Republic of Turkey

Ex-Post Evaluation of Japanese Technical Cooperation Project
"Project on Strengthening the Program of
Expanding Industrial Automation Technologies Departments"

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0. Summary

This project was implemented in order to contribute to developing human resources with skills of Industrial Automation Technologies (IAT) by strengthening capacities of the Teachers' Training Center (TTC) for IAT relative departments, and by expanding IAT education to 20 technical and industrial vocational high schools (hereinafter referred to as expansion schools) in Turkey. This project is consistent with the development policy and development needs of Turkey, and with Japanese aid policy. Therefore, the relevance of the project is high. As a result of the project, TTC trainers' capacity to formulate training plans and implement training courses was strengthened; however, the project purpose was achieved partially, because a system for monitoring, evaluation and feedback was not able to be established. Therefore, although IAT teachers, who completed TTC training, are able to utilize their knowledge learnt from training and practice IAT education in expansion schools, effectiveness and impact of the project is fair.

The project period was as planned; however, because the cost slightly exceeded that planned, efficiency of the project is fair. As the accreditation system of IAT teachers changed, the training courses established by the project were not being implemented at the time of the ex-post evaluation; however, it is likely that the curriculum and textbooks developed by the project and TTC trainers' knowledge will be continually utilized in the short-term teacher training courses for IAT teachers who are accredited at expansion schools under the changed accreditation system. As the TTC trainers have a high level of technical skill, there are sufficient skilled TTC trainers for the short-term training courses and necessary budget has been allocated for the training, it is expected that outcomes of the project are sustainable to some extent. Therefore sustainability of the project is fair.

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

1. Project Description

Project Location

Teachers' Training Center (TTC)

1.1 Background

In Turkey, since the 1990s, as rapid expansion of manufacturing industry, the quantitative and qualitative increase of production technicians, particularly mid-level technicians, became rapidly needed. Above all, training needs of mid-level technicians with skills of IAT[1] which support the growth of manufacturing industry was increased. Therefore, the Turkish Ministry of National Education (MoNE) implemented a technical cooperation project, "The Project on Establishment of Industrial Automation Technologies Departments in Anatolian Technical High Schools" from 2001 to 2006 with Japanese assistance, in order to develop human resources which have IAT techniques. In this project, IAT departments were established in Izmir Technical and Industrial Vocational High School (hereinafter referred to as Izmir high school) and Konya Technical and Industrial Vocational High School, both of which are Anatolian technical and industrial vocational high schools[2].

With the outcome of this previous project, MoNE newly established IAT departments in 20 Anatolian technical and industrial vocational high schools in Turkey. Furthermore, as there is necessity to train the teachers who instruct IAT techniques in expansion schools, TTC was established and started training for IAT teachers in 2006. As the need of development of a training implementation system for the teacher training arose, the Turkish government requested the Japanese government for technical cooperation, and it was decided to implement the project.

1.2 Project Outline

Overall Goal		Vocational education and training (VET) for IAT at the expansion schools is practiced effectively.
Project Purpose		Teacher training system of the TTC is established.
Output(s)	Output 1	TTC's planning capacity of teacher training program is strengthened.
	Output 2	TTC's implementation capacity of teacher training courses is strengthened.
	Output 3	TTC's evaluation capacity for teacher training is strengthened.
	Output 4	TTC's planning capacity of long term organizational strategy is strengthened.
Inputs		【Japanese Side】 1. Experts: 23 (101 M/M) 2. Trainees received: 5 for counterpart training in Japan） 3. Equipment: 13.5 million yen 4. Local Cost: 22.23 million yen 【Turkish Side】 1. Counterparts: 15 2. Equipment: Approximately 58 million yen (Provision of equipment to TTC) 3. Land &Facilities: Training facilities and Project Office 4. Local cost: Daily allowance and accommodation fee for training participants from expansion schools, training textbooks, training

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[1] IAT are a variety of technologies for operating and handling of machinery and manufacturing facilities automatically, and are used in the fields of robotics, factories manufacturing automobiles, aircraft and chemical factories, etc.
[2] It is a secondary education institution for four years, and there are 134 institutions in the whole country.

	materials, and electricity/water/communication costs of training facilities
Total cost	Approximately 38.5 million yen
Period of Cooperation	August 2007 – September 2010
Implementing Agency	Ministry of National Education
Cooperation Agency in Japan	PADECO Co., Ltd. / Institute of National College of Technology
Related Projects	【Technical Cooperation】 "The Project on Establishment of Industrial Automation Technologies Departments in Anatolian Technical High Schools" (2001 – 2006) "The Project on Industrial Automation Technology Extension Project for Central Asian and Middle East Countries" (IATE, 2012-2015)

1.3 Outline of the Terminal Evaluation

  1.3.1 Achievement of Project Purpose at the time of the Terminal Evaluation

Considering the degree of achievement of indicators and the degree of achievement of each outcome, it was judged that the Project Purpose was achieved to a considerable degree and it could be fully achieved by the termination of the project, if the quality of training courses and the value of indicators were improved.

  1.3.2 Achievement of Overall Goal at the time of the Terminal Evaluation

  The terminal evaluation report stated that positive signs for the achievement of the Overall Goal had been observed. The reasons for the statement were that all companies assessed the intern students of Izmir high school as very good or good in the evaluation of intern students; as well as that more than 90% of the internship companies evaluated the interns of expansion schools as good or very good as the result of similar research in five expansion schools.

  1.3.3 Recommendations at the time of the Terminal Evaluation

  (1) To be expected by the end of the project
  ● Promotion of expansion school teachers' understanding of TTC's teacher training
  ● Strengthening of the monitoring and feedback system on TTC's teacher training
  (2) To be expected within and after the project
  ● Strengthening of sustainability in terms of TTC's activity and budget
  ● Authorization of TTC trainers' status
  ● Planning and implementation of a new training course on teaching methods
  (3) To be expected after the project
  ● Establishment of a training system for mechatronics department graduates in university
  ● Expansion of TTC's IAT education to neighboring countries
  ● Expansion of TTC's established teachers' training system to other departments in Turkey

2. Outline of the Evaluation Study

2.1 External Evaluator

Mitsuko Nakamura, Kokusai Kogyo Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: September 2013 - October 2014

Duration of the Field Study: December 1 - 20, 2013, February 10 - 19, 2014

3. Results of the Evaluation (Overall Rating: C[3])

3.1 Relevance (Rating: ③[4])

3.1.1 Relevance to the Development Plan of Turkey

From the time of commencement to completion of the project, promotion of employment; effective human resource development according to the needs of industry; and implementation of effective teacher training were focused on in Turkey's development policy, namely the Ninth Development Plan (2007 – 2013). At the time of completion of the project, the Medium Term Program (2010 – 2012) for achieving the Ninth Development Plan was formulated, and it emphasized the significance of improving quality and quantity of technical education and training. Since the Project Purpose is the establishment of teachers' training system for effective human resource development and improvement of quality of teachers' training, the project is consistent with the development policy.

3.1.2 Relevance to the Development Needs of Turkey

According to the result of Labor Market Skill Needs Survey by the Small and Medium Industry Development Organization (KOSGEB) conducted at the time of planning of the project (October 2005), the market demand for new IAT technicians in seventeen provinces for a next few years was estimated to be about 30,000. Although the statistics related to the market demand for IAT technicians at the time of completion of the project was not available, judging from job offers of IAT technicians, which amounted to approximately 100,000 in the whole of Turkey at the time of ex-post evaluation,[5] it is possible to presume that the needs of human resources with IAT techniques was high from the time of project planning, project completion, and through to the ex-post evaluation. This project aimed at meeting these needs of Turkey.

Furthermore, it was estimated that approximately 300 IAT teachers need to be placed to the newly established department of expansion schools, and new employment and transferring of teachers from other departments were planned. Therefore, TTC already started teachers' training of IAT teachers; however, there were many issues on management and contents regarding the training[6]. In addition, even though 75 teachers were already placed to expansion

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[3] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[4] ③: High, ② Fair, ① Low
[5] The result of Turkish Employment Agency (İŞKUR)
[6] There were issues about operation of the training such as insufficient orientation and long training period, as well as about contents and methodologies of the training such as overlapping training subjects, lack of consideration on trainees' specialties, and poor preparation of training texts and equipment.

schools at the time of commencement of the project, only half of the teachers participated in TTC's training. In this way, IAT teachers' training did not catch up with its quantity and quality; therefore, training of IAT teachers was an urgent need of Turkey.

3.1.3 Relevance to Japan's ODA Policy

According to the Japan's ODA Data by Country of the Ministry of Foreign Affairs of Japan, human resource development for social economic development was a priority area in Japan's ODA policy toward Turkey, from the time of planning to completion of the project. In JICA's Country Action Plan (2006) at the time of commencement of the project, as well as in the Country Assistance Strategy for Turkey (2012) although after the completion of the project, education matched with needs of the industry and human resource development were priority tasks. Therefore, the implementation of the project is consistent with Japan's ODA policy.

3.1.4 Appropriateness of Planning and Approach of the Project

The project was commenced in a state that policy on accreditation system of IAT teachers had not yet been secured.[7] For this reason, as mentioned later[8], and because the policy was secured during the implementation of the project, it meant that it was no longer necessary to continue the training developed by the project, namely "IAT teachers' training". Therefore, commencing the project without collecting sufficient information and planning of countermeasures related to the policy on accreditation system was an issue from the aspect of the project approach.

However, as mentioned later in the section of Sustainability, a principle, which is that some part of training courses for "IAT teachers' training" would be continuously utilized as "short-term training" for the accredited IAT teachers in expansion schools, has been already apparent, and eventually it is likely that the teachers' training, with a changed format of skills development for teachers, will contribute to the Project Purpose, namely "vocational education and training for IAT at the expansion schools is practiced effectively." Therefore, it is concluded that the issue of the project approach is not an issue of significance as to affect the relevance of the project at the time of the ex-post evaluation.

In light of the above, 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 Effectiveness and Impact[9] (Rating: ②)

3.2.1 Effectiveness

Project Purpose is to establish a training system for IAT teachers in TTC. Especially in order to implement training courses effectively and efficiently, it aimed at enabling TTC to

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[7] There was a background for this, for example, new teachers and other departments' teachers who participated in TTC's training were already accredited and engaged as IAT teachers. In the IAT field, no teachers graduated from the university course which was supposed to train new teachers, until 2009.

[8] See 3.4.1 Related Policy towards the Project in the section of 3.4 Sustainability.

[9] Sub-rating for Effectiveness is to be put with consideration of Impact.

rotate a training cycle based on a Plan-Do-Check-Act (PDCA) approach (Figure 1), whereby the training courses are planned, done, checked, then action is taken to improve the course; moreover this approach is to be undertaken autonomously by TTC[10].

In the project, TTC's capacity development on planning, implementation and evaluation of the training, all of which are necessary to establish the training system, was identified as Outputs of the project. In addition, by improving the TTC's function of making long-term operational plan and eventually strengthening the TTC's training management system, it was expected that TTC would contribute to effectively practice the IAT education at expansion schools in a sustainable manner.
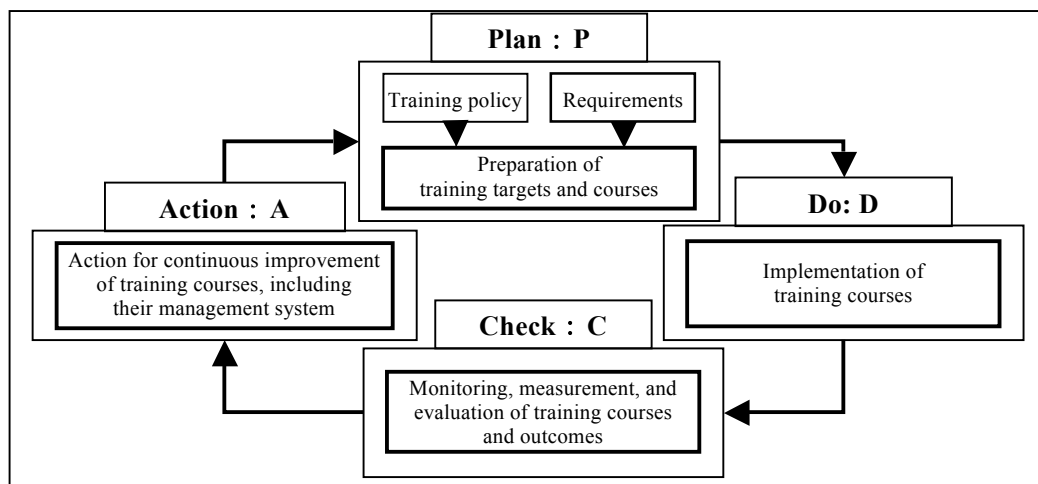
Source: Illustrated by the external evaluator based on the documents provided by JICA
Figure 1: Training cycle based on PDCA approach which the project aims to establish

3.2.1.1   Project Output
(1) Output 1: TTC's planning capacity of teacher training program is strengthened.

Output 1 aimed at enabling TTC to strengthen its planning capacity of teacher training program through developing and modifying the curriculum in the project. The degrees of achievement of each indicator at the time of ex-post evaluation are summarized in Table 1.

Table 1: The degree of achievement of indicators related to Output 1

Indicators	Evaluation	Reason for Evaluation
Indicator 1-1 : Curriculum development scheme is clarified.	Achieved	Process of curriculum development and reasons for revisions were indicated in the finalized curriculum; therefore, processes of development and revision are clear.

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[10] According to the documents provided by JICA, establishment of the training cycle based on PDCA approach and capacity building for establishment of the system were shown as an implementation policy of the project. In the mid-term review report, a perspective of capacity building based on the training cycle is clearly indicated, and also in the terminal evaluation report there are statements such as the project aims for establishment of the training cycle and how far the training cycle is functioning. Furthermore in the Teacher Training Manual developed by the project, it is also indicated that TTC improves the training cycle and activities continuously by introducing a PDCA approach.

Indicator 1-2 : Curriculum of teacher training is developed along with the above mentioned scheme.[11]	Mostly Achieved	Curriculum for main five teacher trainings (Basic level 1 & 2 for Grade 10 & 11. Advanced level 1 & 2 for Grade 12, Summer Course) were developed.
Indicator 1-3 : The developed curriculum has conformity with the framework curriculum for IAT department authorized by Ministry of National Education.	Achieved	Curriculum was developed by collating to the framework curriculum for IAT accredited by MoNE. As a result of comparison, most modules of training curriculum are the same as those of the framework; therefore, consistency of both curriculums was confirmed.

Indicators of Output 1 are appropriate to verify the degree of achievement of strengthening TTC's planning capacity of teacher training program at organizational level; however, they are slightly insufficient to verify that of strengthening TTC trainers' planning capacity. Therefore, in the ex-post evaluation, it was also verified from the perspective of how much TTC trainers' capacity development was achieved, through inspection of the documents provided by JICA and interviews with experts and counterparts (TTC trainers). As a result, it was confirmed that experts and TTC trainers evaluated TTC trainers' planning capacity were improved through the tasks of curriculum development and revision in a collaborative manner with the experts. In addition, TTC trainers expressed opinions that because they owned the experience of pursuing curriculum development and revision in the project, they could develop the curriculum for the on-going technical cooperation, "Industrial Automation Technology Extension Project for Central Asian and Middle East Countries (IATE)", according to the current situation and needs on IAT education in the target countries. At the time of the ex-post evaluation, it was confirmed that the formats of training plan and training texts were revised according to the needs of the target countries, distributed and used as reference materials in the above IAT project.

In light of the above, it is concluded that Output 1 was almost achieved.

(2) Output 2: TTC's implementation capacity of teacher training courses is strengthened.
Output 2 was intended to strengthen implementation capacity of training courses up to the level of which TTC can carry out courses by themselves, through developing training syllabus and materials. The degrees of achievement of each indicator at the time of the ex-post evaluation are summarized in Table 2.
In order to achieve Output 2, it is important to develop each TTC trainers' capacity of making syllabus and materials and implementing training, but the indicators to verify the

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[11] As indicated in Indicator 1-2, it was planned that the project would determine a procedure of curriculum development in a manual and then conduct development tasks, in the original plan. However, in reality, curriculum development tasks and the procedure recording were done in parallel way. Considering high requirement of urgent curriculum development, adaptation to the methodology was realistic, and there seems to be almost no negative influence on curriculum development by not following the order of procedure and development tasks. Therefore the degree of achievement of this indicator was concluded as "mostly achieved."

development were not identified. Therefore in the ex-post evaluation, it was also verified through the interviews with experts whether TTC trainers' capacity was developed or not. As a result, it was confirmed that syllabus and training materials were developed by working groups formed for each training subject, while receiving technical instruction by lectures and practical training from experts, and TTC trainers mastered the syllabus and contents of training as well as how to use training materials. At the time of completion of the project, it was confirmed that TTC trainers' capacity of implementing training was strengthened up to the level whereby TTC could implement training courses without a problem.

Table 2: The degree of achievement of indicators related to Output 2

Indicators	Evaluation	Reason for Evaluation
Indicator 2-1 : Development procedures and format of syllabi and textbooks for teacher training are clarified.	Mostly Achieved	Development procedure of syllabus and training material in the "Teacher Training Manual" remains in a simple statement; however, the procedure is mostly clear. Format of syllabus and contents of materials are unified and clear.
Indicator 2-2: Each developed training course has completed textbooks.	Achieved	In total, 22 training materials (4 for 10th grade, 8 for 11th grade, and 10 for 12th grade) were developed. The surveys on trainees of teacher training showed that the number of trainees who evaluated the training material for teacher training as "very good/very satisfied" and "good/satisfied" increased from 37.5% before the project (September 2006) to 60~70% at the time of the ex-post evaluation. Therefore, it is presumed that quality of training materials is also not a significant issue.
Indicator 2-3 : TTC trainers are equipped with the knowledge and skills sufficient to give lectures and practices of the designed training courses.	Achieved	According to the class observation[12] conducted by TTC trainers and experts during the project, the average score of four-scale evaluation[13] on 1) plan/evaluation, 2) lecture style, and 3) teaching methods of TTC trainers was 3.7; therefore it is likely to say that they were evaluated between "satisfied expectation" and "beyond expectation"[14]. Furthermore, in the beneficiary survey[15], about 97% of trainees of 10th &11th grade training and about 78% of 12th grade

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[12] Monitoring sheet for class observation is divided into five sections: 1) planning and preparation of lesson/lecture, 2) teaching styles in general, 3) teaching methods, 4) about trainees, and 5) training environment, and each section consists of four sub-sections. Monitoring was carried out mainly by experts.

[13] Four-scale evaluation was: 1) below expectation, 2) progressing to criteria, 3) satisfied criteria, and 4) beyond criteria.

[14] Because training course is implemented by two trainers, the average of all training courses was used instead of each trainer's one.

[15] Beneficiary survey was conducted for IAT teachers at expansion schools who participated in the teacher training after the project started. The survey was carried out by telephone interview using a questionnaire, for 63 teachers selected by random sampling.

		training answered quality of TTC trainers was very satisfied or satisfied.
Indicator 2-4: All the developed training courses are conducted at least once.	Achieved	Before the time of completion of the project, last half of the training for 12th grade was implemented once, and all the training except the above one were implemented twice, by using material newly made for the curriculum developed by the project[16].
Indicator 2-5: Logistics such as selection of participants, course notification to the participants, preparation of materials or equipment for each class etc. are well organized.	Not Achieved	According to the survey at the time of the terminal evaluation, since 59% of trainees indicated that there were issues on logistics for the training, it is probable that logistics for training did not reach the expected level. It is unknown about what kind of faults existed in training logistics due to limited availability of information.

In light of the above, although there are a few issues on logistics for implementing the training, Output 2 was mostly achieved.

(3) Output 3: TTC's evaluation capacity for teacher training is strengthened.

Output 3 was intended to enable TTC trainers to conduct evaluation of teacher training autonomously and to strengthen TTC's evaluation capacity. The degrees of achievement of each indicator at the time of the ex-post evaluation are summarized in Table 3.

Table 3: The degree of achievement of indicators related to Output 3

Indicators	Evaluation	Reason for Evaluation
Indicator 3-1： Procedure and format for evaluation (incl. feedback of the result) are clarified with explicit criteria.	Partially Achieved	Until the time of completion of the project, monitoring and evaluation system, which consist of monitoring by class observation, questionnaires at final class of the training, self-evaluation by trainers, evaluation meeting after the training, follow-up questionnaires 6 months after the training, final evaluation meeting, and feedback to the course curriculum was installed. However, the detailed procedures of each evaluation activity were not written in documents such as teacher training manual and so on.
Indicator 3-2： Evaluation on teacher training courses is conducted 5 times according to the developed	Partially Achieved	Before the installation of the above monitoring and evaluation system, evaluations on teacher training were conducted more than 5 times through class observation, questionnaires at final

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[16] Partly because counterparts were too busy due to their teaching commitments at Izmir high school, training material development for 12th grade students was delayed, and only one training course applying the technical transfer content of the project had been implemented.

procedures and format.		class of the training, and evaluation meeting after the training. However, follow-up questionnaires 6 months after the training was conducted only 2 times[17], and self-evaluation of trainers and final evaluation meeting were not actually conducted.
Indicator 3-3： Procedures and format for monitoring of expansion schools are clarified.	Achieved	Monitoring of expansion schools aimed at understanding expansion school teachers' usage of TTC's training outcomes, issues and requests, reflecting these into future training content and into management of training, and providing TTCs continuous support and advice to IAT departments of expansion schools. In teacher training manual, monitoring procedure and format such as objectives, evaluators, targets, and period regarding monitoring of expansion schools including class observation and implementation of management workshops for IAT departments are clarified.
Indicator 3-4： Monitoring is conducted 20 times at expansion schools according to the developed procedures and format.	Partially Achieved	Until the time of completion of the project, monitoring IAT departments of expansion schools were conducted totally 26 times, and management workshops for IAT departments at expansion schools were held every year, totally 3 times. Although the number of monitoring of expansion schools achieved the target, class observation written in monitoring procedure of indicator 3-3 was not conducted, and identification of issues and requests of IAT teachers, which was supposed to be direct monitoring after the training, was not conducted[18].

Output 3 was also verified from the perspective of how much TTC trainers' capacity development was achieved, through interviews with experts and TTC trainers. As a result, it was confirmed that total evaluation of training was conducted by TTC trainers and experts, based on the result of class observation and questionnaire in the final class of the training, and technical instruction about lecture and teaching method of TTC trainers and amendment of training plan were carried out when there were issues. However, because firstly technical instruction about evaluation was not given to TTC trainers by experts, and secondly TTC

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[17] As a result of interviews with TTC trainers, the reasons for this were listed: response rate of questionnaires was very low; TTC trainers could not secure time to collect and add up the questionnaires; and there were no specific technical instruction regarding efficient design of questionnaire, tabulation or analysis methods, meaning that TTC trainers did not master the skills.

[18] Class observation at expansion schools was never done, due to consideration of the negative influence it might have on student concentration, work pressures of TTC trainers, no authorization for TTC to evaluate classes at expansion schools, and so on. Identification of expansion school teachers' issues and requests was supposed to be done indirectly by follow-up questionnaire 6 months after the training.

trainers were too busy to secure time for monitoring and evaluation autonomously, and thirdly TTC trainers had a feeling of resistance over the evaluating method toward colleagues, experts of the project played a key role in a series of activities from monitoring and evaluation to feedback, with the result that participation of TTC trainers in evaluation activities was limited. Therefore, TTC trainers did not become able to conduct such activities autonomously and TTC trainers themselves also felt that their evaluation capacity of teacher training was not strengthened enough.

In light of the above, it is concluded that Output 3 was partially achieved.

4) Output 4: TTC's planning capacity of long-term organizational strategy is strengthened.

Output 4 intended to clarify the procedure of formulating long-term strategy so as to enable TTC to formulate a long-term strategy. It was also intended not only that the formulated strategy is approved by MoNE but also the roles of TTC are set up in the long-term strategy based on the vision of teacher training; eventually, it was planned to secure sustainability of the outcome of the project by strengthening training management system as an organization. The degree of achievement of each indicator at the time of the ex-post evaluation is summarized in Table 4.

Table 4: The degree of achievement of indicators related to Output 4

Indicators	Evaluation	Reason for Evaluation
Indicator 4-1 : Planning scheme of long term strategy for TTC is clarified.	Partially Achieved	In order to formulate the long-term strategy, a taskforce which consists of TTC trainers, experts, General Directorate of Vocational and Technical Education (GDVTE) of MoNE, and JICA Turkey Office[19], was formed, and TTC's institutional position and functions were discussed. Based on the discussion, the long-term strategy which indicated TTC's operational strategy and future activities were formulated; however, the procedure is not articulated in documents such as teacher training manual and so on.
Indicator 4-2 : Long term strategy is appreciated by Ministry of Education.	Achieved	TTC's long-term strategy was approved in the 4th Joint Coordinating Committee which the director of GDVTE chaired, and it indicated that the strategy was officially approved by MoNE.

As for indicator 4-1, the details of actual activities are as follows. As a preliminary stage of

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[19] JICA Turkey Office participated as an observer.

formulation of long-term strategy, because there were gaps[20] between stakeholders in recognition about TTC's institutional position after completion of the project, at first, a temporary task force was formed and TTC's institutional position and roles were discussed as described in Table 4. As a result, the recognition was made in accordance with stakeholders, that TTC would be managed under the same organizational system even after completion of the project with full time trainer's arrangement and security of budget given priority by MoNE and Izmir high school. When this recognition was agreed upon, JICA made a decision that it was effective to respect MoNE's judgment that it would be difficult to change TTC's organizational system because of the internal situation of MoNE such as replacement of minister and director, and instead, support to formulate the long-term strategy reflecting TTC's current situation and surrounding environment (such as change of accreditation system) as well as needs of industry, so that necessary measures would be clarified in the future. Althoughit became a different result from the original assumption, it became at least able to sustain TTC's management system, which was improved by implementation of the project, after completion of the project. Therefore, it is presumed that the decision was rational.

On the other hand, at the time of formulating the long-term strategy, it was clear that it would no longer be necessary to continue the training courses for teachers at expansion schools due to the change of accreditation system. Thus, the activities reflecting decrease of IAT teacher training tasks, such as implementation of skills development training for the university graduate IAT teachers and accredited by the new accreditation system, short-term training courses as one of in-service training for other department teachers, and short-term training for IAT teachers in both Turkey and neighboring countries, were contained in the long-term strategy, as well as reinforcement of cooperation with industry and reinforcement of functions as a research organization. However, the long-term strategy remains in the agreement of recognition between stakeholders that TTC is able and necessary to play such roles. In other words, the necessity of formulating activity plans and providing personnel and budget based on the plan were mentioned; however, the strategy does not include a concrete action plan or policy towards institutionalization[21]. Therefore, it is thought that there are some issues with the plan in itself, and it was concluded that indicator 4-1 was partially achieved.

In light of the above, Output 4 was partially achieved.

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[20] Since TTC is an affiliate organization of Izmir high school, there were some operational issues; for example, at the beginning of the project, TTC trainers needed to hold their teaching work of school and eventually had excessive duties; and due to the situation that TTC's budget was contained with school budget, it was difficult to separate and secure the operation and administration cost for TTC. Although these issues had been improved by MoNE's approval of full-time assignment of trainers at TTC and expenditure of preferential budget by the principal of Izmir high school, JICA, TTC and experts recognized, at the beginning, the necessity of organizational and institutional changes such as personnel allocation and financial management separating TTC from Izmir high school.

[21] Although action plan was not formulated, according to JICA internal materials, MoNE at that time showed intention that the matters decided in the long-term strategy would be realized after the completion of the project, and some of the plan are actually put into practice at the time of ex-post-evaluation.

3.2.1.2   Achievement of Project Purpose

Project Purpose is "Teacher training system of the TTC is established."

Indicator 1 was "More than 90 % of participants assess training courses are practically usable for their lectures and practices for IAT in the questionnaire conducted at the end of the courses." According to the result of questionnaires in the last class of training courses, approximately 83% of trainees on average answered that TTC's training was useful for classes in IAT departments. The target of 90%, however, was not achieved.

Table 5: Evaluation on training by trainees in the last class of training courses

Training Course	Training Period	I think the training is useful.
10th & 11th Grade (Basic level 1)	September 2009	80.4%
10th & 11th Grade (Basic level 2)	November 2009	80.6%
12th Grade (Advance level 1)	March 2010	76.3%
12th Grade (Advance level 2)	April 2010	94.2%
Average	-	82.9%

Source: TTC

Indicator 2 was "Participants complete and are awarded Course Certificate." Out of 141 trainees[22] of IAT teacher training courses implemented during the project period, all of them received a certification of course completion, except one[23].

Indicator 3 was "More than 65 % of participants assess the training courses at TTC are practically usable for their lectures and practices for IAT in the questionnaire 6 months after the training based on their experiences in the classes at school." According to the result of questionnaire 6 months after the training, except one trainee, all the trainees answered that training was actually "very useful" or "useful" for classes at expansion schools. Since the rate of these answers is approximately 98%, the indicator was achieved.

Indicator 4 was "Heads of IAT departments (supervisor of the participants of TTC training) evaluate that the knowledge and skills of the teachers trained by TTC are improved after the training." In the questionnaire related to this indicator, all the IAT department chiefs (18 persons) who answered the questionnaire evaluated the knowledge and skills of the teachers trained by TTC were "very improved" or "improved."   Therefore, the indicator was achieved.

Indicator 5 was "Procedures on management of teacher training course are clarified." Teacher Training Manual was finalized in July 2010. In part of the manual, the items of each task related to operation of teacher training courses, which include objectives, course composition, training period, and numbers of training courses for expansion schools teachers, qualifications of trainers, and selection of trainees, tasks from preparation (e.g. preparing training materials) and implementation to evaluation and feedback of training materials, are comprehensively mentioned with conceptual

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[22]   In the terminal evaluation, trainees were 218; however, it was reconfirmed as 141 in the ex-post evaluation.

[23]   It was unable to obtain any information about why this trainee quit the course, except that the trainee had no choice due to "personal circumstances."

diagram of PDCA approach[24]. However, as mentioned in the section of Output 1, 2 and 3, descriptions about procedures and know-how of each task such as curriculum development, syllabus and material development and evaluation, which were expected in each Output, are not enough and remain in summarized descriptions. Therefore, although the operational procedure (flow) of training management cycle based on PDCA approach which the project aims for became clear, due to lack of the detailed procedure of each task, this indicator is judged as partially achieved.

Indicator 6 was "Teacher training courses are implemented as planned." Implementation status of training is as shown in Table 6. Each training course was implemented based on the annual operation plan in terms of period and numbers, except implementation of training for advance level of 12th grade was delayed due to delay of installation of equipment and preparation of training materials. Therefore, the indicator is mostly achieved.

Table 6: Number and time of implemented teacher training courses

Training Course	Number	Training Starting Time
Teacher for electrics field	1	Jan. 2007
10th & 11th Grade (Basic level 1)	3	Mar. 2008, Oct. 2008, Set. 2009
10th & 11th Grade (Basic level 2)	3	Apr. 2008, Nov. 2008, Nov. 2009
12th Grade (Advance level 1)	3	May. 2008, Mar. 2009, Mar. 2010
12th Grade (Advance level 2)	2	Dec. 2009, Apr. 2010
Summer Seminar	3	June. 2008, Aug. 2009, June. 2010
Winter Seminar	1	Mar. 2010

Source: TTC

As mentioned above, each indicator of the Project Purpose was almost achieved except some indicators; however, these indicators are mainly means to verify the quality and results of training, and they are not sufficient to verify the degree of achievement of "establishment of teachers training system at TTC". "Establishment of teachers training system" in the Project Purpose means the establishment of a system under which TTC can improve training through operating a training management cycle based on PDCA approach autonomously. Considering whether this cycle was functioning or not from this perspective, it was found that training plan was formulated and training courses were implemented by using developed syllabus and materials according to the status of achievement of Output 1 and 2; however, it was found that operation of evaluation and monitoring system of training were not sufficient according to the status of achievement of Output 3. Experts were actually taking main roles to feedback improvements based on monitoring and evaluation activities such as class observation and evaluation meetings, which were barely carried out on the training courses at TTC. From these

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[24] In addition to this, the manual includes descriptions about operational management such as roles and purposes of TTC, organization chart, budgetary approach, human resources, planning of annual training activities, and document control, and also about operation of seminars and activities for teachers other than IAT department and industrial members.

points, it is presumed that due to contribution of the experts training management cycle was operated and eventually it led to increase degree of achievement of each indicator and obtain high evaluation of training courses during implementation time of the project. As for the long-term strategy formulated in Output 4, since there are some issues, for example, that concrete action plan is not contained; its contribution to establishment of teacher training system is concluded as limited.

In light of the above, although the target indicators of the Project Purpose were achieved, TTC did not reach to the level of operating the training management cycle based on PDCA approach in an autonomous manner, as the project aimed, and thus it is difficult to say that "the training system was established". Therefore, it is concluded that the Project Purpose has partially been achieved.

3.2.2 Impact
3.2.2.1 Achievement of Overall Goal
Overall Goal is "Vocational education and training (VET) for IAT at the expansion schools is practiced effectively." First of all, giving an overview of the situation of IAT departments at expansion schools after completion of the project, all expansion schools continue to provide vocational education and training at IAT departments. Although the number of students varies depending on the cities where expansion schools are located, on average 20 to 30 students constantly enter each major course[25] in IAT departments. According to the interviews with MoNE and expansion schools, equipment and laboratories are set up and maintained sufficiently and used for education and training of students. IAT teachers are also assigned sufficiently. As the situations of students of IAT department after the graduation were examined by beneficiary survey[26], it was found that approximately 82%[27] of the graduates entered school of high grade, and the number of graduates who entered IAT related fields was quite large, approximately 80%[28]. Employment rate of the graduates was 15.3 %, approximately 49 % of which found work in IAT related jobs. However, it was unable to grasp whether the project contributed to the above trends of graduates.

Indicator 1 was "More than 90% of students of IAT departments are evaluated by related

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[25] There are two specialties in IAT department: mechatronics mainly on machinery and electricity/electronics subjects, and industrial control mainly on computer and electricity/electronics subjects.

[26] Beneficiary survey was conducted for the graduates of IAT department who registered at expansion schools after the project started. The survey was carried out by telephone interview using questionnaire, for 764 graduates at 13 expansion schools whose contact information were available. Responses from 255 graduates (33%) were gained.

[27] Percentage of entering school of high grade is a percentage of the graduates who entered the school at the time of ex- post evaluation. It includes the students who were employed once after graduation, but entered the school later. The percentage of graduates who entered the school without job hunting after graduation was approximately 68%.

[28] According to the interview with teachers at expansion schools, there is a system that graduates from technical and industrial vocational high school are exempt from entrance examination of specific two-year colleges and able to enter the college; and a tendency is seen that many parents recommend entering the higher school for higher occupational and social status. This could be regarded as a cause of high rate of entering school of high grade.

industries as "very good" or "good" in internship program of the department." By the questionnaire survey[29] at the time of ex-post-evaluation, it was able to obtain the data related to this indicator from 19 expansion schools. The training companies for the students registered from 2009 to 2012 evaluated approximately 93 % of the intern students as " very good" or "good" by five scale evaluation (very good, good, fair, poor, and very poor); therefore the indicator is achieved.

Table 7: Evaluation of students by training companies

	Very good	Good	Fair	Poor	Very poor	No answer	Total
No. of Students	1,666	245	61	29	34	22	2,057
Rate of Students	81.0%	11.9%	3.0%	1.4%	1.7%	1.1%	100%

Source: Expansion schools

Furthermore, in order to verify whether the project contributed to the achievement of the above indicator, the accreditation rate of IAT teachers at expansion schools who finished teacher training courses, the situation about replacement of both trainees who finished teacher training course and trainees who did not participate teacher training course to IAT departments at expansion schools, and the degree of utilization of training output by IAT teachers at expansion schools who were accredited after the teacher training were investigated. The following accounts are the results.

● Accreditation rate of IAT teacher at expansion schools who finished teacher training courses

As mentioned in the section of indicator 2 of Project Purpose, during the project period, 140 teachers finished teacher training courses. As a result of the questionnaire survey for expansion schools at the time of ex-post evaluation, it was confirmed that approximately 88 % of the trainees (120 persons) was accredited as IAT teacher.

● Situation about replacement to IAT departments at expansion schools and experiences of teacher training at TTC

Through the questionnaire survey for expansion schools at the time of the ex-post evaluation, both the status of replacement of IAT teachers and the occupation rate of accredited IAT teachers were analyzed. As a result, out of 120 teachers who were accredited as IAT teacher after the training, approximately 81 % (97 persons) are still working at expansion schools, which occupied 72.4% of all the accredited IAT teachers placed at expansion schools (Figure 8). Other 9 teachers were transferred to other technical and industrial vocational high schools, namely not to expansion schools[30]. Most of the teachers who were accredited as IAT teachers without participating in teacher training courses are those who are accredited under the newly adopted accreditation standard (graduation from the mechatronics and control department of the universities).

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[29] Questionnaire survey was conducted for all expansion schools regarding the number of graduates and teacher replacement. The number of graduates from 2009 to 2013 was in total 3,649 by 16 schools (4 schools did not respond).
[30] Out of 120 teachers who were accredited as IAT teachers, the current status of 14 teachers is not included and is unknown.

Table 8: Accredited IAT teacher and experience of teacher training courses

	Teachers completed training	Teachers without training	Teachers completed special subjects	Total
Number of IAT accredited teachers at expansion schools	97	35	2	134

Source: Expansion schools

● Degree of utilization of training output by IAT teachers at expansion schools who were accredited after the TTC's teacher training

In the beneficiary survey conducted at the time of the ex-post evaluation, the answer that more than 80% of trainees who completed TTC training (teachers at expansion schools) were applying the knowledge and skills "fully" or "partially" in classes for students of expansion schools was provided (Figure 2). As an application example, the most examples were related to training facility such as selection and installation of workshop equipment for students, and others were balance between theory and practice (lecture and exercise) of TTC's teacher training course, and utilization of audio-visual aids and of handouts in classes.
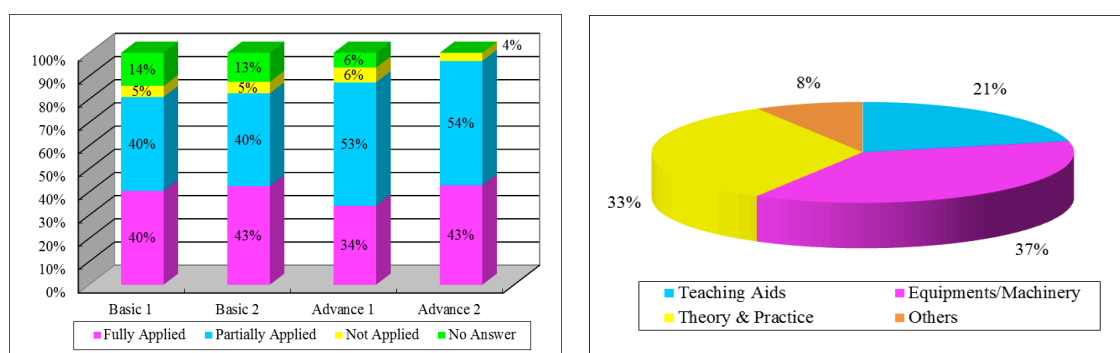
Figure 2: Degree of Application of TTC's Teacher Training

As mentioned above, since the teachers at expansion schools continue working and utilize the knowledge learned by teacher training courses at TTC, it was confirmed that outcome of the project contributed to the practice of IAT education at expansion schools.

3.2.2.2   Other Impacts
(1) Impact on natural environment, resettlement and site acquisition
There is no apparent negative impact on the natural environment caused by the project. Also, the project has not involved any resettlement or site acquisition.

(2) Other indirect effects

1) Third Country Training for Turkey's neighboring countries

During the project period, TTC implemented training for IAT teachers in Azerbaijan two times by utilizing knowledge and experience of planning and implementing teacher training courses for IAT teachers at expansion schools. Furthermore, TTC is currently implementing a technical cooperation, "The Project on Industrial Automation Technology Extension Project for Central Asian and Middle East Countries (IATE)". This is considered to be an impact of the project.

In light of the above, TTC's planning and implementation capacity was strengthened; however, TTC's capacity development related to evaluation and improvement of training was not sufficient. Although the training management cycle based on PDCA approach was functioning thanks to the work of experts, TTC did not reach the level whereby they can rotate the training management cycle autonomously. Therefore, the Project Purpose was judged as partially achieved. As for the Overall Goal, since the IAT teachers who completed TTC's training during the implementation of the project utilize the knowledge gained at the training, practice the IAT education at expansion schools, and expected impact and indirect effects were produced, it has been achieved. Therefore, effectiveness/impact of this project is fair[31].

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

Table 9: Comparison of planned and actual inputs

Inputs	Planned	Actual

(1) Experts	Mainly Short-term experts (no description of M/M)
	1. Chief advisor/
	  Center management
	2. Project coordinator/
	  Training management
	3. PLC
	4. Computer Network
		● 23 for Short-Term (In total approximately 105 M/M)
		1. Chief advisor
		2. Project coordinator/
		  Training management
		3. PLC
		4. Electricity/Electronics
		5. Computer Network
		6. Automatic Control
		7. Factory Automation,
		  Machinery, Control System

(2) Trainees received	No. of received trainees: No description Main fields of training: No description	Training in Japan: 5 Main fields of training: Teacher training for industrial technical education, management of teacher training center
(3) Third-Country Training Programs	No description	No program
(4) Equipment	Office equipment necessary for project implementation, and small	Office equipment for project office and training equipment at

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[31] As background, the overall goal was achieved even though the Project Purpose remained partially achieved , it is presumed that curriculum, syllabus, teaching materials, and training contents developed by the project were high level of performance; effects of the project was high; and there is no necessity to significantly improve these items as the project has just recently been completed. However, it can be said that as a training organization, malfunction of monitoring and feedback system of training will be an issue in future.

	amount of training equipment	TTC
Total Project Cost	Total 340 million yen	Total approx. 386 million yen
Total Local Cost	Total 250 million yen	Total approx. 59 million yen (Provision of equipment to TTC)

3.3.1.1 Elements of Inputs

Because dispatch of experts and acceptance of trainees have no target number, actual numbers and target numbers could not be compared. As for provision of equipment, modification was that the Japanese side procured training equipment for 12th grade in a hurry, in order to avoid having great influence on training plan, since a part of procurement of the equipment, which was supposed to be provided by the Turkey side, was significantly delayed.

3.3.1.2 Project Cost

The total project cost exceeded the original plan by approximately 46 million yen (114% against plan), which means that it exceeded the plan slightly. The main factor for being higher than planned can be considered as the above provision of additional equipment; however, because the planned numbers of dispatch of experts and acceptance of trainees were unknown, accurate analysis was difficult.

3.3.1.3 Period of Cooperation

Period of cooperation in both planned and actual was 37 months from August 2007 to September 2010, and it was just as planned.

In light of the above, although the project period was within the plan, the project cost slightly exceeded the plan. Therefore, efficiency of the project is fair.

3.4 Sustainability (Rating: ②)
3.4.1 Related Policy towards the Project

In the Tenth Development Plan (2014–2017), the national development plan at the time of the ex-post evaluation, training of highly qualified human resources is identified as a priority issue, and improvement of industrial and technical education from a medium to long term perspective, and strengthening of the relationship between educational institutions and industry are regarded as important policies. Also, in the Medium Term Program (2014-2016), training of human resources in accordance with the occupational skills required by the labor market remains important. In light of the above, the policy of Turkey supports sustainability of outcomes produced by the project.

Meanwhile, Board of Education in MoNE decided, at the end of 2009 during implementing the project, to introduce the system which requires qualification of completion of specialized course at university[32] for IAT teachers as same as other department teachers' qualification of accreditation.

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[32] Graduates who completed specialized course of Mechatronics and Control, and Mechatronics Engineer

Given this, teachers of IAT related departments[33] at technical and industrial vocational high schools became unable to be accredited with a condition of completing TTC's training[34], and by this change of accreditation system, the teacher training courses developed by the project were implemented 4 times after completion of the project, and then terminated.

Currently TTC is implementing short-term training as a part of In-Service Training for IAT related department teachers at technical and industrial vocational high schools, which has been implemented in parallel to the project since TTC was established. In the short-term training, curriculum, syllabus and teaching materials developed by the project are being utilized[35]. This training is the one for incumbent teachers provided by the General Directorate of Teacher Training and Development (GDTTD) of MoNE, and the number of training courses has increased since the completion of the project. MoNE is going to carry out the training positively in future.

In addition, according to the interview with expansion schools at the time of ex-post-evaluation, it was confirmed that newly assigned university graduate IAT teachers, who have no job experience in IAT field but are accredited as IAT teachers under the changed accreditation system, need training in order to enable teaching IAT education practically. There is a possibility that TTC can offer the value-added training even for the newly assigned university graduate IAT teachers, by utilizing TTC trainers' knowledge accumulated in the project, curriculum and syllabus of teacher training for IAT teachers. In fact, as mentioned in Output 4, TTC's long-term strategy indicates that teacher training, which premise on training for the newly assigned university graduate IAT teachers, continues. Also, it is in accordance with the positive training policy of MoNE, as mentioned earlier. Therefore, it is highly probable that by utilizing outcome of the project, the activities to pursue the Overall Goal, "to practice vocational education related to IAT at expansion schools" will be continued in future. However, it is possible to say that there are some issues, because, for example, the action plan of this training is not formulated, and neither is the policy for prospective institutionalization clarified. In addition, as mentioned in the footnote of last section of effectiveness/impact, insufficient capacity development on evaluation and improvement within TTC's training management cycle is also a factor that still leaves some issues about sustainability of the Overall Goal.

3.4.2 Institutional Aspects of the Implementing Agency

At the time of the ex-post-evaluation, there is no change about the position that TTC as an affiliate organization of Izmir high school; however, management of training and accommodation facility is currently outsourced for 5 years until 2017. Although deputy principle principal of Izmir high school and leader of TTC trainers were responsible for the management of training and

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Department
[33] Electricity/Electronics, Machinery, and Computer departments
[34] Finally, trainees of TTC training were accredited as IAT teachers without completing or gaining qualifications of specialized courses.
[35] Turkish side identifies even teacher training of the project as part of in-service training. Number of In-Service Training implemented outside the project were 6 in 2006, 12 in 2007, 4 in 2008, 18 in 2009, 12 in 2010, 45 in 2011, 7 in 2012, and 16 in 2013. After 2011, because training period was shortened to about 2 weeks, number of training increased largely. After 2012, because IATE project started, the number of training started to decrease.

accommodation facilities during implementation of the project, by allocating a full-time manger to the facility where the training management system is largely improved.

Out of eight TTC trainers who used to be the counterparts of the project, five trainers are currently assigned to TTC full time, although they are belong to Izmir high school as same as they were during the implementation of the project . Eight trainers were assigned to TTC full time for one year until September 2011, after the project was terminated.   Then after the teacher training was completed, only In-Service Training was implemented. Since the In-Service Training became implemented during school vacation, they were mainly teaching students at the time of when opening IAT department of Izmir high school is opened, and working as trainers only at the time of implementing In-Service Training at TTC. From June 2012, the IATE project mentioned above was started, and five trainers out of them were again assigned to TTC full time. Other two trainers returned to be IAT teachers of Izmir high school and one trainer was transferred to another school.

As explained above, in order to respond to changes in training activity at TTC, letting holding the TTC trainers belong toat Izmir high school as before seems to be a rational judgment.. Furthermore, judging from that MoNE and the principle of Izmir high school are assigning the ex-counterparts who accumulated knowledge of teacher training for IAT teachers in the project to TTC full time under such a circumstance, it could be concluded that the outcome produced by the project are is being utilized continuously. In addition, at the time of the ex-post evaluation, in order that five TTC trainers concentrate on the activities of IATE project, the number of In-Service Training has been decreased. However, the IATE project is planned to be completed in 2015 and after then, they will be able to concentrate on the In-Service Training. Even if the number of In-Service Training increases, it can be considered that they will be able to implement the In-Service Training with the ex-counterparts belonging to Izmir high school (including two trainers who are not assigned full time at present).

3.4.3 Technical Aspects of the Implementing Agency

Training equipment provided by the project is utilized for In-Service Training and IATE project, and they are maintained properly. Moreover, training materials for teacher training developed by the project are also utilized for both trainings. In TTC, the counterparts at the time of implementing the project are assigned and utilizing technology and knowledge transferred by the project by means of working as trainers of IATE project, and as such they are accumulating knowledge and experience. Through the interview with stakeholders and trainers at the time of ex-post evaluation, it was found that with a background of accumulation of knowledge and experience as mentioned above, trainers came to have sufficient skills regarding planning and implementing of teacher training.

Furthermore, as stated in TTC's long-term strategy, it is necessary to improve knowledge and techniques of TTC trainers in accordance with progress of technology in the field of IAT, so that MoNE is planning a brush up training for IAT teachers such as overseas practical training, and a project is applied for within the ministry. Specifically, it is planned that the ministry selects 10 teachers from IAT departments, makes them participate in overseas field work for two months to

train as teacher's trainers, and transfer the technology through In-Service Training after they returned to Turkey. In light of the above, since technical capacity of the counterpart is high at the time of implementing the project and the plan to train teacher's trainers and improve technical capacity exists, it is presumed that sustainability of technical aspect of the implementing agency will be maintained.

3.4.4 Financial Aspects of the Implementing Agency

Trend of budget amount of MoNE as a whole is shown in Figure 3, and actual amount after eliminating inflation also tends to increase.

As TTC is an affiliate facility of Izmir high school, it has no experience of independent appropriation of budget and expenditure. Izmir high school applies for a budget which includes necessary cost based on annual plan of teacher training to MoNE (GDTTD, GDVTE). As appropriation of budget and disbursement (excluding personnel cost) from MoNE are shown in Table 10, disbursement rate of budget is high. The amount of budget and expenditure are different depending on fiscal year; however, this is because the budget is allocated in accordance with number of students enrolled and number of teachers, and necessity of maintenance of facility and equipment. According to the interviews with Izmir high school and 6 expansion schools visited at the time of the ex-post evaluation, responses were given that necessary budget was allocated to the schools from MoNE. For example, in case of Izmir high school, among the cost for TTC's training (both teacher training and short-term training), fuel and light expenses, teaching materials, maintenance of training equipment, and personnel cost of trainers are disbursed by the budget of Izmir high school allocated by MoNE. Transportation cost and allowance for trainees are paid according to the budget of GDTTD. Ordinary budget including fuel and light expenses to manage training equipment and facilities is stable over time. Although it is not included in Table 10, problem is also not found with disbursement of personnel cost. In addition, Izmir high school is taking actions in recent years to secure its own financial resources such as implementing seminars for private companies at TTC, and outsourcing management of TTC's training facility so as to rent the training and accommodation facility to obtain income. For continuing teacher training in future, it is presumed that there are no special financial issues.

(Unit: Million Tsh)

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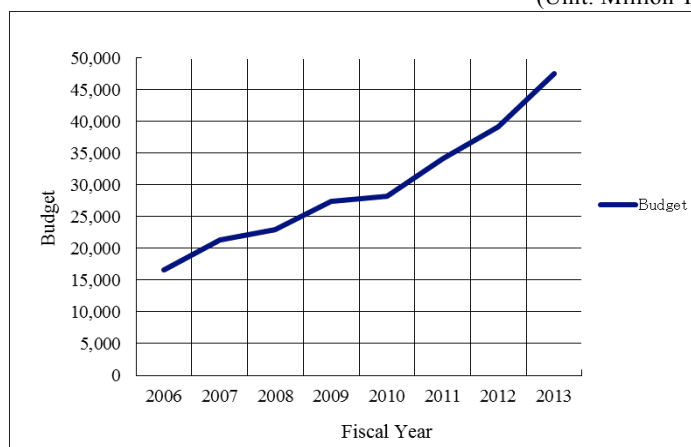
Figure 3: Trend of MoNE's budget

Table 10: Appropriation of budget from MoNE to Izmir high school[36]

		2010	2011	2012	2013
Ordinary Budget (Electricity, fuel, etc.)	Budget	288,260	232,903	299,450	323,800
	Expenditure	288,260	232,895	299,441	236,342
General Budget (Facility repair)	Budget	-	-	-	-
	Expenditure	-	-	49,980	-
Project Budget	Budget	54,482	-	-	-
	Expenditure	54,482	-	-	-
Special Ordinary Budget	Budget	2,000	59,806	131,900	2,100
	Expenditure	1,998	59,805	131,886	0
Special Budget (Machinery/ equipment)	Budget	150,000	-	-	-
	Expenditure	149,948	-	-	-
Total	Budget	494,742	292,709	431,350	325,900
	Expenditure	494,688	292,700	481,307	236,342

Source: MoNE

As for whole budget, expenditure and future budget plan of In-Service Training, including TTC's training for IAT related fields, data was not obtainable because GDVTE does not mainly control them. According to the interview with GDVTE, they plan to implement In-Service Training in IAT related fields continuously in accordance with requests of TTC and teachers in future.

In light of the above, although there is generally no problem in the personnel, technical and financial situation of counterpart organization, some problems have been observed in terms of institutional aspects. Therefore, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented in order to contribute to develop human resources with skills of IAT by strengthening capacities of TTC for IAT relative departments, and by expanding IAT education to 20 expansion schools in Turkey. This project is consistent with the development policy and development needs of Turkey, and with Japanese aid policy. Therefore, the relevance of the project is high. As a result of the project, TTC trainers' capacity to formulate training plans and implement training courses was strengthened; however, the project purpose was achieved partially, because the system for monitoring, evaluation and feedback was not able to be established. Therefore, although IAT teachers, who completed TTC's training, are able to utilize their

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[36] Fiscal year of Turkey is from January to December. In 2013, the amount is from January to the end of August.

knowledge learnt from training and practice IAT education in expansion schools, effectiveness and impact of the project are fair.

The project period was as planned; however, because the cost slightly exceeded that planned, efficiency of the project is fair.   As the accreditation system of IAT teachers changed, the training courses established by the project were not being implemented at the time of the ex-post evaluation; however, it is likely that the curriculum and textbooks developed by the project and TTC trainers' knowledge will be continually utilized in the short-term teacher training courses for IAT teachers who are accredited at expansion schools under the changed accreditation system. As the TTC trainers have a high level of technical skill, there are sufficient skilled TTC trainers for the short-term training courses and necessary budget has been allocated for the training, it is expected that the outcomes of the project are sustainable to some extent. Therefore sustainability of the project is fair.

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

4.2 Recommendations
    4.2.1 Recommendations to the Implementing Agency
    4.2.1.1 Recommendations to MoNE (GDVTE)
Teachers of newly established IAT departments at the technical and industrial vocational high schools after completion of the project as well as newly assigned IAT teachers who graduated from specialized university courses have not received training for IAT teachers established by the project. As a result of interviews, during the ex-post evaluation, with newly assigned university graduate IAT teachers at expansion schools, it was confirmed that because training equipment/facility for IAT education at most universities, except a few universities, are not yet sufficient, the gap of equipment/facilities between universities and expansion schools is huge and needs for TTC training based on equipment/facility, curriculum, and textbooks of expansion schools are high. In TTC's long-term strategy the policy of implementing training for newly assigned university graduate IAT teachers; however, this has not been implemented as yet. Therefore, MoNE should make a specific action plan such as for necessary input and personnel assignment and training schedule, utilize the system introduced by the project as required, and implement IAT teachers' skill development training. Furthermore, it is desirable that GDVTE reconfirm how teacher training in IAT fields should be implemented in future, for example, activities related to implement training and assignment plan of trainers, with ministerial department related to In-Service Training (GDTTD, etc.).

4.3 Lessons Learned
(1) Implementation of teacher training under the circumstance that policy of accreditation system is not secured
    In the project, during the period of project activities, Board of Education in MoNE decided not to set the completion of training courses developed by the project as a condition for qualification

(teacher accreditation system), but to set only graduation from IAT related departments of universities as required qualification. Therefore, after completion of the project, the training courses for teachers established by the project were discontinued. However, it is assumed that if the accreditation system and relevant policies had been properly confirmed before implementing the teacher training, changes of the accreditation system and so on could have been foreseen to some degree. In this project, training courses developed by the project are being continued in a different form; as a result, however, for similar projects that provide support related to an accreditation system prior to set-up, it is necessary to recognize, at the time of project planning, that there may be delays and changes to the system, and that this could become risk factors of achievement of project purpose and sustainability. As countermeasures to these risks, it can be considered to collect information of the planned system to be established and closely communicate with relevant department(s) of higher supervising organization(s).

(2) Establishing training system (training management cycle)

The project aimed to establish a teacher training system including PDCA cycle and to enable TTC trainers to operate the system. However, knowledge and skills of staff of implementing agency regarding evaluation and improvement of training, which is a part of the training management cycle, were not accumulated sufficiently during cooperation period, and operation of the cycle has not reached to the expected level even after completion of the project. In projects that aim to establish a training system including evaluation and improvement like this project it is important in increasing sustainability that counterpart personnel experience operation of the cycle many times, and become able to operate the cycle autonomously. In order to do that, it can be considered that experts should transfer the techniques for the activities related to evaluation and improvement of training in addition to the activities related to planning and implementation to the counterparts.

(3) Indicators in PDM related to capacity building

In the project, TTC's capacity building was a target of each output. However, it was not clear "whose (which) and what kind of capacity is to be strengthened" and "by what is the capacity to be strengthened" as indicator to verify capacity development of the counterparts who received technical transfer by the project. When capacity development is designed as an output or purpose, it is desirable to set not only the indicators to verify the improvement of knowledge at an organizational level such as clarification of manuals and procedures, but also set the target of capacity development at a personal level and prepare the indicators to verify them. In other words, it can be considered to be effective to measure and analyze specific indicators to verify the capacity of planning, implementation and evaluation of capacity related to technical training by the trainers as counterparts; for example, a simplified capacity assessment[37] to measure changes of capacity

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[37] The Project Document of the project includes the results and radar chart of self-evaluation survey in terms of knowledge and skills of teaching ability of IAT teachers at (10) expansion schools and provides a good reference. In addition, as for capacity assessment at organizational and personal level, "Capacity Assessment Handbook:

development from the aspects including basics of technology, curriculum/syllabus development, teaching material development, practical training, understanding (knowledge), implementation (action) and trainer's attitude toward training evaluation, at the time of planning (as a baseline), mid-term review and terminal evaluation.

BOX : Suggestions and lessons learned from a comparative study of four technical cooperation projects of vocational training

While conducting this ex-post evaluation, a comparative study of technical cooperation projects was conducted to find their features and effects, by taking examples from four projects: "The Project on Strengthening the Programme of Expanding Automation Technologies Department (SPREAD)" in the Republic of Turkey, "The Project for Strengthening the Capacity of Training Management of Vocational Training Corporation" in Jordan, "Project for Establishment of Japan Sri Lanka College of Technology to Strengthen Technical Education and Training" in Sri Lanka and this project. The following suggestions and lessons were learned from the analysis of the main components of the four projects: (1) development and implementation of policies and systems of vocational training; and (2) strengthening of functions of vocational training centres.

1. Development and implementation of policies and systems of vocational training

When a project is implemented along with the development of new policies and systems for vocational training, a delay in the development or change in the systems can be a risk factor for the project to achieve its purpose or create the expected effects. With the project in Uganda, a qualification system was established as planned partly because the project activities included the activities to contribute to the establishment of the system; and the established system had facilitated the creation and continuation of the expected effect of the project. A change in the conditions of qualification of the instructors with the project in Turkey, a delay in the restructuring of Vocational Training Corporation assisted by the World Bank with the project in Jordan, and a delay in establishing a new vocational qualification system assisted by the Asian Development Bank with the project in Sri Lanka, gave a negative influence for the creation and continuation of the project effects. These examples suggest the importance of adequate study of the implementation capacity of the government institutions which are responsible for the development of the policies and systems, and the importance of collecting information on the contents and progress of the policies and the systems to be developed.

2. Strengthening of functions of vocational training centres

(1) Assistance with establishment of training management cycle

It is essential to assist the counterpart officers until they are able to operate the training

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management cycle independently in projects to assist the establishment of a cycle, which includes planning, implementation, monitoring, evaluation and improvement of training courses. With the project in Jordan, the training management cycle was further disseminated after the project, as a result of the staff of Vocational Training Corporation operating the cycle two to three times independently and also experiencing dissemination of the cycle to other training centres than the model training centres. As for the projects of Turkey and Sri Lanka, the counterpart officers could not gain adequate knowledge and experience of the cycle during the projects; therefore, they were not able to gain the necessary technical skills to operate the cycle on their own.

(2) Reflection of the needs of industry in the training courses

For introduction of measures to reflect the needs of industry in the training courses, it is important to establish a system that incorporates advice from industry representatives into the training courses immediately, not just to receive advice from them. With the project in Jordan, Curriculum Development Committees, which included industry representatives, were provided with authority to add training items, review the hours of practical lessons, etc. The project also introduced a system for decisions of the committees to be incorporated in the next training courses. This system was functioning at the time of the ex-post evaluation. Technical committees formed in the project of Sri Lanka, on the other hand, did not have authority to decide on revisions and improvement of the training courses; therefore, the suggestions of the committees were not incorporated into the revision and improvement of the training courses immediately. As a result, the industry representatives of the committees gradually lost interest in participating in the committees, and the committees became non-operational.

(3) Capacity building of the instructors

It is important for projects aiming at capacity building of instructors to adequately identify the gaps between the existing capacity of the instructors and what is required to conduct the training courses; and to establish a system for the implementing agencies to improve capacity of the instructors continuously by using resources available in the countries, in addition to the training sessions in Japan and technical transfer from JICA experts. With the project in Jordan, Vocational Training Corporation had planned and conducted in-plant training for the instructors during the project and has been continuing such trainings even after project completion. With the project in Uganda, no new master trainers, who conduct training for the instructors and managers, had been trained after completion of the project; this was a result of master trainers only being trained in Japan, and, therefore, the implementing agency had not learned how to carry out the training. With the project in Sri Lanka, capacity building of the instructors of the model training courses was mainly conducted in the training in Japan, and a system for the relevant ministry and department to plan and conduct measures for capacity building of instructors had not been introduced by the project. As a result, some of the instructors having insufficient teaching skills were still a problem at the time of the ex-post evaluation.