

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan Project

“Inland Higher Education Project (Regional Vitalization, Market Economy Reform Support,
and Environmental Conservation) (Heilongjiang Province)”

External Evaluator: Takako Haraguchi, OPMAC Corporation

0. Summary

This project aimed to improve teaching and research at nine major universities in Heilongjiang 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 Heilongjiang 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 environmental conservation. Efficiency of the project was evaluated to be fair on the whole: although the project cost was within the plan, the project period exceeded the planned period due to delays in procurement. 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



Building of the School of Pharmacy
(Harbin Medical University)

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.

Heilongjiang Province is located in the northeastern end of China with a total population of 38,130,000 persons (2002) and a total area of approx. 469,000 km². Although the province achieved high economic growth, and per capita gross domestic product (GDP) (10,184 yuan in 2002) was higher than the national average (7,966 yuan), there was a wide gap between urban and rural areas. The provincial government aimed to promote a market economy and further economic development in the 10th 5-year Plan in Heilongjiang Province (2001-2005). Also, the 5-year Plan for Education in Heilongjiang Province (2001-2005) planned to increase the number of students in higher education to around 495,000 persons and the enrollment ratio to 16.3% 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 48 institutions in 2002) had to be addressed.

Under such conditions, this project specified three development issues, namely, (i) regional vitalization, (ii) market economy reform support, and (iii) environmental conservation of Heilongjiang Province, and aimed to contribute to human resource development in order to address such issues by enhancing quality and quantity of higher education at major universities in the province.

1.2 Project Outline

The objective of this project was to quantitatively and qualitatively enhance higher education at nine major universities in Heilongjiang Province (Heilongjiang University, Harbin University of Commerce, Harbin University of Science and Technology, Harbin Medical University, Northeast Agricultural University, Harbin Normal University, Jiamusi University, Heilongjiang Institute of Technology, and Qiqihar University) 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 regional vitalization, market economy reform support, and environmental conservation of the province.

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

| | |
|--|---|
| Loan Approved Amount/ Disbursed Amount | 4,972 million yen / 4,733 million yen |
| Exchange of Notes Date/ Loan Agreement Signing Date | March 2004 / March 2004 |
| Terms and Conditions | Interest Rate 1.5% (0.75% for training component) Repayment Period 30 years (Grace Period) (40 years for training component) (10 years) Conditions for General untied Procurement: |
| Borrower / Executing Agency | The government of People’s Republic of China / Heilongjiang Provincial People's Government (Education Bureau) |
| Final Disbursement Date | August 2011 |
| Feasibility Studies, etc. | - “Feasibility Study Report”, Heilongjiang International Engineering Consulting Company, 2003. - “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 (OPMAC Corporation)

2.2 Duration of Evaluation Study

Duration of the Study: August 2013 – November 2014

Duration of the Field Study: October 27 – November 28, 2013 and March 23–31, 2014²

3. Results of the Evaluation (Overall Rating: A³)

3.1 Relevance (Rating: ③⁴)

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, which all aim at quantitative

² The field study period included the periods for ex-post evaluation of the Inland Higher Education Project (Regional Vitalization, Market Economy Reform Support, and Environmental Conservation) (Anhui Province) and the Inland Higher Education Project (Regional Vitalization, Market Economy Reform Support, and Environmental Conservation) (Anhui Province).

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

⁴ ③: High, ② Fair, ① Low

and qualitative development of higher education both at the times of appraisal and ex-post evaluations of this project (Table 1). While there were no large policy changes between the appraisal and ex-post stages, in recent years more importance has been given to higher education development, and the role of higher educated human resources in socio-economic development has become more clarified. Also, the key industries of Heilongjiang Province have shifted to those that require higher technologies.

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

| | At the time of appraisal | 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 in western area; 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 midwestern 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 Heilongjiang Province (2001-2005):</u> To achieve annual economic growth rate of 9-10% or higher by 2005; develop the key industries including information technology biotechnology, automobile, petrochemical industry and pharmaceutical industry, etc. | <u>The 12th 5-year Plan for Economic and Social Development in Heilongjiang Province (2011-2015):</u> To increase GDP to more than two times the 2010 level by 2015; to develop key industries including biotechnology (focusing on pharmacy, agriculture, energy and manufacturing), manufacturing of new energy instrument (nuclear power, wind power, gas turbines, etc.), manufacturing of new agricultural machinery, manufacturing of transportation instrument, green food industry, steel and mining industry, coal chemistry and petrochemical industry, and forestry and paper industry, etc. To further promote reduction of urban-rural gaps in income and education, etc. |
| Provincial level education sector plan | <u>The 10th 5-year Plan for Education in Heilongjiang Province (2001-2015)</u> To increase higher education enrollment ratio from 14% in 2001 to 16.3% in 2005; to increase student enrollment in HEIs to around 495,000 (including around 396,000 in regular HEIs ⁵). | <u>The 12th 5-year Plan for Education in Heilongjiang Province (2011-2015)</u> To increase higher education enrollment ratio from 34.8% in 2011 to 47% in 2015. <u>Heilongjiang Powerful Province of Higher Education Construction Plan (2008)</u> To plan and implement higher education plans as a key factor for socio-economic development of the province. |

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

⁵ 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. (Note for English translation only: in this report, “universities” include both universities and colleges that grant undergraduate or higher academic degrees unless otherwise mentioned.)

3.1.2 Relevance to the Development Needs of China

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

At the time of the appraisal, 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 Heilongjiang Province (school intake rates in 2002 were 98.9% for primary education and 123.4% for secondary education). It was forecasted that the number of new entrants in regular HEIs would increase from 110,000 in 2002 to 150,000 in 2006. The nine universities targeted by this project were all leading universities under the jurisdiction of Heilongjiang Province⁶, but their financial resources for developing the hardware (facilities and equipment) and software (teachers’ training) aspects to address such increasing demand were limited. Also, there were few opportunities provided for the teachers to visit overseas.

At the time of the ex-post evaluation, the real GDP growth rate had been higher than 10% since 2002, and provincial per capita GDP was 35,711 yuan in 2012, which was 93% of the national average. Although this is a higher economic level than other inland provinces, the province still needed to maintain the growth and reduce gaps between urban and rural areas⁷. The number of new entrants to regular HEIs in the province continued to increase from 180,000 in 2006 to more than 200,000 in 2012, and the need for quantitative and qualitative enhancement of HEIs remains high. The nine targeted universities have continued to be the leading provincial universities. On the other hand, the need for hardware development seemed to have been more satisfied compared to the time of the appraisal, due to increased financial injection to provincial universities following the above-mentioned higher education development policies. The Education Bureau of Heilongjiang 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 appraisal, Japan’s Country Assistance Policy for China, the Medium-term Strategy for Overseas Economic Cooperation Operations and the Country Assistance Strategy put priorities on human resources development from the viewpoint of

⁶ The other major universities located in Heilongjiang Province are state-run Harbin Institute of Technology and Harbin Engineering University, which can obtain more funding than province-run universities, and therefore were not covered by this project.

⁷ According to the provincial statistics of Heilongjiang, per capita disposable income in urban areas was 5,425 yuan in 2001, while per capita net income in rural areas was 2,283 yuan in the same year. In 2012, these were 17,760 yuan and 8,604 yuan, respectively.

support for openness and reform and post-WTO economic reform, and on assistance in the inland China from the aspect of narrowing the economic gap. The project objective was consistent with such aid policies of Japan. The Country Assistance Strategy upholds “regional vitalization and exchange”, “market economy reform support”, and “environmental conservation” as important areas of human resource development.

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 Effectiveness⁸ (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

The number of students as well as various teaching and research-related indicators designated at the appraisal showed improvement between before and after this project. The set targets were achieved at the same as or better levels than expected. The effects of this project cannot be assessed by these indicators alone, since they measure operation and effects not only of this project but also of other projects (school building construction, equipment procurement, etc.) that were implemented around the same time by the province or target universities themselves. Nevertheless, by observing the use of the facilities and equipment developed and the activities of the teachers trained in Japan under this project, it was confirmed that this project constituted some factors which contributed to the improvement of the indicators.

(1) Quantitative expansion of teaching and research⁹

The number of students as well as the size of the facilities and equipment increased. The facilities and equipment developed under this project were mostly utilized, and therefore it can be said that they played the expected role as part of the response to the quantitative expansion of teaching and research.

First, the number of students increased far beyond the planned level at most of the targeted universities (Table 2).

⁸ Sub-rating for Effectiveness was given with consideration of Impact. Taking into consideration the project objective and plan set at appraisal, this ex-post evaluation was designed based on the following definition of the key elements of effectiveness and impact of this project:

- Effectiveness: quantitative and qualitative enhancement of teaching and research at the targeted universities;
- Intended impact: enhancement of teaching and research at the provincial level, and contribution to provincial-level development in the areas of regional vitalization, market economy reform support and environmental conservation;
- Other impacts: strengthening of exchanges and cooperation with universities in Japan.

⁹ In the appraisal, the target year for evaluating the quantitative indicators was set at 2007. However, due to the delays in project implementation (see “3.4 Efficiency”), the ex-post evaluation set the actual comparison year at 2012, a year after the project was actually completed (i.e. the equipment procurement competed).

Table 2: Number of students
(Total number of graduate, undergraduate and single department college students)

Unit: Person

| | Actual 2002 | Planned 2007 (Planned year of completion) | Actual 2007 (Planned target year) | Actual 2012 (A year after project completion) |
|---|-------------|--|---|--|
| Heilongjiang University | 24,127 | 25,730 | 34,884 | 35,034 |
| Harbin University of Commerce | 13,026 | 18,781 | 21,980 | 25,384 |
| Harbin University of Science and Technology | 17,309 | 25,011 | 25,678 | 34,287 |
| Harbin Medical University | 5,581 | 10,746 | 9,891 | 11,690 |
| Northeast Agricultural University | 17,549 | 20,799 | 18,350 | 24,813 |
| Harbin Normal University | 16,136 | 19,882 | 43,362 | 40,015 |
| Jiamusi University | 19,820 | 25,620 | 23,649 | 24,497 |
| Heilongjiang Institute of Technology | 6,674 | 11,200 | 14,220 | 16,785 |
| Qiqihar University | 15,842 | 22,086 | 23,505 | 24,110 |
| Total | 136,064 | 179,855 | 215,519 | 236,615 |

Sources: JICA internal documents; responses to the questionnaire from the executing agency.

The floor area of school buildings also increased beyond the planned levels (Table 3). Most of the increase was funded by the province or the target universities (mainly private borrowing) outside of this project, and the floor area increased through this project accounts for only a small portion of the total increase (i.e. part of the areas of seven universities). As a whole, however, the expanded area of school buildings has played a fundamental role in bringing about the desired effects of this project. The buildings developed by this project are all fully utilized.

Table 3: School building area
(Classrooms, laboratories, libraries, gymnasiums and auditoriums)

Unit: m²

| | Actual 2002 Total area | Planned 2007 | | Actual 2007 Total area | Actual 2012 | |
|--|---------------------------------|---------------|-------------------------------------|---------------------------------|---------------|-------------------------------------|
| | | Total area | Portion under this project | | Total area | Portion under this project |
| Heilongjiang Univ. | 202,746 | 351,282 | 22,000 | 1,130,380 | 1,153,435 | 22,000 |
| Harbin Univ. of Commerce | 247,373 | 390,045 | 16,000 | 600,318 | 613,071 | 15,871 |
| Harbin Univ. of Science and Technology | 245,052 | 400,000 | 0 | 378,479 | 572,757 | 0 |
| Harbin Medical Univ. | 190,438 | 280,940 | 14,000 | 332,753 | 483,351 | 14,000 |
| Northeast Agricultural Univ. | 162,586 | 386,266 | 0 | 304,877 | 325,646 | 0 |
| Harbin Normal Univ. | 197,773 | 397,773 | 0 | 636,033 | 660,797 | 57,000 |
| Jiamusi Univ. | 291,055 | 422,994 | 27,000 | 332,502 | 358,990 | 27,000 |
| Heilongjiang Institute of Technology | 111,831 | 250,000 | 18,000 | 251,971 | 321,427 | 18,000 |
| Qiqihar Univ. | 213,530 | 298,000 | 31,000 | 270,092 | 286,406 | 33,462 |
| Total | 1,862,384 | 3,177,300 | 129,000 | 4,237,405 | 4,775,880 | 187,333 |

Sources: JICA internal documents; responses to the questionnaire from the executing agency.

As to the monetary value of educational and research equipment¹⁰, the portion procured by this project increased to a level slightly below the planned value (Table 4). The reasons that the indicator did not reach the target at some universities are considered to be cancellation of procurement of some equipment (see “3.4 Efficiency) and arrival of the useful life of some other equipment such as personal computers that were installed at an early stage of project implementation. The total value of such equipment of the entire university substantially increased as well (mainly due to investments made by the provincial government and the universities themselves). While the equipment procured by this project now constitute only a part of the total value, the provincial Education Bureau and the targeted universities commented that they were particularly important during the project implementation stage when making large-scale investments on their own were difficult, and they continued to play a meaningful role at the time of ex-post evaluation.

Table 4: Total monetary values of educational and research equipment

Unit: thousand yuan

| | University total | | Portion under this project | |
|---|-----------------------|-----------------------|----------------------------|-----------------------|
| | Actual as of end 2002 | Actual as of end 2012 | Planned 2007 | Actual as of end 2012 |
| Heilongjiang University | 130,050 | 318,270 | 34,980 | 36,250 |
| Harbin University of Commerce | 45,170 | 155,340 | 29,400 | 31,810 |
| Harbin University of Science and Technology | 80,540 | 307,960 | 60,460 | 46,060 |
| Harbin Medical University | 70,690 | 331,660 | 38,490 | 36,900 |
| Northeast Agricultural University | 73,710 | 357,000 | 67,450 | 40,270 |
| Harbin Normal University | 80,800 | 455,010 | 35,010 | 35,010 |
| Jiamusi University | 80,120 | 260,000 | 34,360 | 18,840 |
| Heilongjiang Institute of Technology | 32,730 | 92,590 | 36,570 | 38,820 |
| Qiqihar University | 73,460 | 280,740 | 25,900 | 25,930 |
| Average | 74,140 | 284,290 | 40,290 | 34,430 |

Sources: JICA internal documents; responses to the questionnaire from the executing agency.

The equipment procured by this project have generally been well used, and seven out of the nine targeted universities answered that the utilization rates of major equipment procured under this project were more than 90% to more than 100%. The remaining two universities said that the rates were around 70%, due to several reasons including replacement of old PCs with new ones, obsolescence of some equipment over time, changes in research themes, and insufficient parts at the time of arrival. Some measures to increase the utilization rates have already been taken: with respect to the insufficient parts, the concerned universities and the Education Bureau

¹⁰ At appraisal, this indicator was not designated as an operation and effect indicator for this project. However, in the ex-post evaluation the indicator was considered necessary for confirming how the project responded to the quantitative expansion of teaching and research, and therefore the data was collected including those from before the project.

are considering to procure them; and in one case, a teacher has been newly recruited for an area of research that would require use of the non-used equipment. Also, utilization of large equipment has been enhanced by incorporating them into platforms for sharing of laboratory equipment¹¹ within universities and at Heilongjiang Department of Science and Technology.

On the visits made to each target university for ex-post evaluation, the evaluator made observations of major equipment focusing on the more expensive or highly-used ones, and confirmed that they were being utilized. All universities named many equipment as being useful, including laboratory analytical instruments, experimental equipment for teaching, computers and networking equipment. For example, Harbin University of Science and Technology mainly procured equipment with high unit prices and adopted a policy to avoid short lived equipment such as PCs, but instead to buy those usable for a longer term. According to the university, the transmission electron microscope, with which the university bought a full set of equipment for pretreatment of samples, is particularly well used, and was thus commended as an excellent equipment of the provincial laboratory equipment platform.

(2) Qualitative enhancement of teaching and research

It was found that the average school building area and the monetary value of equipment per student satisfied the national standard at most targeted universities, implying that the quality of teaching/research environment was ensured to a certain degree (Table 5). The increment in the area per student achieved through this project was below the planned value due to the rapid increase in the number of students.



Scanning electron microscope (SEM) that was booked for a month. Before this project, students had to travel to Harbin for laboratory work using SEM. (Qiqihar University)

¹¹ A system to which laboratories register their equipment for use by other faculties (schools) or outside institutions. In some cases, the equipment were concentrated to an integrated laboratory named such as Testing Center, and in other cases, the equipment were installed at individual laboratories, which allowed outside researchers to use them upon request.

Table 5: School building area (teaching, research and administration) 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 2002 | Planned 2007 | | Actual 2012 | | Actual 2002 | Actual 2012 |
| | | Area per student | Increment through this project | Area per student | Increment through this project | | |
| Heilongjiang Univ. | 8.1 | 13.1 | 0.9 | 32.90 | 0.6 | 4,651 | 8,071 |
| Harbin Univ. of Commerce | 18.6 | 19.9 | 0.8 | 24.15 | 0.6 | 3,468 | 6,120 |
| Harbin Univ. of Science and Technology | 13.6 | 14.8 | - | 16.64 | - | 2,926 | 8,193 |
| Harbin Medical Univ. | 28.1 | 20.2 | 1.0 | 29.39 | 0.9 | 10,500 | 20,200 |
| Northeast Agricultural Univ. | 8.7 | 15.5 | - | 13.59 | - | 4,200 | 14,388 |
| Harbin Normal Univ. | 11.7 | 18.3 | - | 30.49 | 1.3 | 4,824 | 11,371 |
| Jiamusi Univ. | 14.4 | 15.8 | 1.0 | 27.50 | 1.0 | 3,969 | 10,614 |
| Heilongjiang Institute of Technology | 16.8 | 22.3 | 1.6 | 19.14 | 1.1 | 4,000 | 14,700 |
| Qiqihar Univ. | 13.4 | 13.3 | 1.4 | 29.20 | 1.3 | 4,637 | 10,954 |
| Average | 14.8 | 17.0 | 1.1 | 24.78 | 1.0 | 4,797 | 11,623 |

Sources: JICA internal documents; responses to the questionnaire from the executing agency.

Notes: The national standards of per student school building area of regular undergraduate schools are as follows: total school building area including canteens and dormitories should be “more than 30m²”, and teaching, research and administration building area should be “more than 20m²” in natural science faculties, “more than 15m²” in humanity and social science faculties and “more than 30m²” in physical education and art faculties (Interim Provisions for Establishment of Regular Undergraduate Schools, No.18 [2006]). 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 according to the above-mentioned Interim Provision 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) services¹³ projects, the number of published research papers, the number of awards, the number of patents granted, etc., showed increasing trends (Table 6).

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. In this ex-post evaluation, the number of these was used as indicators to show high quality of disciplines and laboratories.

¹³ As Social (or community) services, the number of research, testing, etc. commissioned by external organizations (government, companies, etc.) and the number of training courses conducted for those organizations were counted.

Table 6: Trend of major teaching/research indicators (total of the targeted universities)

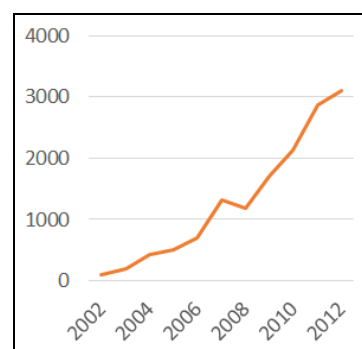
| Indicator | Actual 2002 or 2007 ¹⁾ | Actual 2012 |
|---|-----------------------------------|-------------|
| Number of key disciplines (state level) | 5 | 12 |
| Number of key disciplines (provincial/ministerial) | 95 | 174 |
| Number of key laboratories (state level) ²⁾ | 2 (2007) | 2 |
| Number of key laboratories (provincial/ministerial) ²⁾ | 34 (2007) | 60 |
| Number of undergraduate faculties/departments | 326 | 525 |
| Number of master's degree programs | 205 | 794 |
| Number of doctorate degree programs | 57 | 223 |
| Number of research projects (state level) | 65 | 391 |
| Number of research projects (provincial/ministerial) | 239 | 745 |
| Number of social services projects ³⁾ | 95 | 466 |
| Number of award-winning researches (state level) | 0 (2007) | 8 |
| Number of award-winning researches (provincial/ministerial) | 70 (2007) | 228 |
| Number of patented research outcomes | 121 (2007) | 1,094 |

Sources: JICA internal documents, responses to the questionnaire from the executing agency.

Notes: 1) Where the data of 2002 were either non-available or not comparable with the ex-post data due to difference in counting, the data of 2007 were used. 2) The number of key laboratories is a total of the eight universities that provided the data. 3) The number of social services projects is a total of the seven universities that provided the data (but 50 projects of Heilongjiang University in 2012 was excluded because the data of 2007 was not available from that university).

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. Below are some examples.

- Example of being designated as key disciplines: the project inputs were concentrated to the development of key disciplines of biology and chemistry. Accordingly, the Chemistry Building was constructed, analytical and testing instruments such as microscopes were procured, and teachers who were candidates to be leaders of the key disciplines were sent to Japan for training. Such development also accelerated the development of provincial (i.e. designated by the province) key disciplines. For example, a discipline “Genetics” was designated as a second-level provincial key discipline in 2006, and then it became a first-level provincial key discipline in 2011, because “Biology” that contains “Genetics” as a constituent



Source: prepared based on responses to the questionnaire from target universities.

Figure 1: Total number of internationally-published research papers by each of the targeted universities

was designated as a first-level key discipline¹⁴. An ex-participant in teachers' training in Japan became the leader of the discipline. (Qiqihar University)

- Example of winning research projects: after the training in Japan, a teacher remained in Japan as a researcher and to obtain a doctoral degree, and was engaged in research as well as research & development in the field of biometrics. After returning to China, she won large research projects such as the one funded by the National Natural Science Foundation of China. (Harbin University of Science and Technology)
- Example of social services: based on the research in computational intelligence which he was engaged in his training in Japan and using the equipment procured under this project, a teacher provided a Chinese company with technical assistance in developing an automatic control system for wastewater treatment. The system developed is used in four out of more than ten wastewater treatment plants in the Songhua River basin, including the monitoring center in Harbin. (Harbin University of Science and Technology) (Besides this university, many universities reported cases of social services that benefited from this project.)
- Example of research papers: The number of internationally-published research papers, i.e. those cited in the SSCI, SCI, EI or ISTP¹⁵, produced by ex-participants in teachers' training in Japan under this project amounted to 43 during the period from 2002 to 2012. The total impact factors¹⁶ of those papers were more than 169.77. (Harbin Medical University)
- Example of patented research results: a resin composite material with a high dielectric constant that was developed using the transmission electron microscope (TEM) and other equipment procured under this project received a patent. The teacher engaged in this development learned about the research techniques using TEM in Japan. (Harbin Normal University)

¹⁴ The first-level disciplines are the large category and the second-level disciplines are the small category. When a first-level discipline is designated as a key discipline, all subordinate second-level disciplines become key disciplines as well.

¹⁵ SSCI (Social Science Citation Index), SCI (Science Citation Index), EI (Engineering Index) and ISTP (Index of Scientific & Technical Proceedings) are all citation indices for internationally-published research papers.

¹⁶ The impact factor is a measure of importance of an academic journal, based on the number of citations.

3.2.2 Qualitative Effects¹⁷

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

Regarding effects of the hardware components, it was confirmed from interviews with the provincial Education Bureau and targeted universities as well as document review that the educational/ experimental facilities and equipment developed under this project have contributed to the improvement of the following aspects to a certain extent.

- The national undergraduate education level evaluation by the Ministry of Education¹⁸: during the implementation period of this project, three of the targeted universities underwent the national undergraduate education level evaluation. Heilongjiang University and Qiqihar University were evaluated as “Excellent”, and Heilongjiang Institute of Technology was evaluated as “Good”. They commented that the equipment procured by this project contributed to such evaluation results through improvement of teaching conditions.
- Improvement of conditions for teaching and experiments: all targeted universities commented that they were able to eliminate shortages of facilities and equipment due to the rapid increase in students and that they became capable of providing more practical education by acquiring additional equipment and increasing the proportion of laboratory classes. For example, a teacher at Harbin Medical University said that before the project, he could only show students micrographs that were published in journals, and after the project, he became able to show them micrographs that he took using the equipment procured under this project. Also, at the Comprehensive Practice Center of Economic Management of Harbin University of Commerce, students are now able to simulate company management, international trade, banking, stock transactions, futures transactions, etc. using computers procured under this project (that accounted for almost all of the computers of the Center during project implementation, but at the time of ex-post evaluation, 60% were those purchased by the university after the project) and software donated by companies. Students in 38 out of 58 majors of Economic

¹⁷ 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 provincial Education Bureau (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, 147 persons from the 9 universities (including 46 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 one of them and contacted several more universities by telephone or e-mail.

¹⁸ An evaluation conducted by the Ministry of Education of China to assure quality of higher education. 198 universities and 87 universities were evaluated in 2007 and 2008, respectively. The evaluation criteria are multifaceted including university management, teaching staff, students, facilities and equipment, academic disciplines/graduate programs, etc. The assessment is made in four levels, “Excellent”, “Good”, “Qualified”, and “Not Qualified”.

Management use the Center, and many of them got successful results in various student competitions. The Center was designated as a provincial-level experimental teaching model center in 2006, and as a state-level experimental teaching model center in 2008.

- Regarding the enhancement of research and social services, all targeted universities answered that the equipment developed by this project enabled them to construct key laboratories, acquire new research projects and provide new social services (see also “3.2.1 Quantitative Effects”).



Students practicing model business activities at the Comprehensive Practice Center of Economic Management

(Harbin University of Commerce)



Equipment for mechanical and electrical systems. A new experimental course was opened using these equipment.

(Heilongjiang Institute of Technology)



Laser molecular beam epitaxy (Laser MBE) system used for analysis of new functional materials, etc.

(Harbin University of Science and Technology)

As to effects of the software component, ex-participants in the teachers’ training in Japan provided the following comments. In each point, the numbers in () represents the number of universities (out of the nine universities) where the interviewed teachers said the project was “useful” for the concerned aspect.

- Promotion (5 universities): after returning from Japan, teachers became core staff members (such as heads of schools, deans, heads of research center, professors, qualified doctoral advisors, etc.) of the respective universities.
- Teaching method (7 universities): teachers were able to learn about the state of undergraduate and graduate teaching in Japan. Although it is difficult to directly apply it to undergraduate education in China (because the number of undergraduate students is much higher), they are utilizing a part of what they learned in their teaching after returning from Japan. For example, some started allowing undergraduate students to conduct experiments with graduate students. For graduate students, some teachers introduced to them the seminar style and experiments in smaller groups.
- Operation of laboratory equipment (2 universities): some teachers learned how to operate advanced laboratory equipment. After returning to their universities, such experience and knowledge was useful when similar equipment was purchased either under this project or using other budget resources.

- Approach and style of research (8 universities): teachers were impressed by the attitude towards research in Japan, such as seriousness, attention to details, and thoroughness in pursuing the answer, and tried to incorporate such attitudes after returning to their respective universities.
- Contents and direction of research (6 universities): some teachers decided on research themes in Japan, and these determined the direction of their research thereafter. They brought back new research themes to their universities, and students began to be involved in research in such themes.
- Foundation for overseas activities (2 universities): training under this project provided a foundation for overseas research to some universities and participating teachers. It then opened a path to research in western countries and publication of papers in international journals. Some ex-participants in the university management course said that after they learned about internationalization of universities, they began to put more weight on the candidates' overseas experience when recruiting teachers.

Besides such positive responses, all targeted universities pointed out that the 6-month duration of training, which was applied to the majority of teachers, was too short for participants to deepen their specialization skills. Therefore, some teachers extended their stay or revisited Japan using other financial resources or on their own.

The table below summarizes notable effects, including those mentioned above, of the project on teaching and research at each targeted university.

Table 7: Qualitative effects at each targeted university

| | |
|--|---|
| Heilongjiang University | Overall, the university implemented the project smoothly and achieved good results. Arts and sciences were well balanced in both procurement of equipment and training in Japan. A teacher who had learned about the Bills of Exchange and Promissory Notes Act of Japan contributed a lot to drafting of the bill to revise the Commercial Law of China that is currently being processed. There were also unique cases of training in Japan such as the one for collection of documents related to China-Japan political history before World War II. |
| Harbin University of Commerce | The equipment procured, mostly PCs and language laboratories, are well utilized at the time of ex-post evaluation. A case that has a unique feature is the Comprehensive Practice Center, which is equipped with the simulators for business activities such as company management, money and banking and investment (developed mainly with the equipment under this project). Joint research with companies as well as social services are active. The project equipment is used also for adult education. Besides, the university conducted administration management training for officials of developing countries with use of the project equipment. So far nine courses were held. |
| Harbin University of Science and Technology | With the aim to develop as a research university, the procurement under this project was focused on large equipment. The transmission electron microscope, with which the university fully developed equipment for pretreatment of samples, is particularly well used and was thus commended as excellent equipment of the provincial laboratory equipment platform. Teachers achieved results after returning from training in Japan, such as in areas of research and development and basic research in biometrics, development of an automatic control system and use of that system for waste water treatment plants along the Songhua River, publication of a book on environmental laws that are referred to by the government, and so on. The training component and procurement component were linked to each other in many cases. Also, there are recognized cases of indirect contribution of graduates to key industries and environmental protection. |

| | |
|---|---|
| Harbin Medical University | The university installed a number of equipment at the Teaching Building of the School of Pharmacy constructed using the local currency portion of the cost of this project. The status of operation and maintenance of such equipment is good, producing a number of good practices, i.e., positive impacts on research, clinical services and teaching. The university had sustained a wide range of exchanges with Japanese universities, and such relationships were reinforced through this project. The International Office advised on which university to visit based on the degree of matching. |
| Northeast Agricultural University | The university had been very active in social services including development of new breeds of soybeans and corns, to which the general purpose laboratory equipment procured under this project contributed. Educational effects and good practices by ex-participants in teachers' training in Japan were also observed. The operation and maintenance status is also good: for example, the language laboratories developed in 2008 are still highly utilized. |
| Harbin Normal University | While being a normal university, it had placed importance on scientific research. Therefore, most of the equipment procured under this project were large analytical instruments. The university constructed a common experimental center facility as an additional output of this project, and registered all project equipment to the large equipment sharing platform of Heilongjiang Province for utilization for social services. However, some of the equipment has not been fully functional: the transmission electron microscope could not be used with an analytical instrument that was intended to be used together, because the delivered equipment had a different specification than expected; and some equipment have had unspecifiable problems since they arrived. There are many good practical outcomes of research results and academic exchanges with Japan involved by ex-participants in the teachers' training, such as opening of new courses and setting of new research themes. |
| Jiamusi University | The School of Life Sciences used the equipment procured under this project for establishment of the Testing Center (equipment sharing platform), which is also registered to the large equipment sharing platform of Heilongjiang Province. The equipment have basically been well utilized although there have been some cases of troubles. In a visit to one university for the ex-post evaluation, an instrument was being underutilized, although it was only a very small part of the procured equipment, since the trouble had not been solved because there was no response received to an inquiry sent to the manufacturer. Also, some language laboratory equipment were broken down as they became old. On the other hand, the university made full use of the opportunities of training in Japan under this project. After their return to China, teachers have promoted research, education (they opened a number of new experiment courses) and social services (some of which have been commercialized in the field of pharmacy) with the use of the equipment procured by this project. Also, some teachers who returned from Japan also contributed to the upgrading of the Japanese Language Program. |
| Heilongjiang Institute of Technology | Every year, 80% of a total of more than 500 graduates from the School of Automobile and Traffic Engineering, where a Japanese auto manufacturer has human resource development center, are employed in the automobile industry. The project benefited the school in that a teacher who was trained in Japan and the laboratory equipment promoted research and enhanced practical skills of graduates. The teacher also published a book on his research in hybrid engine vehicles. Another example was found at the School of Surveying and Mapping Engineering, where there is a collaborative relationship with a worldwide optical instrument manufacturing company (it opened a showroom within the school as the university purchased a number of its products under this project) and provision of surveying services to Harbin City. |
| Qiqihar University | The university attached high value to this project, and carefully selected the equipment that was limited to large equipment for laboratories in priority disciplines. At the same time, the university sent teachers of those laboratories to Japan for training. The procured equipment were all registered to the university-wide equipment sharing platform, which initially started with the project equipment only. Booking procedures and management of the equipment are all conducted online. When a visit was made to the university in mid-November 2013, the scanning electron microscope, the most frequently-used equipment, was fully booked until the end of the following month. Many of the ex-participants in the training in Japan were promoted to discipline leaders or took management positions such as the head of the science and technology office and deans of graduate programs. They are actively engaged in joint research with professors in the host universities in Japan as well as student exchanges with those universities. Also, in one case, the equipment procured by this project was used for development of an instrument for river water purification that was put into practical use. |

Sources: Prepared based on responses to the questionnaire from targeted universities, interviews with them, information from their websites, etc.

3.3 Impact

3.3.1 Intended Impacts

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

Table 8 shows some higher education indicators at the provincial level. Improvement is seen in the quantitative indicators such as higher education enrollment rate that were planned at appraisal. As the targeted universities of this project are all top ranked among regular HEIs of the province in terms of size and other criteria¹⁹, it can be said that they have lead such improvement.

Table 8: Higher education indicators of Heilongjiang Province

| | Actual 2002 | Planned 2007 | Actual 2007 | Actual 2012 |
|--|----------------------|------------------|----------------------|----------------------|
| Number of regular HEIs | 48 | 58 | 68 | 79 |
| Number of students enrolled in regular HEIs | 443,000 | 542,000 | 635,000 | 705,000 |
| Enrollment rate in HEIs | 15.3% | 17% | 26.8% | 38.8% |
| School building area per student (average of targeted universities) (m ² /person) | 36.79 m ² | 8 m ² | 32.70 m ² | 25.13 m ² |

Sources: Prepared based on JICA internal documents, responses to the questionnaire from the executing agency, provincial statistics, etc.

(2) Contribution to regional vitalization, market economy reform support, and environmental conservation

Regarding the three development issues intended at appraisal, namely, (i) regional vitalization, (ii) market economy reform support and (iii) environmental conservation, sufficient quantitative data to show the overall trend could not be collected for ex-post evaluation. Also, as large-scale universities tend to simultaneously implement a number of development projects, which made it difficult to see the impact of this project. Nevertheless, at least certain cases of contribution of this project were observed in all targeted universities, including the ones that the facilities and equipment were used for research that would benefit the development and environment of the province and the concerned cities, and that teachers who were trained in Japan were playing important roles in the educational aspect (i.e. through development of good graduates) and the research aspect (through university-industry collaboration and social services). Many cases are reported particularly in the area of environment.

(i) Regional vitalization

First, regarding how the project provided human resources to the province's key industry (information technology, biotechnology, automobile, petrochemical industry and pharmacy), the

¹⁹ For example, the total number of students of the nine targeted universities accounted for 34% of the total number students of all of the 79 regular HEIs in the province (data are all as of 2012). Also, according to "China Colleges and Universities Rankings 2012" of the Chinese Universities Alumni Association, all targeted universities were ranked between the 3rd to the 13th places in Heilongjiang Province (the first and second places were taken by Harbin Institute of Technology and Harbin Engineering University, both state-run and outside the scope of this project).

targeted universities did not have precise data on employment status of graduates. Therefore, the number of graduates who majored in those fields was evaluated instead. From the available data the number of such graduates (ranging between 100 and 2,000 persons depending on university) showed an increasing trend. In this relation, targeted universities also commented that a certain portion of the graduates are employed in the concerned industry, and this project contributes to regional vitalization indirectly through improvement of graduates' practical skills. For example, a teacher of Heilongjiang Institute of Technology conducted research on hybrid engine and made observation visits to relevant vehicle manufacturers during his training in Japan. He continued his research after returning to China, and published research papers and a book on the structural principles and maintenance of hybrid engine vehicles. He also said that the practical skills of students improved by using the equipment for electro mechanical experiments procured by the project. More than 80% of a total of 520 graduates from the School of Automobile and Traffic Engineering are employed in the automobile industry.

Utilization of the outputs of this project in vocational education and adult education was observed only at two target universities. For example, Harbin University of Commerce named examples of the use of the multimedia systems, accounting systems and information systems developed under this project.

As to the project's contribution through dispatch of teachers and doctors to rural areas, only Harbin Medical University said that it dispatched around 1,000 doctors every year. All other universities seldom dispatched human resources to rural areas, and including Harbin Medical University, particular connection with this project was not observed.

(ii) Market economy reform support

The number of graduates in the related fields (i.e. economics, law, accounting, finance, etc.) is generally increasing (ranging between less than 100 and 1,000 persons depending on university). Five universities acknowledged the indirect contribution of this project, mainly instruction by teachers who were trained in Japan, to provision of human resources with higher practical skills. Also, there were cases of contribution of some facilities/equipment and teachers through social services and university-industry collaboration. For example, a teacher of the College of Law of Heilongjiang University learned about Japan's Bills of Exchange and Promissory Notes Act during his training in Japan under this project, and expanded what he had learned in Japan in the late 1990s. After returning from Japan, he became known as a leading expert in laws of bills of exchange in China. Sponsored by the China Law Society, he led and completed the drafting of the part related to laws of bills of exchange in the draft bill to revise the Commercial Law of China. According to him, the draft bill was about to be put to the state legislation process. He also said that the training in Japan under this project led the College to start an annual conference on civil and commercial laws of China with a Japanese law association.

(iii) Environmental conservation

The number of graduates in the environment-related fields is increasing (ranging between less than 100 and 1,000 persons depending on university). Most of the targeted universities acknowledged indirect contribution of this project to environmental conservation through providing graduates with higher practical skills. At the same time, those universities all reported concrete cases where research outcomes, university-industry collaboration and social services using the procured equipment and the ideas or methods that teachers learned in Japan contributed to environmental measures. For example, a teacher of Northeast Agricultural University used part of the agricultural mechanical techniques that he had learned in the training in Japan when he participated in a project to improve wind generation motor technology in Shangzhi County. According to him, the improved machinery has already been produced and distributed. As another example, Jiamusi University uses part of the project equipment in water quality monitoring of the Songhua River that is commissioned by the government of Jiamusi City.

3.3.2 Other Impacts

(1) Impacts on the natural environment

No negative impacts were observed. By the time of the appraisal, 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 the 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. During the project implementation period as well as after project completion, each school said that it has been taking necessary measures of exhaustion, water discharge and noise control and that it implemented environmental monitoring as planned.

(2) Land acquisition and resettlement

As planned in the appraisal, there was no land acquisition and resettlement associated with this project.

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

Impacts of the project on strengthening of exchanges with universities in Japan were observed. In some cases new relationships were built with universities in Japan, and in other cases the existing relationships were strengthened after the project. While there were a few cases where the exchanges were developed to university-level cooperation (e.g. Heilongjiang University and Kochi University of Technology), most of the exchanges seemed to be at the teacher (individual) or faculty levels, including invitation of teachers from Japan for lectures, sending students to Japan for study and joint research.

The outcomes of individual cases of exchange are described in Table 7. 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 gained a better understanding of Japan.

This project has mostly achieved its objectives, therefore its effectiveness and impact 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 3). The “hardware” outputs were mostly produced as planned while there were a few additional building construction, cancellation of some education and research equipment (due to reasons such as discontinuation following the delay in project implementation), and small changes in the specifications and location of some other equipment.

As for the “software” outputs, the total number of teachers sent to Japan for training was below the planned number, while some universities sent more teachers than planned to respond to demands. The main reasons for such an overall decrease include difficulties in securing the host universities with the areas of research that matched the teachers' (trainees') research areas, difficulties to send internally-appointed teachers (trainees) after the postponement of the training schedule due to project implementation delays, and reallocation of the project funds from training to procurement of equipment. Some invitation of experts from Japan were cancelled, because sending Chinese teachers to Japan were given higher priority. Unlike Inland Higher Education Projects (ODA loan projects) in other provinces, this project sent only a small number of personnel to the university management course. According to the provincial Education Bureau, this was because overseas training of government officials were restricted at the time this project was being implemented.

During the project implementation period, the provincial Education Bureau organized various training courses for personnel of the targeted universities in charge of implementation of this project. The subjects included procurement, project management, accounting, intellectual property rights, etc. The Education Bureau also organized study tours to Inland Higher Education Projects in other provinces in order to upgrade those personnel's project management skills: on a visit to Chongqing Municipality, participants received guidance from the Municipal Education Commission (the executing agency), and on visits to other provinces, they made

observations of the universities targeted in those provinces such as Jilin University.



Laboratory Building

(Jiamusi University)



Part of this building was constructed as an additional output of this project. A common laboratory (equipment sharing platform) was established there.

(Harbin Normal University)



The project-related documents that are still well managed.

(Northeast Agricultural University)

3.4.2 Project Inputs

3.4.2.1 Project Cost

As shown in the table below, the total project cost was 8,801 million yen (of which the Japanese ODA loan was 4,733 million yen), which was within the plan (ratio against the plan: 92%).

Table 9: 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 | 3,418 | 3,418 | 0 | 3,490 | 3,490 |
| 2. Equipment | 4,409 | 1,047 | 5,456 | 4,568 | 577 | 5,145 |
| 3. Training | 231 | 0 | 231 | 160 | 0 | 160 |
| 4. Price contingency | 95 | 1 | 96 | 0 | 0 | 0 |
| 5. Physical contingency | 237 | 169 | 406 | 0 | 0 | 0 |
| Total | 4,972 | 4,635 | 9,607 | 4,729 | 4,067 | 8,796 |

Sources: JICA internal documents, responses to the questionnaire from the executing agency.

Notes: As the actual amount in the table does not include the disbursement charges, the total amount is different from the amount mentioned in the main text. Also, due to rounding down of the fractions smaller than 1 million yen, the breakdown and total amounts may not match. The exchange rates applied were: (planned) 1 yuan=14.3 yen; (actual) 1 yuan=13.8 yen.

3.4.2.2 Project Period

As shown in Table 10, the actual project period was 90 months, which was longer than the planned 61 months (ratio against the plan: 148%). The major reason reported by the provincial Education Bureau was that the procurement process was complicating and thus took a longer time than planned. On the other hand, the Education Bureau learned from Inland Higher Education Projects in preceding provinces and switched the procurement packaging from procurement by type of equipment to procurement by university in midstream in order to

minimize the effect of the delays to each university. Also, it tried to avoid effects of frequent personnel turnovers by strictly controlling documentation and handing over tasks to the succeeding staff. Such efforts of project management by the executing agency are worth noting..

Table 10: Planned and actual project periods

| | Plan (appraisal) | Actual |
|--|-------------------------|--|
| Signing on Loan Agreement | March 2004 | March 2004 |
| Building construction | June 2004 | May 2010 (The originally-planned portion was completed in the planned period) |
| Procurement of equipment | March 2007 | August 2011 |
| Training | March 2009 | August 2011 |
| Project completion (lengths of months) | March 2009 (61 months) | August 2011 (90 months) |

Sources: JICA internal documents, responses to the questionnaire from the executing agency.

3.4.3 Results of Calculations of Internal Rates of Return (Reference only)

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 appraisal, the facilities and equipment developed under this project are operated and maintained by each targeted university, and the Education Bureau of Heilongjiang 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. The division of responsibilities among related organizations is clear, and 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. At all targeted universities, the manuals and precautions are posted near individual instruments for easy reference. Also, it was reported that teachers in charge of sensitive equipment receive technical training regularly from the manufacturers.

3.5.3 Financial Aspects of Operation and Maintenance

The targeted universities are all overseen by the provincial government. Their budgets consist of subsidies from the state or province and own income such as tuitions and fees. Although the financial data were only partially available, the budgets of the province and individual universities are generally stable or in an increasing trend, and revenues and expenses are well-balanced at each university (Tables 11 and 12). Based on the interviews, it can be said that the necessary budget for operation and maintenance is ensured in the university budget²⁰. None of the main facilities and equipment developed under this project were found unused due to lack of budget for operations and repairs.

Table 11: Financial expenditure of Heilongjiang Province

Unit: billion yuan

| | 2010 | 2011 | 2012 |
|--|-------|-------|-------|
| Total expenditure | 254.1 | 339.8 | 369.6 |
| % of increase of expenditures in the education sector over the previous year | 12.2% | 25.0% | 45.7% |

Source: Prepared based on statistics from provincial Education Bureau.

Table 12: Revenues, expenditures and operation and maintenance (O&M) expenses of the targeted universities

Unit: thousand yuan

| | 2010 | | 2011 | | 2012 | |
|---|--------------|---------|--------------|---------|--------------|---------|
| Heilongjiang University | Income | 611,487 | Income | 822,881 | Income | 855,389 |
| | Expenditure | 611,929 | Expenditure | 857,702 | Expenditure | 877,682 |
| | of which O&M | 2,150 | of which O&M | 2,210 | of which O&M | 2,250 |
| Harbin University of Commerce | Income | 416,758 | Income | 754,955 | Income | 592,250 |
| | Expenditure | 362,858 | Expenditure | 724,476 | Expenditure | 496,352 |
| | of which O&M | 1,845 | of which O&M | 2,254 | of which O&M | 2,668 |
| Harbin University of Science and Technology | Income | 282,830 | Income | 470,800 | Income | 370,590 |
| | Expenditure | 282,830 | Expenditure | 470,800 | Expenditure | 370,590 |
| | of which O&M | 2,470 | of which O&M | 2,520 | of which O&M | 2,850 |
| Northeast Agricultural University | Income | 409,210 | Income | 634,530 | Income | 681,870 |
| | Expenditure | 422,290 | Expenditure | 495,960 | Expenditure | 759,020 |
| | of which O&M | 9,030 | of which O&M | 13,850 | of which O&M | 5,840 |

²⁰ Although the data were not available, all universities said that they use income from testing services and other services using equipment for maintenance of the equipment.

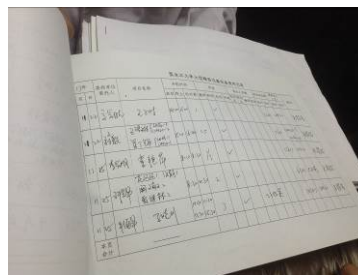
| | 2010 | | 2011 | | 2012 | |
|--------------------------------------|--------------|---------|--------------|-----------|--------------|---------|
| Harbin Normal University | Income | 746,628 | Income | 1,133,466 | Income | 822,833 |
| | Expenditure | 746,628 | Expenditure | 1,133,466 | Expenditure | 822,833 |
| | of which O&M | 1,968 | of which O&M | 2,709 | of which O&M | 3,671 |
| Jiamusi University | Income | 438,255 | Income | 552,889 | Income | 576,012 |
| | Expenditure | 438,255 | Expenditure | 559,563 | Expenditure | 575,663 |
| | of which O&M | 15,960 | of which O&M | 24,609 | of which O&M | 45,855 |
| Heilongjiang Institute of Technology | Income | 254,121 | Income | 321,677 | Income | 314,149 |
| | Expenditure | 254,121 | Expenditure | 321,677 | Expenditure | 314,149 |
| | of which O&M | 266 | of which O&M | 230 | of which O&M | 479 |
| Qiqihar University | Income | 391,696 | Income | 495,734 | Income | 493,286 |
| | Expenditure | 346,581 | Expenditure | 495,618 | Expenditure | 493,286 |
| | of which O&M | 431 | of which O&M | 534 | of which O&M | 813 |

Source: Responses to the questionnaire from target universities.

Note: The O&M expenditures of Jiamusi University are one digit larger than other universities. It was explained that the amounts included personnel costs and were double checked.

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. A few pieces of equipment were out of order. While most of them were under repair, a very small part of them such as the confocal laser scanning microscope of Jiamusi University had no prospect for repair as the manufacturers had not responded to the inquiries from the universities. All universities said that there is no problem in purchase and stock of spare parts that are produced.



Log book for large laboratory instruments.
(Heilongjiang University)

No major problems have been observed in the institutional, technical and financial aspects of the operation and maintenance system. Therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed to improve teaching and research at nine major universities in Heilongjiang 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 Heilongjiang 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 environmental conservation. Efficiency of the project was evaluated to be fair on the whole: although the project cost was within the plan, the project period exceeded the planned period due to delays in procurement. 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

- (1) 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.
- (2) The Education Bureau and the targeted universities that have unusable equipment (e.g. a microscope not fully functioning) are recommended to solve the problems as soon as possible (e.g. purchase of necessary parts).

4.2.2 Recommendations to JICA

The higher education human resources who were developed by this project and who have gained a good understanding of Japan (i.e. teachers of the targeted universities) should be regarded as resource persons for future cooperation projects with China. Therefore, information on those human resources should be maintained. Utilization of the (Inland) Higher Education Projects web site, which is currently operated for the provinces where the Projects are still being implemented, could be considered. Possible ways to utilize the website for the provinces where the (Inland) Higher Education Projects have been completed could include updating of the information on, and encouraging posting from, those “completed” provinces.

4.3 Lessons Learned

(1) Minimizing effects of delays in procurement of equipment

At some of the targeted universities, the utilization rate of equipment was slightly decreasing due to the obsolescence of some equipment following the delay in the procurement process. Future projects should select a procurement method and type of contract that can flexibly respond to such situations (i.e. where procurement is delayed and it turns out that the initially-planned equipment can no longer fulfill the education and research needs at the time of arrival). If such flexible procurement and contract is not possible, selecting equipment which are least vulnerable to procurement delays (e.g. avoiding short-lived PCs) should be considered.

Also, procurement packaging by university, which minimized the effects of delays to each university in this project, could be considered in similar projects as well in relation to procurement costs.

(2) Avoiding lack of parts upon arrival of equipment

In this project, some equipment lacked necessary parts when they were delivered, and thus were not fully usable. The executing agency made a detailed investigation and found that there were defects on the sides of the manufacturers and suppliers. In addition, however, it was explained that in some cases, the teachers who had prepared the procurement list for the concerned equipment had not clearly listed all necessary parts because those parts were assumed to come with the main equipment. In other cases, all parts had not been fully checked upon arrival of the equipment, and it was too late to complain when the deficiency was found. Such cases are only a very small part of the whole, but the practice should be improved in future projects: it is important to clearly mention all accessories and parts in the procurement list and to fully check them when receiving the equipment.

(3) Making achievements in short-term teachers' training

In order to raise efficiency of short-term training such as half a year, the applicant teachers should prepare clear research plans in advance and show them to the host universities. Also, in order to produce large impacts, JICA could possibly prepare a system to support re-visits by ex-trainees to Japan and visits by Japanese advisors to China (e.g. approach the host universities in Japan and provide information and opportunities, etc.).

End

Comparison of the Original and Actual Scope of the Project

| Item | Original | Actual |
|---|---|---|
| <p>1. Project Outputs</p> <p>(a) Hardware</p> <p>i) Building construction</p> <p>ii) Procurement of educational equipment</p> <p>(b) Software Teachers' training in Japan or acceptance of experts from Japan</p> | <p>Target: 9 universities in Heilongjiang Province</p> <p>10 buildings such as experimental building for 6 universities; total floor area of 129,000m²</p> <p>Chemistry, material science, environmental science, basic medicine, public health, pharmacy, mechanical engineering, electric engineering, automobile engineering, language, economic management, etc.</p> <p>Total 179 persons (including 4 experts from Japan)</p> | <p>Target: same as planned</p> <p>Completed: 11 buildings such as experiment building for 7 universities (a university additionally constructed a part of a building, but no data on floor area of that portion was available); total floor area of 130,333m²</p> <p>Areas of education: same as planned Total 833 items 4,917 pieces</p> <p>Total 140 persons sent to 50 Japanese universities or institutions (experts from Japan: none)</p> |
| <p>2. Project Period</p> | <p>March 2004 – March 2009 (61 months)</p> | <p>March 2004 – August 2011 (90 months)</p> |
| <p>3. Project Cost</p> <p>Amount paid in Foreign currency</p> <p>Amount paid in Local currency</p> <p>Total</p> <p>Japanese ODA loan portion</p> <p>Exchange rate</p> | <p>4,972 million yen</p> <p>3,635 million yen (254 million yuan)</p> <p>9,607 million yen</p> <p>4,699 million yen</p> <p>1 yuan = 14.3 yen (As of July 2003)</p> | <p>4,733 million yen</p> <p>4,068 million yen (295 million yuan)</p> <p>8,801 million yen</p> <p>4,556 million yen</p> <p>1 yuan=13.8yen (average during 2004-2011)</p> |