

Republic of South Africa

FY2015 Ex-Post Evaluation of Technical Cooperation Project

“Capacity Building of Medical Equipment Maintenance and Management in Southern Africa”

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0. Summary

The project was implemented to improve medical equipment maintenance and management (hereafter, MEMM) in the Republic of South Africa (hereinafter South Africa) by providing a holistic model that contains the development of a training system for clinical technicians¹ in order to build the capacity of MEMM and by strengthening the organizational structure for MEMM in Eastern Cape Province, the pilot province, and by utilization of the developed model by other provinces.

The project was consistent with the development policy and development needs of South Africa, the aims of which were to secure health technology, develop human resources and improve the health system from the time of planning to the project completion. In addition, the project’s consistency with Japan’s ODA policy was also high because the policy gave priority to capacity development in the health sector at the time of planning. As a result of the revision of the Project Design Matrix² (hereafter, PDM)³, with a reduction in the number of activities performed, the project design was not coherent from its activities and outputs to the project purpose, and this had a negative effect on the effectiveness and impact of the project. Hence, its relevance is fair. Each output was not achieved either and activities such as the consultation were not sufficient to adopt the project’s model in other provinces. Therefore, the project purpose was not achieved. The overall goal was not achieved either because no activities have been performed since the completion of the project. Thus, the effectiveness and impact of the project are low. The project period was extended and the project cost exceeded the planned amount because of the additional equipment provision; however, these additional inputs did not contribute to an increase in the output. Hence, the efficiency of the project is low. Although sustainability in terms of the policy aspect is high, some major problems have been observed in terms of the organizational and technical aspects of the

¹ It requires the qualification of an “engineering diploma” to be recognized as a “technician” in South Africa. Bachelor’s degree holders such as “bachelor of science in engineering” and “bachelor of engineering” are recognized as a “engineer.” However, there are many staff who engage in MEMM at the institutions without qualifications and the project targeted all these staff at the institutions. Therefore, a “clinical technician” in the report refers to all staff who engage in MEMM.

² PDM stands for project design matrix. It is a matrix to show the overview of a project plan, which clarifies the objectives, activities, input, important assumptions, objectively verifiable indicators, etc., and the logical relationships among them.

³ The PDM was revised twice at the first Joint Coordinating Committee and the mid-term review.

implementing agency. In terms of the financial aspect, there were some problems with the budget allocation for the improvement of organizational structure and the implementation of the training. Therefore, the sustainability of the project's effects is fair. In light of the above, this project can be evaluated as unsatisfactory.

1. Project Description



Project Location(s)



Provided Test Equipment

1.1 Background

After apartheid (the racial segregation policy) was abolished in 1994, the National Department of Health (hereafter, NDOH) acknowledged that health is a basic requirement for social and economic growth in the country. Therefore, NDOH began making efforts to strengthen the health system in South Africa, including capacity building of medical equipment maintenance and management, as one of the priorities for the improvement of health service delivery in terms of both quality and quantity. However, a large part of medical equipment maintenance had been outsourced to private companies, and, as a result, requests for services were not responded to promptly and the costs for MEMM had been quite high. Health facilities that received referrals from primary health facilities lack clinical engineering workshops, especially in poor areas, which resulted in a regional gap in the quality of health services. In addition, only fifteen percent of the people required for maintenance of medical equipment had been deployed, and a serious shortage of experienced clinical technicians existed.

Under the circumstances, NDOH directed a request for support for improvement of MEMM to the government of Japan in 2004. Upon the request, the project for “Capacity Building of Medical Equipment Maintenance and Management in Southern Africa” was launched in 2009 with the primary objective of developing and utilizing a comprehensive model for MEMM.

1.2 Project Outline

Overall Goal		Good Practice models in South Africa make an impact on the improvement of Medical Equipment Maintenance and Management (hereafter, MEMM) practices in the country.
Project Purpose		A holistic provincial model to improve MEMM is developed, which is applicable to other provinces in South Africa.
Output(s)	Output 1	A MEMM training package is developed in the pilot province based on evidence of the effectiveness of a training package model (Support the establishment of a provincial practical training institute for clinical engineering in the Eastern Cape).
	Output 2	The organizational structure of MEMM in the pilot provinces is reinforced (Strengthen HTC function in the Eastern Cape).
	Output 3	Enabling environment is prepared to disseminate the MEMM improvement model (Contribute towards the finalization of national standards and its application at provincial level).
Total cost (Japanese Side)		347 million yen
Period of Cooperation		June, 2009 – March, 2013 (Extended period: June, 2012 –March, 2013)
Implementing Agency		National Department of Health Eastern Cape Department of Health
Other Relevant Agencies / Organizations		East London Health Complex Port Elizabeth Health Complex Mthatha Health Complex
Supporting Agency/Organization in Japan		None
Related Projects		Improvement of Medical Equipment for Primary Health Care Institutes in Eastern Cape Province (JICA): January, 2005 – March, 2006

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of Project Purpose at the Time of the Terminal Evaluation

As for the project purpose, i.e., “A holistic provincial model to improve MEMM is developed, which is applicable to other provinces in South Africa,” some parts of the project’s model have been recognized in policy documents or guidelines developed by

both NDOH and the Eastern Cape Department of Health (hereafter, ECDOH), such as “A Framework for Health Technology Policies,” and “Annual Performance Report 2009-2012 in ECDOH.” Moreover, it was assessed that the application of the model by other provinces would be accelerated by the workshop to be conducted by the project with participation of stakeholders from other provinces.

1.3.2 Achievement Status of Overall Goal at the Time of the Terminal Evaluation (including other impacts.)

As for the overall goal, i.e., “Good Practice models in South Africa make an impact on the improvement of MEMM practices in the country,” it was difficult to develop the good practice model which would be applicable to all the provinces because of the variety of the maintenance approaches in each province. However, the project managed to develop a holistic model for MEMM for replication in those provinces that adopt the same or similar maintenance approach as the Eastern Cape, and it was assessed to be likely that the model would impact the improvement of MEMM practices there. In addition, as an indication of the positive impact, relationships between stakeholders such as clinical technicians, medical institutions, training institutions and medical equipment agencies improved with MEMM.

1.3.3 Recommendations at the Time of the Terminal Evaluation

Some recommendations were made to NDOH, ECDOH, the targeted hospitals⁴, the project team and JICA. The achievement of each recommendation by the time of the ex-post evaluation is shown below (Table 1).

Table 1 Recommendations at Terminal Evaluation and Achievements

Recommendations	Achievements
National Department of Health	
To support and advise ECDOH continuously on the allocation of clinical technicians ⁵ for adequate MEMM.	NDOH advised ECDOH on the allocation of clinical technicians in order to provide high quality of care during the project period.
To deliberate with ECDOH continuously, including training institutions, to improve MEMM.	The best way to secure human resources for MEMM was considered within NDOH; however, training institutions was not included.

⁴ According to a Japanese expert, at the time of the completion of the project, the targeted hospitals were Dr. Malizo Mphole Memorial Hospital, St. Patrick Hospital, St. Elizabeth Hospital, Frontier Hospital, Nelson Mandela Academic Hospital and Butterworth Hospital. In addition to the above hospitals, other hospitals that clinical technicians were assigned were also considered as target hospitals during the project period. Therefore, when a clinical technician moves to another institution, the institution that he/she moves to becomes the targeted hospital.

⁵ In the terminal evaluation report, it was described as a clinical engineer, but it is standardized as a clinical technician in the report.

To provide the essence of an MEMM good practice model, which the project would develop, to other provinces through periodical reporting sessions with provincial departments of health.	NDOH encouraged departments of health in other provinces to participate in a workshop in February 2013 and with the National Health Technology Committee (hereafter, NHTC), in order to share the achievements and the lessons learned from the project.
To brief NDOH leadership on the achievements of and challenges identified through the project—for example, through utilizing tools such as the NDOH Annual Report.	The achievement of the project did not appear on the document such as the NDOH Annual Report and there was no opportunity to share these achievements with others.
Eastern Cape Department of Health	
To develop an environment for training by considering both infrastructure improvement and human resource deployment.	Neither infrastructure improvement nor human resource deployment have been implemented. The training at COEGA Development Corporation ⁶ sponsored by ECDOH started in September 2015.
To support both the Provincial Health Technology Committee (hereafter, PHTC) and the District Health Technology Committee (hereafter, DHTC) to better understand and appreciate the importance and necessity of having a functional DHTC in all districts.	The draft TORs for both PHTC and DHTC were framed and ECDOH participated in the DHTC meeting in each district to support the activities of the DHTC. A PHTC/DHTC meeting with a workshop was held in February 2013.
To encourage DHTC to update and utilize the medical equipment inventory at the institution level. In addition, ECDOH should monitor the functionality of medical equipment and the quality of maintenance using test equipment and further requesting and analyzing periodical reports submitted by target hospitals.	The medical equipment inventory developed by both the project and the DHTCs was utilized to conclude a contract for maintenance and procurement by ECDOH. At the beginning, the medical equipment inventory was supposed to perform the monitoring through the computerized maintenance management system (hereafter, CMMS), and the system was experimentally introduced to Nelson Mandela Academic Hospital; however, it was dysfunctional at the time of the ex-post evaluation.
To encourage clinical technicians by creating awareness of clinical engineering as a profession with a potential career path, creating new posts and filling vacant posts for clinical technicians, seeking ways to retain existing clinical technicians and offering continuous refresher training.	Although the training at COEGA Development Corporation was provided, the working conditions did not improve, and it was difficult to see a career path developing in the future. Employee retention was still a serious problem for existing clinical technicians.
Targeted Hospitals	
To make clear the importance and the status of MEMM, which could result in better understanding and appreciation of it.	Sharing the information about the medical equipment inventory generated by test equipment and by participation in the DHTCs and the workshop contributed to a better understanding and appreciation of MEMM.

⁶ The details will be given in “Impact” (P16).

Clinical engineering sections in targeted hospitals are recommended to report to ECDOH by optimally utilizing the records generated by the test equipment.	The records generated by the test equipment were reported to ECDOH and NDOH during the project period. It was planned for the records to be monitored through CMMS; however, the system has been dysfunctional so far.
Project Team	
To seek opportunities to share project achievements with other provincial departments of health. In addition, to address outstanding activities within the remaining project period.	The person from only one provincial department of health participated in the workshop in February 2013.
JICA	
To explore opportunities to perform periodical monitoring of the utilization of the test equipment result at targeted hospitals.	It was planned that CMMS would be utilized to perform monitoring; however, this has not been done so far. Although other ways were explored, there were no opportunities to perform a periodical monitoring.
To earmark and prioritize ECDOH candidates for MEMM group training courses being offered to the South African government. To strengthen the network of clinical technicians in South Africa and the Southern African region by interfacing with graduates (alumni) of MEMM training courses in Japan and third countries.	After the project completion, two people from the project participated in training in Japan; however, no network of clinical technicians was established. However, it has been already decided that clinical technicians from ECDOH will participate in a JICA Knowledge Co-creation Program in Japan in MEMM in 2016.

Source : The Terminal Evaluation Report, Questionnaire and Interview Survey

2. Outline of the Evaluation Study

2.1 External Evaluator

Kozue Amemiya, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

Duration of the Study: August, 2015 – September, 2016

Duration of the Field Study: November 9, 2015 – November 28, 2015

February 13, 2016 – February 21, 2016

3. Results of the Evaluation (Overall Rating: D⁷)

3.1 Relevance (Rating: ②⁸)

3.1.1 Relevance to the Development Plan of South Africa

At the time of planning, the implementation of the project was in line with one of the priorities, “securing safety and management for health technology to contribute to

⁷ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁸ ③ High, ② Fair, ① Low

improving basic health services,” shown in the “National Health Strategic Plan 2007/08-2009/10,” which was enacted in 2007. In addition, according to the “National Health Strategic Plan 2010-2012,” a 10-point plan adopted by the health sector in South Africa, included the following priorities: “Overhauling the health care system and improving its management,” and “Improving human resources planning, development and management.” In the Eastern Cape Province, the “Policy and Budget Speech 2013/2014” had the priority of strengthening the procurement capability, asset management capability and human resource development of management.

Therefore, the project direction was consistent with the development policy of South Africa from the time of planning to the project completion.

3.1.2 Relevance to the Development Needs of South Africa

At the time of planning, there was a shortage of human resources for medical equipment and maintenance and only a few training programs were provided to existing clinical technicians. The development needs in the pilot province were considered high because the score⁹ for the medical equipment maintenance level in the pilot province was far below the target score. Furthermore, the challenges in the pilot province were basically similar to other provinces; thus, it was assessed that the output of the project would contribute to improving MEMM in other provinces as well. At the time of the project completion, the number of clinical technicians was 23 in the Eastern Cape Province, which was far below the required number (78 in the National Standard).

Therefore, improvement of MEMM in South Africa which is the project purpose has been consistent with the development needs of the pilot and other provinces from the time of planning to the project completion.

3.1.3 Relevance to Japan’s ODA Policy

At the time of planning, Japan’s ODA policies in South Africa gave priority to assisting “livelihood improvement for poor communities,” especially from the perspective of the health sector. Furthermore, since medical equipment was provided to 5 district hospitals, 6 health centers and 83 clinics in the Oliver Tambo district in the Eastern Cape as a grant aid project in 2006, it was expected that the project would lead to effective use of this equipment.

Therefore, the project’s consistency with Japan’s ODA Policy was also high.

⁹ The survey was conducted by NDOH. 7 items (management, staffing, laws and regulations, upgrading and replacement, inspections and testing, planning, and emergency properness) were evaluated comprehensively for the score for the Medical Equipment Maintenance Level. It was 35.84 in Eastern Cape (2006), against the NDOH’s target score: 80. 6 items (planning, policies and procedure, equipment management, staff training, risk management and quality assurance) were evaluated comprehensively for the score or Health Technology Management Level. In the Eastern Cape, it was 18.65 against the NDOH’S target score of 80.

3.1.4 Relevance to the Appropriateness of Project Planning and Approach

At the time of planning, it was indicated that the project purpose was significantly high, in spite of the small amount of input. However, the Memorandum of Understanding (hereafter, MOU) for the project was signed immediately in order to make it a priority to schedule the project smoothly in agreement between the both sides that the project plan shall be revised after the project's launch. First, the target area of the overall goal was modified to focus on South Africa rather than Southern Africa¹⁰ at the Joint Coordinating Committee¹¹ (hereafter, JCC) in August 2009. Second, subtitles were added to all outputs to be redefined for the purpose of corresponding with the actual project conditions, and the indicators for all the outputs were downgraded to reduce the scale of the project at the time of the mid-term review in July 2011. Then, some activities that were considered difficult to implement were called off.

Since the PDM of the project was modified to correspond with the situation at that time, this modification is judged to be appropriate. On the other hand, each output was modified from independent point of view, which led to a lack of logic for the plan from the whole outputs to the project purpose. Additionally, it was difficult to properly assess both the output and the project purpose after the indicators were downgraded.

Therefore, the project planning and approach were not appropriate.

Based on the above, it can be seen that the project was highly relevant to the country's development plan and development needs and to Japan's ODA policy. On the other hand, the project planning and approach were not appropriate. Therefore, its relevance is fair.

3.2 Effectiveness and Impact¹² (Rating: ①)

3.2.1 Effectiveness

3.2.1.1 Project Output

(1) Indicators for Output

The outputs and the indicators for each output revised at the time of the mid-term review in July 2011 are shown in Table 2.

¹⁰ Including Botswana, Namibia, Lethoto, Swaziland, Malawi, Zambia and Zimbabwe.

¹¹ The Joint Coordinating Committee Members were as follows: Health Technology Directorate, NDOH, Health International Relations Directorate, NDOH, ECDOH, JICA South Africa Office and Project Team Members.

¹² Sub-rating for effectiveness is to be combined with a consideration of impact.

Table 2 Indicators for Each Output

Output	Verifiable Indicator
Output 1 : A MEMM training package is developed in the pilot province based on evidence of the effectiveness of a training package model (Support the establishment of a provincial practical training institute for clinical engineering in the Eastern Cape)	Verifiable Indicator 1 : Practical training institute is established
	Verifiable Indicator 2 : Number of new staff trained by the institute (Target: 8 new staff)
Output 2 : The organizational structure of MEMM in the pilot province is reinforced (Strengthen HTC function in the Eastern Cape)	Verifiable Indicator 1 : Number of established District Health Technology Committees (DHTC) (Target: 3 DHTCs)
Output 3 : Enabling environment is prepared to disseminate the MEMM improvement model (Contribute towards the finalization of national standards and its application at provincial level)	Verifiable Indicator 1 : Number of hospitals taken medical device inventory (Target: 10 hospitals)

As already mentioned in “3.1.4 Relevance to the Appropriateness of Project Planning and Approach,” it is difficult to assess the achievement of each output according to the above indicators after revising the PDM. Thus, the achievement of each output was assessed according to the following points of view.

1) Output 1

Although output 1 intended to develop “A MEMM training package,” its subtitle indicated that it would support the establishment of a provincial practical training institute. Moreover, the PDM in the Japanese version showed that it would establish a training system. The above three interpretations create ambiguity about what output 1 indicates exactly. In this regard, the understanding of the Japanese expert, the Japanese expert’s counterpart and JICA also differed. Therefore, in terms of output 1, it was assessed by combining two initial indicators and the above three points, including “Development of a MEMM training package,” “Establishment of a provincial practical training institute” and “Establishment of a training system.”

2) Output 2

Although an indicator for output 2 was the number of district health technology committees (hereafter, DHTCs) established, the subtitle for output 2 intended to reinforce the organizational structure of MEMM in the pilot province. Both PHTC and DHTCs had an important role in supporting lower level HTC from the province to the districts and from the districts to the institutions. Therefore, it was assessed that it would focus not only on the establishment of DHTCs but also on the establishment of PHTC and institutional HTCs, their activities, and the support systems among them.

3) Output 3

At the time of planning, output 3 intended to prepare for sharing the project's model with other provinces as an environmental arrangement¹³. However, the PDM was revised and became what is shown in table 2 above at the time of the mid-term review. It was then recognized as environmental improvement in institutions in the pilot province. Even in the latter case, using only the medical device inventory did not contribute to the finalization of national standards and their application at the provincial level, as shown in the subtitle. Thus, the achievement was assessed whether the medical equipment inventory was utilized by the CMMS or other systems. Besides, it was confirmed whether the activities for sharing the project's achievement were performed.

(2) Achievement of Output

1) Output 1

At the initial plan, the project planned to develop a training package containing a textbook and a curriculum based on existing training programs, and training of trainers was also one of the contents of the package. In fact, the kinds of training contents that would be necessary for new staff were considered, and then the project sorted out the existing training and showed a combination of the Technical Competency Assessment (hereafter, TCA) training and the Health Technology Management (hereafter, HTM) training with the amount of budget to be required and the list of the agencies which could provide the trainings. On the other hand, the training curriculum and the textbook were not developed. Four of the new staff¹⁴ was trained using the training program by local agents and teaching staff at universities. According to the staff from JICA, there were several reasons for the project not to establish an original training program. First, the universities to foster clinical technicians in South Africa did not provide enough practical training, and, as a result, it was difficult to develop skills to utilize medical equipment. Second, it was difficult to find trainers who could provide practical training with adequate skills. Therefore, providing an original training program did not fit with the reality.

In terms of establishing a training system, the local agent and the universities teaching staff provided the TCA training and the HTM training respectively for existing clinical technicians on an irregular basis. As mentioned above, the training of new staff was conducted only once and these training sessions were not approved as an official training program in the Eastern Cape Province by ECDOH. Therefore, the

¹³ Output 3 in the initial plan was to develop a project website in order to share the information about training and the organizational structure of MEMM in a pilot province with clear intellectual property rights.

¹⁴ Two out of these had worked as electrical engineers and others had been the level of the future graduates from college.

establishment of the training system can hardly be assessed to be achieved.

In terms of the establishment of a training institute, the project renovated the training room at Frere Hospital in order to use it as a training facility. Although the training room was used for meetings and trainings for MEMM occasionally, nobody was assigned for the training facility to manage it. At the time of the project completion, there was no plan for periodical training; therefore, it was assessed that the training facility at Frere Hospital was not recognized as a training institution.

Therefore, the above three points were not achieved, and thus output 1 was also assessed as not being achieved.

2) Output 2

Six out of seven districts in the pilot province established DHTCs and carried out several activities such as the medical equipment inventory. Moreover, some institutions with clinical technicians receiving a HTM training established HTC. On the other hand, according to members from DHTCs and HTCs at the medical institutions, few HTCs received support for their establishment and activities from the upper level of HTCs in accordance with the draft terms of reference (hereafter, TOR), and most of the HTCs established their committees and conducted the medical equipment inventory by themselves without any support. As mentioned above, the support system from the upper level of HTCs to the lower level was not developed. Thus, it can be assessed that the establishment of DHTCs did not contribute to strengthening the organizational structure of MEMM in the pilot province. In addition, TORs for PHTC and DHTC were not approved by ECDOH because the position that was capable of making a decision was vacated, and then nobody could give approval for it.

Therefore, some HTCs in the province, in the district and in the institutions were established; however, it was difficult to conclude that it contributed to strengthening the organizational structure in the pilot province. Hence, output 2 was moderately achieved.

3) Output 3

Although six hospitals carried out medical equipment inventory by utilizing the standard performance test procedure developed by the project, any results of the inventory were not utilized by CMMS or any other source. Moreover, output 3 did not contribute to sharing the activities of the project or receiving recognition from other provinces.

Therefore, output 3 was not achieved.

3.2.1.2 Achievement of Project Purpose

(1) Indicators of Project Purpose

The indicator and the achievement of the project purpose at the time of the project completion is shown in Table 3. Although the indicator of the project purpose states that a holistic model to improve MEMM should be developed by the pilot province and should be capable of being adopted as an applicable model in other provinces, this indicator did not show clearly what the model was adopted for. In this regard, it was assessed whether the project achievements or models were recognized in policy documents or guidelines developed by the NDOH and ECDOH at the final evaluation. Therefore, it was also assessed from the same perspective at the ex-post evaluation.

Table 3 Achievement of Project Purpose

Project Purpose	Indicator	Actual
A holistic provincial model to improve MEMM is developed, which is applicable to other provinces in South Africa.	By the end of the project, a holistic model to improve MEMM developed in the pilot province is adopted as an applicable model for other provinces.	There were no policy documents or guidelines documenting the project's model developed by the NDOH or ECDOH.

(2) Achievement of Project Purpose

There were no policy documents or guidelines documenting the project's model developed by NDOH or ECDOH. The activities in the initial plan contained a consultation with other provinces in the project's model as part of output 1 and output 2 in order to make the model applicable; however, the consultation was conducted only once at the beginning of the project period—namely, there were no sufficient opportunities for discussing the drafted model with other provinces. Besides, the maintenance approach varied among the provinces because of the decentralization¹⁵. Therefore, it was impossible to adopt the project's model itself, and it was necessary to have an opportunity to discuss the model to make it “applicable”. As described, NDOH did not encourage other provinces to become actively involved in the project, and then, the project' model was not described in the policy reports or guidelines.

The project did not achieve its purpose because it can be assessed that the project's model was not an “applicable model” for other provinces and did not adopt the National Standards. Therefore, the project's purpose was not achieved.

¹⁵ After apartheid was abolished in 1994, residential areas for black people were integrated and new municipalities were installed. Therefore, a new constitution to set up a framework of municipalities was established in 1996, which clarified the respective authority and responsibilities of the nation, province and district.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

The questionnaire survey was conducted with departments of health in eight provinces, besides the pilot province, in order to confirm the achievement of the overall goal at the ex-post evaluation. Seven out of eight provinces answered the questionnaire. This was followed by conducting a hearing survey with them. The achievement of the overall goal at the time of the ex-post evaluation is shown in Table 4.

Table 4 Achievement of Overall Goal

Overall Goal	Indicator	Actual
Good Practice models in South Africa make an impact on the improvement of MEMM practices in the country.	At the end of FY2015, all provinces will utilize the essence of good practice of MEMM model.	Of the seven provinces that responded, three provinces have established a PHTC. NHTC was established independently of the project in 2010. After that, NHTC supported the establishing of PHTC in all provinces. Even in the case of the provinces with PHTC, the PHTC members did not understand what the achievements of the project were. Therefore, it can be seen that the establishment of PHTCs was not influenced by the project. As for the other good practice, it was assessed that no achievement was made in the other provinces in terms of the project's good practice. Even in the pilot province, there are still many obstacles to MEMM, and it was not found to improve it.

According to hearings from the departments of health in seven provinces, one was aware of the achievement of the project because the director was a member of the project¹⁶. Only one out of six provinces recognized the project implementation and its achievements, but no other provinces recognized it.

The overall goal was to have all provinces using the good practice model; however, as already mentioned in “3.2.1.2 (2) Achievement of Project Purpose”, the maintenance approach varied among the provinces¹⁷. Therefore, it was difficult to adopt the good practice model in other provinces. Moreover, according to the JICA staff, other provinces were less committed to the project after the pilot province was determined. Based on the above, it was important to implement the activity with the intention of sharing the project's model with other provinces. In reality, however, the workshop that was meant to share information about the project's achievements was held only once at the end of the project period, and only Limpopo province

¹⁶ The trainer for HTM was assigned as a director at Health Technology Directorate in the Western Cape DOH after the project completion.

¹⁷ Several provinces outsourced MEMM. Therefore, these provinces did not assign clinical technicians to the institutions, but only to the Department of Health.

participated in it. That is to say, this workshop was insufficient for sharing the good practice model with other provinces. Any activities such as holding a workshop, introducing the project's model from NDOH and describing it within the policy documents were not performed by the project's completion.

The study examined the differences in MEMM before and after the project was completed in order to assess whether the project's good practice had contributed to the improvement of MEMM at the time of the ex-post evaluation. The self-completion questionnaire survey was conducted for medical staff such as doctors, nurses and mid-wives at eleven institutions where clinical technicians received support from the project and maintained and managed the medical equipment. Samples were selected by means of judgement sampling, which was introduced by the chief executive officer or clinical technicians at each institution¹⁸.

First, the results from the questionnaire survey about MEMM were gathered at each institution from forty-five medical staff who had been at the institution from the launch of the project, as shown in Figure 1. Since the number of valid responses, i.e., forty-five, is not enough to assess the project's effects, the results should be regarded as having only a reference value. The proportion of staff who answered "improved" reached 57.8%.

¹⁸ The sample size was 105. Frere Hospital 15 (Doctors 4, Nurses 8, Midwives 3), Nelson Mandela Academic Hospital 18 (Doctors 6, Nurses 10, Midwives 2), Dr. Malizo Mpehle Memorial Hospital 14 (Doctors 4, Nurses 6, Midwives 4), St. Elizabeth Hospital 14 (Doctors 4, Nurses 7, Midwives 3), Butterworth Hospital 19 (Doctors 4, Nurses 9, Midwives 6), Frontier Hospital 14 (Doctors 5, Nurses 3, Midwives 6), St. Barnabas Hospital 8 (Doctors 2, Nurses 5, Midwives 1), St. Lucys Hospital 1 (Nurse 1), Isilimela Hospital 1 (Nurse 1) and Zituhulele Hospital 1 (Midwife 1).

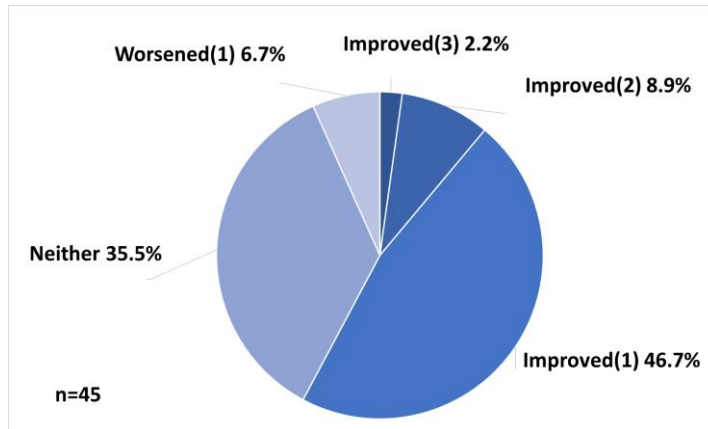


Figure 1 Comparison of MEMM before (2008) and after (2013) the Project
Source: Beneficiary survey from medical staff at institutions

Remarks: 5-level evaluation (1: Very good 2: To some extent 3: Medium 4: Not so much 5: Not at all) was conducted on before and after the project respectively. Based on the result, the graph shows how many steps the institutions improved or worsened by; e.g., “Improved (3)” means improved by 3 steps such as from “4: Not so much” to 1: Very good” and form “5: Not at all” to “2: To some extent”.

Second, the results of the survey of all the medical staff on the technical level of the knowledge and practical skills of clinical technicians at each institution are shown in Figure 2.

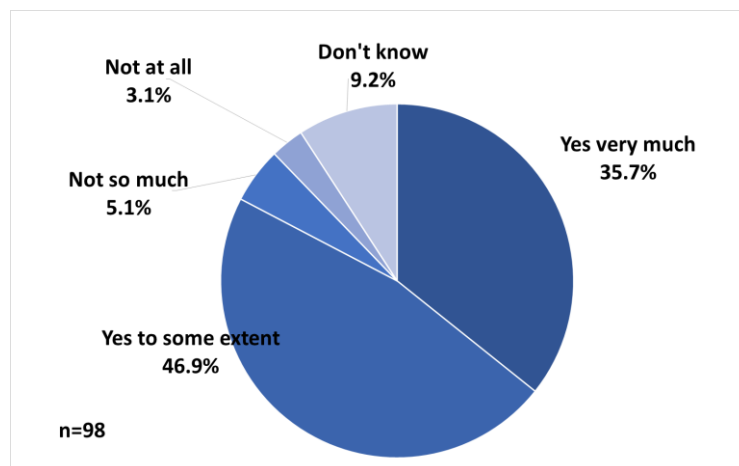


Figure 2 Technical Level of Knowledge and Practical Skill for Clinical Technicians from the Perspective of Medical Staff at the Time of the Ex-post Evaluation

Source: Beneficiary survey from medical staff at institutions

83% of the valid responses for ninety-eight of the respondents were “Yes very much” or “Yes to some extent”. This shows that most of the medical staff assessed their technical level as high. Moreover, the staff at a certain department of health in another province that employed clinical technicians who received training as part of the project believed that their performance was high. Based on the above, it can be considered that the project’s training contributed to an improvement in the staff’s knowledge and practical skills. On the other hand, the training of new staff was not provided after the project completion, and thus, the number of clinical technicians was low at the time of the ex-post evaluation, compared to at the project completion. Since no formal PHTC and DHTC meetings were held after the project completion, it was assessed that the organizational structure had not yet improved. Based on the above, only the training had an effect on the improvement of the clinical technicians’ skills; however, the training did not continue. Hence, it was recognized that the improvement of MEMM was limited.

The overall goal was not achieved because no provinces adopted the good practice models and there was few improvement in MEMM.

3.2.2.2 Other Impacts

No negative impacts on the natural environment and no resettlement or land acquisition occurred.

According to the implementing agency, the training at COEGA Development Corporation¹⁹ in Port Elizabeth was provided for new staff who had graduated college after September 2015. Twenty students received the training at the time of the ex-post evaluation. They were supposed to work at the institutions or the department of health in the Eastern Cape after 18 months of training. The training there showed an effect of the project such as the TCA training from output 1.

This project did not achieve its project purpose and overall goal because only the training had a small effect. Therefore, the effectiveness and impact of the project are low.

¹⁹ The COEGA Development Corporation is a state-owned company established in 1999. COEGA’s vision is to be a catalyst for socio-economic growth in the Eastern Cape and South Africa. Providing customized trainings with training facilities is one of the functions of the COEGA.

3.3 Efficiency (Rating: ①)

3.3.1 Inputs

Table 5 Plan and the Actual Input of the Project

Inputs	Plan	Actual
(1) Experts	<ul style="list-style-type: none"> • One long-term expert (36 MM*) • Two short-term experts • Policy advisor:16 million yen • Technical advisor:10 million yen 	<ul style="list-style-type: none"> • Two long-term experts (Medical equipment maintenance and management: 35.37 MM) • One short-term expert (Technical advisor: 0.43 MM)
(2) Equipment	4 million yen <ul style="list-style-type: none"> • Vehicle • Laptop PC for an expert • Database application 	175 million yen <ul style="list-style-type: none"> • Test equipment • Hand tool for medical equipment maintenance
(3) Operational costs	<ul style="list-style-type: none"> • Implementation of training (34 million yen) • Web construction (9 million yen) • Local operational costs (16 million yen) 	Overseas activities costs: 74 million yen <ul style="list-style-type: none"> • Two local consultants <ul style="list-style-type: none"> One technical advisor (11.16 MM) One test equipment advisor (2.53 MM) • One project assistant
Japanese Side Total Project Cost	180 million yen	347 million yen (192% of the plan)
South Africa Side Operational Expenses	No description for costs (Counterpart personnel, project office, trainer, training facility and implementation of training, guideline and training material)	1.3 million yen

* MM stands for man month.

3.3.1.1 Elements of Inputs

(1) Japanese Input

Although the nine-month absence of the Japanese long-term expert had an effect on the stagnation of the project, locally available human resources were optimally utilized. After the Japanese expert, who has additional post of project coordinator was dispatched, the practical skill training was conducted effectively with good collaboration.

The costs for equipment provision increased compared to the initial plan because an additional twelve kinds of test equipment were donated to twelve institutions²⁰; however, the additional cost did not result in the increase of expected effect of the project. The project purpose was to develop a holistic model in a pilot province that would be applicable to other provinces. The additional provision was considered dispensable in order to achieve the project purpose. On the other hand, it could be considered relevant to the project if the provision was for the training institute to develop a training program or workshops at tertiary hospitals in the health complexes. In actuality, the facility level of the twelve institutions receiving the provision varied, and two out of nine institutions, which was confirmed at the ex-post evaluation, did not use any equipment because the clinical technicians did not understand how to use them, they did not have the medical equipment that was to be tested by the test equipment or there were no clinical technicians at the institution.

Therefore, the equipment provision to the twelve institutions was not appropriate.

(2) South Africa Input

According to the implementing agency and the Japanese expert, the number of counterparts decreased to two from three during the latter half of the project period, which led to the project's delay. The project's office was located far from the office for the counterpart at ECDOH, which also had an influence on the project implementation. Moreover, the counterparts were assigned to ECDOH and three health complexes that were located far away from each other. According to the implementing agency and a Japanese expert, there were some difficulties involved in the project from the health complexes in Port Elizabeth and Mthatha, which were located between 200 and 300 km from East London.

3.3.1.2 Project Cost

Although the project cost was planned to be 180 million yen, the actual cost was 347 million yen, which was significantly higher than planned (192%). The major

²⁰ These were the institutions assigned a clinical technician at the time selected.

reason why the project cost exceeded the planned amount was that the equipment provision increased by 171 million yen in comparison to the plan. As mentioned above, the equipment provision did not contribute to enhancing expected effects of the project.

3.3.1.3 Period of Cooperation

Although the project period was planned to be 36 months, the actual period was 45 months, which was 125% longer than planned. The extension was considered appropriate because there was the partial absence of a Japanese expert for 9 months.

Although both the project cost and the project period exceeded the plan, they did not contribute to the achievement of the project purpose. Therefore, the efficiency of the project is low.

3.4 Sustainability (Rating: ②)

3.4.1 Related Policy and Institutional Aspects for the Sustainability of Project Effects

At the time of the ex-post evaluation, the project was aligned with program 5 in the “National Health Strategic Plan 2014-2019”, which includes “Health facilities infrastructure planning” and “Workforce development and planning”. Therefore, MEMM remains a high priority in South Africa’s development policy.

3.4.2 Organizational Aspects of the Implementing Agency for the Sustainability of Project Effects

Although the project’s implementing agencies were NDOH and ECDOH, the counterparts were also assigned at three health complexes in East London, Mthatha and Port Elizabeth. Although the health complexes were dissolved after the project, Frere Hospital in East London, Nelson Mandela Academic Hospital in Mthatha and Livingstone Hospital in Port Elizabeth held the workshop and undertook core roles as tertiary hospitals in the surrounding area at the time of ex-post evaluation. In addition to these institutions, PHTC and DHTCs are considered as a necessary structure for the sustainability of the project effects. Therefore, all of the structures are assessed in this point.

(1) National Department of Health

Only two staff members were assigned to the Health Technology Department at NDOH. The director took over after the project completion, and the expectations were high; however, allocation of two staff members was not a sufficient amount to manage all of the health technology matters in the whole country in addition to routine work

such as policy planning, monitoring and procurement. Therefore, the organizational structure at NDOH was inadequate to support continuing the project activities.

(2) Eastern Cape Department of Health

Although seven staff members were supposed to be assigned to the Health Technology Directorate, only five staff members were assigned at the time of the ex-post evaluation. The organizational structure has changed since the project completion, and a director whose position has been vacant was assigned. As the other four staff members have been at the directorate since the project began, they understand the project well. Most of the departments of health in the districts did not have any clinical technicians at the time of the ex-post evaluation, which has led to an increased workload at ECDOH to take care of everything technical in these districts. The organizational structure at ECDOH is inadequate for continuing the project activities unless assigning more clinical technicians to each district. Moreover, since ECDOH commissions the training for the COEGA Development Corporation, the organizational structure at ECDOH is insufficient to manage all the training by itself as a package.

(3) PHTC and DHTCs

Due to the fact that both PHTC and DHTC do not implement any activities at the time of the ex-post evaluation, it can be seen that there is no PHTC and DHTC structure in a substantial sense. According to the staff at the departments of health in the districts, most of the DHTCs stopped their activities because the staff receiving the HTM training were transferred to other positions. Therefore, it can be assessed that the HTCs developed by the project have not been firmly established as committees in the organizational structure of MEMM.

(4) Medical Institutions at the Health Complex

Staff assignment at the above three tertiary medical institutions, which functioned as the core medical institutions, has not changed very much. Since there is a shortage of clinical technicians in the health technology section at Nelson Mandela Academic Hospital and Livingstone Hospital, the staff at the management level have to take care of MEMM in the clinical setting in both their own hospital and in surrounding institutions. As the health complexes were dissolved at the time of the ex-post evaluation, there is a possibility of them changing their role in the province.

(5) Institutions and Clinical Technicians

An improvement in the relationship between clinical technicians and medical equipment manufacturers/agencies could be found because clinical technicians received the TCA training from them. This positive relationship makes clinical technicians contact them actively when they experience any difficulties at an institution, and this contributes to persistent improvement in the capacity for MEMM at the institutional

level. In addition, the number of clinical technicians will increase because of the training at COEGA Development Corporation.

Based on the above, the organizational structure at NDOH and ECDOH has not changed largely; however, some problems still remain regarding the assignment of staff. In addition, the HTC's are dysfunctional. Therefore the project was moderately sustainable in terms of its organizational aspects.

3.4.3 Technical Aspects of the Implementing Agency for the Sustainability of Project Effects

(1) Technical Capacity of Management

The training by NDOH and ECDOH has not been conducted using the project's training package since the project completion, and it has been outsourced to a different program. Both PHTC and DHTCs implemented some activities just after the project completion, and since then, they have not carried out any action at the time of ex-post evaluation. Moreover, there is no response to the problems faced; for example, the TORs for both HTC's still remain in draft form. Some institutions conducted the medical equipment inventory by themselves without any support from DHTCs.

Therefore, both NDOH and ECDOH lack the level of technical skill for the sustainability of the project's effect because they could not manage the training or support for the institutions for the HTC's.

(2) Technical Capacity of the Maintenance of Equipment

Although most of the test equipment provided is in good condition and utilized on a routine basis, some of it is rarely used. Software for data analysis has not been updated, and despite signing the contract for calibration until 2017 with an agent, annual periodic updates have not been conducted since 2013. ECDOH and the medical institutions have tried to contact the agents; however, no more action has been taken at the time of ex-post evaluation, as the agents could not be contacted. The calibration is legislated and it is a serious problem that the test equipment is being used in the institutions without calibration. This issue should be dealt with by ECDOH, not the institutions, because ECDOH needs to manage all of the medical equipment in a province. Therefore, the technical capacity of the medical equipment maintenance at ECDOH has not been established.

3.4.4 Financial Aspects of the Implementing Agency for the Sustainability of Project Effects

(1) National Department of Health

The budget for MEMM at NDOH is shown in Table 6. It has been increasing, and there is now a different financing system for medical infrastructure, including medical equipment, in order to secure the budget, which is called the “Health Facility Revitalization Grant” and is taken from the “National Health Strategy 2014-2019”. Based on the above, NDOH has an adequate budget after the project’s completion. However, it is possible that the situation might change because the National Health Insurance²¹ might change the budget allocation for the procurement of medical equipment²².

Table 6 Budget for Medical Equipment at NDOH

(Unit: Thousand Rand)

	2013/14	2014/15
Medical equipment maintenance and management		
Budget	46,000	76,000

Source: Interview and Questionnaire survey for NDOH

(2) Eastern Cape Department of Health

The budget for and actual expenditure on MEMM at ECDOH is shown in Table 7. The budget for both procurement and maintenance of equipment is sufficient to manage them. On the other hand, it is regarded to be problematic that the sufficient budget for procurement discourages the staff from maintaining the medical equipment and leads to insufficient awareness of the importance of MEMM because it enables the institutions to purchase new equipment instead of repairing them. All of the budgets are connected to each category and fixed to what it is to be spent, which leads to inflexibility in the use of the budget. As a result, despite securing a sufficient budget at ECDOH, it becomes difficult to secure human resources and training in the health technology section because the section is not allowed to manage the budget for them²³.

²¹ National Health Insurance targets all South African citizens and the implementation is envisaged to be a 14-year process in total from 2007. There are three phases and currently 11 NHI pilot districts in the country that have been tested in the first phase. On the other hand, the taxation system for the insurance has not yet been decided.

²² At the time of the ex-post evaluation, the province procured the medical equipment from the national government, putting together the application from the institutions. In other words, most of the staff who procured the equipment did not understand what it was like at the institutions. After the introduction of the NHI, it is expected that a practical procurement will be implemented, as the data for MEMM is planning to be managed at the national level. However, there are many uncertainties whether flexible actions will be taken depending on the situation.

²³ The Health Technology Directorate needed to apply to the Human Resource Development Directorate for the budget.

Table 7 Budget and the Actual Expenditure for Procurement and MEMM at ECDOH

(Unit: Thousand Rand)

	2011/12	2012/13	2013/14	2014/15	2015/16
Procurement					
Budget	23,200	23,289	48,805	23,741	40,949
Expenditure	15,489	11,589	34,393	13,886	12,708
Medical equipment maintenance and management					
Budget	5,900	17,947	1,140	12,881	26,000
Expenditure	2,341	8,876	1,120	7,481	5,845

Source: Interview and Questionnaire survey for ECDOH

Therefore, although there are some problems with the budget allocation, the project is sustainable in terms of its financial aspects.

Some minor problems have been observed in terms of the organizational and technical aspects of the implementing agency. Therefore, the sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project was implemented to improve MEMM in South Africa by providing a holistic model that contains the development of a training system for clinical technicians in order to build the capacity of MEMM and by strengthening the organizational structure for MEMM in Eastern Cape Province, the pilot province, and by utilization of the developed model by other provinces.

The project was consistent with the development policy and development needs of South Africa, the aims of which were to secure health technology, develop human resources and improve the health system from the time of planning to the project completion. In addition, the project's consistency with Japan's ODA policy was also high because the policy gave priority to capacity development in the health sector. As a result of the revision of the PDM, with a reduction in the number of activities performed, the project design was not coherent from its activities and outputs to the project purpose, and this had a negative effect on the effectiveness and impact of the project. Hence, its relevance is fair. Each output was not achieved either and activities such as the consultation were not sufficient to adopt the project's model in other provinces. Therefore, the project purpose was not achieved. The overall goal was not achieved either because no activities have been performed since the completion of the project. Thus, the effectiveness and impact of the project are low. The project period was extended and the

project cost exceeded the planned amount because of the additional equipment provision; however, these additional inputs did not contribute to an increase in the output. Hence, the efficiency of the project is low. Although sustainability in terms of the policy aspect is high, some major problems have been observed in terms of the organizational and technical aspects of the implementing agency. In terms of the financial aspect, there were some problems with the budget allocation for the improvement of organizational structure and the implementation of the training. Therefore, the sustainability of the project's effects is fair. In light of the above, this project can be evaluated as unsatisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

(1) Reorganization of a HTC

Since it is difficult for ECDOH alone to maintain the MEMM system in the Eastern Cape, it is necessary to make both PHTC and the DHTCs functional. Therefore, it is recommended that ECDOH revise the TORs for both PHTC and DHTC, which are prepared by the project, and approve them for the continuing activity of HTCs. In addition, although the health complexes were dissolved, Frere Hospital in East London, Nelson Mandela Academic Hospital in Mthatha and Livingstone Hospital in Port Elizabeth function as tertiary hospitals, having a workshop with several clinical technicians to maintain the medical equipment. Therefore, it is recommended that the health technology sections in these hospitals support the departments of health in the districts, which do not have any clinical technicians in collaboration with ECDOH and PHTC.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

(1) Planning of the project, including activities about introducing the model case to other areas.

Although the project purpose was to improve MEMM in all provinces, there was no close contact with other provinces before or during the project period. Additionally, the PDM was revised several times, which led to a reduction in the activities that would have introduced the project's model to other provinces. As a result, there were few activities encouraging other provinces to adopt the project's achievements during the project period, and this resulted in to a failure to expand them to the whole country.

The system of MEMM varied among the provinces due to decentralization.

Therefore, NDOH was unable to force provinces to follow the national guidelines, and it was difficult to share the project's model through NDOH.

When a project that aims to expand a model developed in a pilot place to other areas or to the whole country is planned, the possibility of applying the model to other places and ways to expand the model need to be carefully considered at the time of planning, paying attention to the governance structure. Moreover, starting from the planning stage, those who would be involved in the project, not only representatives from the pilot area but also from other areas where the model to be developed is expected to be applied later, need to agree on adopting the model in their areas. Then, the project should conduct monitoring and a workshop with them during the project period. At the same time, NDOH should support and encourage them to continue their activities.

(2) Optimal allocation of inputs to achieve outcomes when the additional budgets are provided

The actual project costs were significantly higher than planned because of the additional equipment provision. When investment of the additional budget is being considered, it is necessary to assess whether this input is really necessary for the project in light of the project design and whether the additional input contributes to increasing the project outcome. Even though the equipment is necessary at the site, it should be carefully examined in terms of efficiency.

In the case that the project's implementation system is insufficient or there is a lack of technical skills to provide training, it is necessary to consider other inputs other than the provision of equipment, which contribute to increasing the outcome of the project such as dispatching a Japanese expert or local staff.

(3) Allocation of locally available human resources

The Japanese expert was in charge of coordinating the project and a local technical advisor was in charge of MEMM during the project. Since the local consultant had vast experience in teaching MEMM in African countries and had a good understanding of the South African health system, he gained a lot of credibility from clinical technicians and provided effective training.

Therefore, it is an effective way to hire a local person with good knowledge of the local situation to contribute to improving the efficiency and effectiveness of the technical cooperation project.

(4) Utilization of local agents

The practical trainings in MEMM were conducted by both a short-term expert and local agents who knew a lot about the equipment used in the local environment, which enabled them to provide practical training on management skills, based on the deep

knowledge on the characteristics of each equipment. Moreover, using local agents led to a good relationship between them and clinical technicians, which contributed to improving MEMM at the field level.

Depending on the prevalent management and maintenance system and the relationship with local agents and the availability of human resources, the provision of training and the establishing of the management system in collaboration with local agents and manufacturers can be considered effective for the MEMM project.