2 Other Impacts

There is no issue related to land acquisition in this project as the target places were selected in cooperation with farmers and where afforestation was possible. In this regard, there was no negative impact. On the other hand, there was a positive impact on the improvement of the ecological environment. According to the results of the questionnaire survey, most respondents replied that the number of sandstorms decreased and that the microclimate of the afforested areas changed for the better.

The development of cultivation between the protection trees is also counted as a positive impact. Since the protection trees, such as poplars, are planted at intervals, there is a room to cultivate vegetables or pasture between the trees. This has resulted in the side effect of diversifying agriculture products and increasing the income of farmers.

In light of the above, this project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

This project was implemented at eleven districts in four major cities (Yikezhao, Bayannur, Hohhot and Baotou). The afforested areas were same as planned but some of the names of the areas were changed from League to City or City to District because of administrative reorganization.

Table 4: Target Afforestation Areas

Project Area	Counties/Cities/Banners	Note
Yikezhao League	Hangjin Banner, Wushen Banner, Yijinhuoluo Banner, Dongsheng City	Yikezhao was renamed as Ordos and become a City from a League. Dongsheng was changed from City to District.
Bayannur League	Dengkou County, Linhe City, Wuyuan County, Wulate Front County	Bayannur was changed from League to City.
Hohhot City	Qingshuihe County, Tuoketuo County	
Baotou City	Suburb of Baotou City	Suburb of Baotou City was changed to Jiuyuan District.

Source: Appraisal documents and the documents from the Forest Department of the Inner-Mongolia Autonomous Region

The output of the project is described below. The Inner-Mongolia Forest Department and each regional forest bureau explained that the project was implemented based on the original plan in accordance with the feasibility study. The ex-post evaluation mission visited 2 to 3 sites per district, that are representative of each target area. All the sites were afforested as planned in the feasibility study. The equipment procured for administration and monitoring, such as PCs, has come to the end of its service life but some of the equipment is still utilized. With regard to training, it was explained that the total number of participants was more than one thousand and a variety of training courses has been provided with an emphasis on plantation techniques and measures against damage by blight and insects.

Table 5: Original Plan and Actual Output

Items	Plan	Actual
1. Afforestation	106,465 ha	As planned
- Plantation	80,222 ha	As planned
Of which Economic Forest	53,233 ha	As planned
Of which Protection Forest	26,989 ha	As planned
- Regeneration by Enclosures	10,018 ha	As planned
- Aerial Sowing	16,225 ha	As planned
2. Rebuilding / Expansion of Nurseries	10 lots	As planned
3. Forest Protection	Facilities for forest protection	As planned
4. Environment Monitoring	Equipment for monitoring (PC, GPS, etc.)	As planned
5. Office Equipment and Vehicles	4WD vehicle, PC, Photocopy etc.	As planned
6. Technical Training	Training including equipment	As planned

Source: Appraisal documents and the documents from the Forest Department of the Inner-Mongolia Autonomous Region

Note: "Regeneration by enclosures" means to fence the afforestation area so that sheep cannot enter that place. "Aerial sowing" means to sow bush seeds from the air. These methods are usually applied to stabilize sands.

Table 6: Afforested Places and Areas

Unit: ha

	Afforested area	Artificial forest	Of which economic forest	Of which protection forest	Fenced afforestation	Aerial seeding afforest'n
Place \ Total	106,465	80,222	53,233	26,989	10,018	16,225
Ordos City (subtotal)	42,586	27,681	20,328	7,354	3,194	11,711
Dongsheng district	10,646	7,452	4,840	2,612	1,065	2,129
Yijinhuoluo Banner	10,647	7,453	4,841	2,613	—	3,194
Wushen Banner	10,647	6,388	5,807	581	1,065	3,194
Hangjin Banner	10,646	6,388	4,840	1,548	1,064	3,194
Bayannur City (subtotal)	31,939	27,418	12,339	8,224	2,136	2,385
Dengkou County	9,239	6,854	4,113	2,741	—	2,385
Linhe City	6,854	6,855	4,113	2,741	—	—
Wuyuan County	6,855	6,855	4,113	2,742	—	—
Wulate Front County	8,991	6,854	—	—	2,136	—
Hohhot City (subtotal)	21,293	16,605	11,614	4,991	2,559	2,129
Tuoketuo County	8,500	7,650	4,636	3,014	—	850
Qingshuihe County	12,793	8,955	6,978	1,977	2,559	1,279
Baotou City (Jiuyuan District)	10,647	8,518	4,840	3,678	2,129	—

Source: Appraisal documents and the documents from the Forest Department of the Inner-Mongolia Autonomous Region

Note: The net total may not be the same as the total for each figure due to rounding off.



Aerial Sowing Site at Wushen Banner



Regeneration by Enclosure Site at Dongsheng City



Nursery at Tuoketuo County

3.4.2 Project Inputs

3.4.2.1 Project Cost

The project cost was estimated on the condition that most of the expenditure would be paid in local currency except for vehicles (82 million yen). The Japanese ODA Loan was allocated to costs directly related to the afforestation (3,346 million yen not including unexpected expenses). According to the Forest Department of the Inner-Mongolia Autonomous Region, the Japanese ODA Loan was outlaid within the original budget and expenditure from the Inner-Mongolian government and local governments were also made within the original budget.

The actual project cost (4,907 million yen) was mostly as planned according to information from the executing agency (the ratio between plan and actual is 100%)¹⁴.

Table 7: Breakdown of Expenditure

Unit: Million Yen

Item	Plan				Actual			
	Local Currency		Foreign Currency	Total	Of which Yen loan	Domestic budget	Yen loan	Total
	Million Yuan	Yen equivalent						
Afforestation	277	3,597		3,597	3,346 include*	711	3,272	3,983
Nursery	6	81		81		15	66	81
Forest protection	5	71		71		17	54	71
Environment monitoring	1	18		18		4	14	18
Vehicles	1	9	82	91	82	9	86	95
Training	11	141		141	*	33	108	141
Others	3	32		32		0	0	0
Labour costs	24	317		317	—	317		317
Management expenses	8	100		100	—	100		100
Price escalation	10	129		129	*	-	-	-
Unexpected expenses	17	225	4	229	172	-	-	-
Interest during construction	8	101		101	—	101	-	101
Total	371	4,821	86	4,907	3,600	1,307	3,599	4,907

Source: Appraisal documents and the documents from the Forest Department of the Inner-Mongolia Autonomous Region

Note 1: With regard to the local currency of the plan, the net total may not be the same as the total for each figure because of exchange rate between the Yuan and Yen and round offs. (1 US\$ = ¥108, 1 yuan = ¥13, as of July 2007)

Note 2: The details of local expenditure were not confirmed by the Finance Department of the Inner-Mongolia Autonomous Region.

¹⁴ The ex-post evaluation mission confirmed the project cost by questionnaire. The answer to the questionnaire by the Inner-Mongolia Forest Department was “as planned”.

3.4.2.2 Project Period

The implementation of the project was scheduled from January 2001 to December 2005 (60 months). The actual data shows that it started in March 2001 and ended in December 2009, 106 months, which was far behind the schedule (177% compared to the original period).

Project completion was defined as achieving a survival rate of 60% and over in the whole afforested area. The survival rate is measured 3 years after plantation. At the time of appraisal it was planned that the afforestation works would be complete by the spring of 2003. The inspection of the survival rate would then be done in 2005 after the 3rd growing period and the project would be complete after confirming that the total area of 106,465 ha had passed the criteria of the survival rate.

However, since the signing of the loan agreement was delayed to March 2001, preparatory works could not be implemented before the rainy season between April and June. Afforestation in 2001 was therefore insufficient. In addition, the drought in 2004 and 2005 required additional plantation in 2006 in areas making up about 20% of the total afforested area where a survival rate of 60% and over could not be achieved. Because of this, the survival rate was measured again in 2009, 3 years after the additional plantation. This is why the original loan period to July 2008 could not be kept. Therefore the loan disbursement period was extended for 2 years to July 2010, which included the adjustment time for disbursement after plantation. The survival rate of 60% was finally achieved in the whole afforested area by the end of 2009¹⁵.

3.4.3 Results of Calculations of Internal Rates of Return (IRR)

Due to difficulties in appropriately calculating direct economic benefit derived from the project, a quantitative analysis of both the Economic Internal Rate of Return (EIRR) and the Financial Economic Rate of Return (FIRR) was not completed at the time of appraisal. In addition, it became more difficult to recalculate economic benefit as output data for economic forest belonging to the project was not collected. Therefore the calculations of FIRR as well as EIRR are not made in this ex-post evaluation.

In light of the above, although the project cost was within the plan, the project period exceeded the original schedule, therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

In principle, the operation and maintenance of economic forest (apple trees, vine, etc.) after afforestation is left to farmers. The farmers maintain their economic forests cooperatively as well as individually. With regard to protection forest, such trees as Chinese wolfberry, which

¹⁵ It was estimated that additional plantation was necessary but the period was scheduled between February and April. It seems that February was still cold and the scheduled period was not right time to prepare plantation.

also have economic value as economic forest, are left to farmers. Other protection forests are maintained by the Local Forest Departments who water the trees and take care of damage caused by blight and insects.

The operation and maintenance system in the Forest Department and its divisions after the completion of disbursement of the project remained unchanged in three layers. Specifically, the Forest Department of the Inner-Mongolia Autonomous Region supervises the Forest Department of each city or league which in turn supervises the Forest Department of each county or banner. Local Forest Departments hire forest rangers, who are responsible for protecting from fire, insects and illegal logging, patrolling protection forests and controlling cars which approach the forests. After completion of the project, the number of staff belonging to the forest management sections, such as national forest farms, forest product stations and forest disease protection stations, was 37,522 in 2010 and 36,674 in 2011 which remains at the same level¹⁶.

3.5.2 Technical Aspects of Operation and Maintenance

In order to implement afforestation successfully, farmers received not only technical trainings on plantation techniques but also trainings on cultivation, care, maintenance, protection from damage by blight and insects, protection from damage by animals, such as hares or field mice, and countermeasures against drought and fire. These trainings took place regularly (about twice a year) and on an ad hoc basis. Those trained ensured operation and maintenance after afforestation. The staff in the Forest Departments were also trained in forest management, afforestation techniques for protection against desertification, nursery management, measures against harmful organism and so on, in the Forest Department of the Inner-Mongolia Autonomous Region and National Forestry Department. Recently GPS and satellite pictures have been used as the afforested areas are widely scattered.

3.5.3 Financial Aspects of Operation and Maintenance

Economic forests generate income for operation and maintenance from their products, such as apples, vines, Chinese wolfberries etc. Protection forests can receive a subsidy for maintenance when the forests are acknowledged as used for public benefit and these forests are designated as public forests in accordance with the “National Forest Division Measures”. Specifically, those forests which are used as windbreaks, for the prevention of flying sand, the protection of watersheds and banks, conservation of environment, national defense and science experiment can be public forests. Local governments can also designate forests as public forest to their standards.

¹⁶ Source: National Forestry Department: “China Forestry Statistical Yearbook 2010” and “China Forestry Statistical Yearbook 2011”

When forests are designated as national public forests, 5 yuan per mu is provided for those forests as a subsidy. In the case of local public forests, the subsidy is 3 yuan per mu for maintenance and administration. These subsidies are reviewed from time to time.

The investment budget for forest management in the Inner-Mongolia Autonomous Region, which is the total for the nurturing of forests, protection from forest fires and protection from damage by blight and insects, has increased from 73 million yuan in 2009 to 232 million yuan in 2010¹⁷.

3.5.4 Current Status of Operation and Maintenance

According to the results of visits to 11 representative sites in 4 cities, forests are well maintained through measures as regular watering, periodic cutting, such as in the case of *Salix psammophila* for 3 to 4 years, and protection measures against damage by blight, insects and forest fire. In this regard no problems have been observed in operation and maintenance. Since the project area belongs to an arid zone, there is a possibility in future that drought could cause a problem of water. In the meantime, the recent survival rate after inspection has been 66% for protection forests, and 62% for aerial sowing forests which is not a problem for now.

In light of the above, no major problems have been observed in the operation and maintenance system, therefore the sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project aimed at the afforestation of 11 districts of 4 major cities, i.e. Hohhot, Baotou, Ordos and Bayannur in the Loess Plateau. These were covered with protection forest and economic forest, in order to increase the forest cover ratio, to protect surface soil erosion and to increase farmers' income by selling their products such as fruits from the planted trees. The project was implemented in accordance with national policy of China and is contributing to the improvement of the ecological environment, one of the important policies at present in China. The project is also consistent with Japan's ODA policy to China. In this sense the relevance of this project is evaluated to be high. The project was implemented just as planned and contributed to the improvement of the project areas by increasing the forest cover ratio. This also had a certain protection effect against desertification. These results show the high effectiveness and impact of the project. With regard to project cost, although a detailed track record could not be analyzed, the project cost was lower than planned. On the other hand, the implementation period was delayed significantly compared to the original schedule because of

¹⁷ National Forestry Department: "China Forestry Statistical Yearbook 2010" and "China Forestry Statistical Yearbook 2011"

the influence of drought, and so forth. This resulted in the extension of the disbursement period by two years. From this point of view, the efficiency of the project is evaluated to be moderate. With respect to operation and maintenance since implementation of the project has been the responsibility of farmers for their own economic forests and the Forest Departments for protection forests. To date there has been no problem which has jeopardized the sustainability of the project.

Based on the above results, this project is evaluated to be very high.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Nothing to mention

4.2.2 Recommendations to JICA

Nothing to mention

4.3 Lessons Learned

(1) Comprehensive Support to the Executing Agency (Project supervision based on the detailed plan)

The Forest Department of the Inner-Mongolia Autonomous Region has appreciated the continuous support of the JICA (then JBIC) Beijing Office from the beginning. JICA has supervised the project in a comprehensive manner through extending its support to the executing agency from their standpoint. This has included the provision of manuals necessary for the implementation of the Japanese ODA Loan project, regular supervision at sites and the conducting of an intermediate evaluation in cooperation with the National Forestry Department. This direct support by JICA has had a positive effect on farmers as well as on the executing agency and has helped the project be a success.

There are cases even now where a borrower or executing agency receives a Japanese ODA Loan for the first time. Mostly, in these cases, a consultant will be employed using the Japanese ODA Loan, or JICA will hire a consultant to support the borrower or the executing agency. The lesson learned from this project is that, when extending a loan to an executing agency who is not familiar with Japanese ODA Loan, it is very effective that JICA initiates the support plan and has frequent communication with the executing agency.

(2) Preparation of Maps for the Supervision of a Project over a Wide Area

In this project, maps which showed the location of the afforested sites, the houses of farmers and the location of protection forests were not made. Sign boards which identified that the forests had been planted were provided with the Japanese ODA Loan, but if there had been maps at the implementation stage, it would have been easy to compare the scenery before and

after afforestation, at the time of supervision and to date. In fact, the JICA supervision mission later had to use GPS to confirm the sites.

In case like this, when a project is implemented in a wide area, a project site map to identify the detailed places of implementation should be prepared in advance in order that the concrete situation of the project at site can be easily grasped.

(3) Setting of the Project Implementation Period under Severe Natural Conditions

It was agreed at the appraisal regarding the project completion time that a survival rate of 3 years after the first plantation should be the yardstick for judgment. Inner-Mongolia, Shanxi and Shaanxi were implementing afforestation projects at the same time and therefore a unified criteria had to be set.

However afforestation is influenced by natural conditions such as climate, quality of the seedlings, etc. which cause differences in growth. There is a limit to how much the same criteria can be applied in areas where natural conditions are different. In particular, the weather is extremely dry in the Inner-Mongolia, compared to other areas, and the natural conditions are harsher. In addition, afforestation needs complementary planting as not all the trees can survive after the first plantation. Therefore, the timing and period for complementary planting should also be taken into account.

It is recommended that at the appraisal for the same kind of project, the completion time be decided taking into account the necessity for, and the workload related to, complementary plantation, and that the climate and environment of the project sites are examined.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	See Table 4 through Table 6	As planned
2. Project Period	January 2001 – December 2005 (60 months)	January 2001 – December 2009 (106 months)
3. Project Cost		
Amount paid in foreign currency	86 million yen	86 million yen
Amount paid in local currency	4,821 million yen (371 million yuan)	4,821 million yen (n.a)
Total	4,907 million yen	4,907 million yen
Japanese ODA loan portion	3,600 million yen	3,599 million yen
Exchange rate	1 yuan = 13 yen (As of September 2000)	1 yuan = 14 yen ⁽¹⁾ (Average between 2001 and 2010)

Note (1): The exchange rate was calculated from a yuan/yen cross rate which was derived from the middle rate of yuan/US\$ and yen/US\$ in each year in IFS.

Change of Forest cover ratio in the Inner-Mongolia Autonomous Region
and Project Afforested Areas

	Start of the Project		Middle of the Project		Ex-post Evaluation		12 th 5year Plan
	%	Survey year	%	Survey year	%	Survey year	Target %
Whole Inner-Mongolia	14.8	1999~2000	20.0	2010~2011	n.a	n.a	21.5
Total Project Area	11.8	2000	17.4	2005	24.3(est.)	2012	n.a
Baotou City (Jiuyuan District)	9.9	2000	n.a	n.a	19.2	2012	20.0
Bayannur City	8.7	2000	14.5	2010	15.4	2012	15.0
Wuyuan County	8.5	2000	10	2010	11.2	2012	n.a
Dengkou County	12.3	2000	16.5	2010	17.9	2012	n.a
Linhe City	6.0	2000	15	2010	17.8	2012	22.9
Wulate Front County	9.5	2000	13.3	2010	15.5	2012	n.a
Ordos City	12.2	2000	22.2	2009	n.a	n.a	n.a
Hangjin Banner	7.3	2000	14.6	2010	15.2	2012	n.a
Dongsheng district	17.1	2000	33.0	2010	16.9	2012	n.a
Wushen Banner	25.2	2000	30.9	2010	32.3	2012	36.0
Yijinhuoluo Banner	30.1	2000	39.9	2010	39.9	2012	42.0
Hohhot City	15.9	2000	23.4	2007	27.1	2012	n.a
Qingshuihe County	19.8	2000	29.7	2007	32.9	2012	n.a
Tuoketuo County	11.9	2000	12.1 17.1	2002 2010	21.3	2012	22.3

Source: Forest Department of the Inner-Mongolia Autonomous Region (each Local Forest Department)

Note: The forest rate was rounded off to one decimal place.

Answers to the Questionnaire

Questions were raised about “the cases in which the environment was improved”. Freely written answers were collected by the Department of Forest of the Inner-Mongolia Autonomous Region as follows. 106 samples were collected.

	Answer	No. of answers
1	Cultivated area for Chinese wolfberry in the whole village increased.	2
2	Natural disasters decreased. The climate improved a little.	21
3	Plantation areas increased. The air was cleaner.	1
4	The number of sandstorms decreased. Plantation areas increased. Income increased.	9
5	The number of sandstorms decreased. There was protection against surface soil erosion. Environmental beautification was promoted. The air was cleaner.	25
6	The areas were effectively protected from erosion by water and wind. Plantation areas increased	7
7	Timber forest area increased. The number of sandstorms decreased. The natural environment was improved dramatically. The micro climate changed for the better and the number of wild animals and wild plants increased substantially. Income increased to some extent.	11
8	The number of sandstorms decreased. Rainfall increased.	9
9	The number of sandstorm disaster decreased. Floods decreased.	1
10	Humidity became higher. Dry hot winds decreased. The environment improved.	5
11	The micro climate improved. Humidity became higher.	2
12	The micro climate improved. The sand fixation effect was remarkable.	1
13	Disaster days caused by sandstorms decreased. Flood protection dams in the Yellow River were guarded. There was protection against surface soil erosion.	2
14	Agriculture was protected. Agricultural products increased. The micro climate was changed for the better. Income increased.	5
15	Before afforestation the area was of fluid sand and barren. After afforestation the vegetation coverage rate exceed 80%. The micro climate changed for the better. The living environment of farmers improved. Houses were no more buried in sand after strong winds like in the past.	4
16	No answer	1
	Total	106

Note: The questionnaire was distributed to farmers in the project areas (11 sites in 4 cities, 169 in terms of banner) through the Department of Forest of the Inner-Mongolia Autonomous Region. 100 households were expected to answer the questionnaire but 106 answers were collected. The answers were 38 from Ordos, 37 from Bayannur, 17 from Hohhot, 10 from Baotou and 4 from others. The survey was conducted from March to April 2013.