

Federal Democratic Republic of Ethiopia
Ethiopian Water Technology Institute

Advisor for
Management of Technical Vocational Education and
Training Institute

Work Completion Report

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Japan International Cooperation

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Acronyms

BCs	Bachelor of Science
BPR	Business Process Re-Engineering
CoC	Center of Competence
C/P	Counter Part
EC	Ethiopian Calendar
EGSECE	Ethiopian General Secondary Education Certificate Examination
EHEEE	Ethiopian Higher Education Entrance Examination
ENFQ	Ethiopian National Qualification Framework
EOS	Ethiopian Occupational Standard
EWTI	Ethiopian Water Technology Institute
EWTEC	Ethiopian Water Technology Center
EWTEC3	THE GROUNDWATER DEVELOPMENT AND WATER SUPPLY TRAINING PROJECT PHASE-III
GTP	Growth and Transformation Plan
JICA	Japan International Cooperation Agency
MoWIE	Ministry of Water , Irrigation and Energy
MoWR	Ministry of Water Resources
MSc	Master of Science
PDCA	Plan, Do, Check, Action
RWB	Regional Water Bureau
TVET	Technical Vocational Education and Training
TVETC	Technical Vocational Education and Training College
WWO	Woreda Water Office
WWCE	Water Works Construction Enterprise
WWDE	Water Well Drilling Enterprise
WWDSE	Water Works Design and Supervision Enterprise
ZWRO	Zonal Water Resources Office

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1. Activities and Proposed Achievements

1.1. Background and Objectives of the Project

1.1.1. Background

Ethiopian Water Technology Institute (EWTI) is a new organization established in August 2013 to expansively reorganize Ethiopian Water Technology Center (EWTEC) under The Ministry of Water, Irrigation and Energy (MoWIE) as Public Institute, the purposes of which are stated in the Council of Ministers Regulation No. 293/ 2013 to establish EWTI as the following three clauses and expected to provide a long period of on-the-job training in accordance with Ethiopia Occupational Standard(EOS) and to train the instructors at vocational training institutions and implement short-term and long-term training for practitioners in water sector.

1. Facilitate the transfer of technology to those engaged in water development and related activities.
2. Provide practical trainings to capacitate the existing and potentially joining manpower of the sector in cooperation with other technical and vocational education and training institutions and higher education institutions, and
3. Support the development of capability required for the instructors at technical and vocational education and training institutions.

However, only the short-term training, which had been executed during the time of EWTEC, has been implemented by this newly established EWTI and no other trainings are prospected, as the detailed management system preparation plan nor the system consolidation in order to secure proper instructors and to prepare teaching materials are yet developed, while the mid-term strategic planning (lend lease material) was formulated in August 2014. Particularly, the lack of the needs information is found, which is mandatory to set up the various systems and conditions for development of human resources and the management of vocational training institution in water sector to formulate such plans, but EWTI has a difficulty of collecting sufficient information on its own and formulate such plans.

Under these circumstances, it is requested to Japan to dispatch the advisors to EWTI to strengthen its capability.

1.1.2. Objective of the Project

Original objectives of the Project are as follows.

Advisor for Management of Technical Vocational Education and Training Institute

dispatched by JICA will technically support Ethiopian Water Technology Institute (EWTI) in order to strengthen its capacity on organizational management and vocational training planning based on the result of ‘the labor demand survey on water technicians in Ethiopia’. It is to capacitate concerned EWTI officials to be able to collect necessary information and data for managing and upgrading capacity building training at EWTI.

However, when Advisor arrived at EWTI, the Business Process Re-engineering activities were implemented under the strong leadership of Director General who arrival at new post February this year.

Accordingly, objective of the Project was amended as follows.

Advisor for Management of Technical Vocational Education and Training Institute dispatched by JICA will technically support Ethiopian Water Technology Institute (EWTI) in order to strengthen its capacity on organizational management and vocational training planning after BPR based on the result of ‘the labor demand survey on water technicians in Ethiopia’. It is to capacitate concerned EWTI officials to be able to collect necessary information and data for managing and upgrading capacity building training at EWTI.

1.1.3. Basic policies and considerations in executing the Work

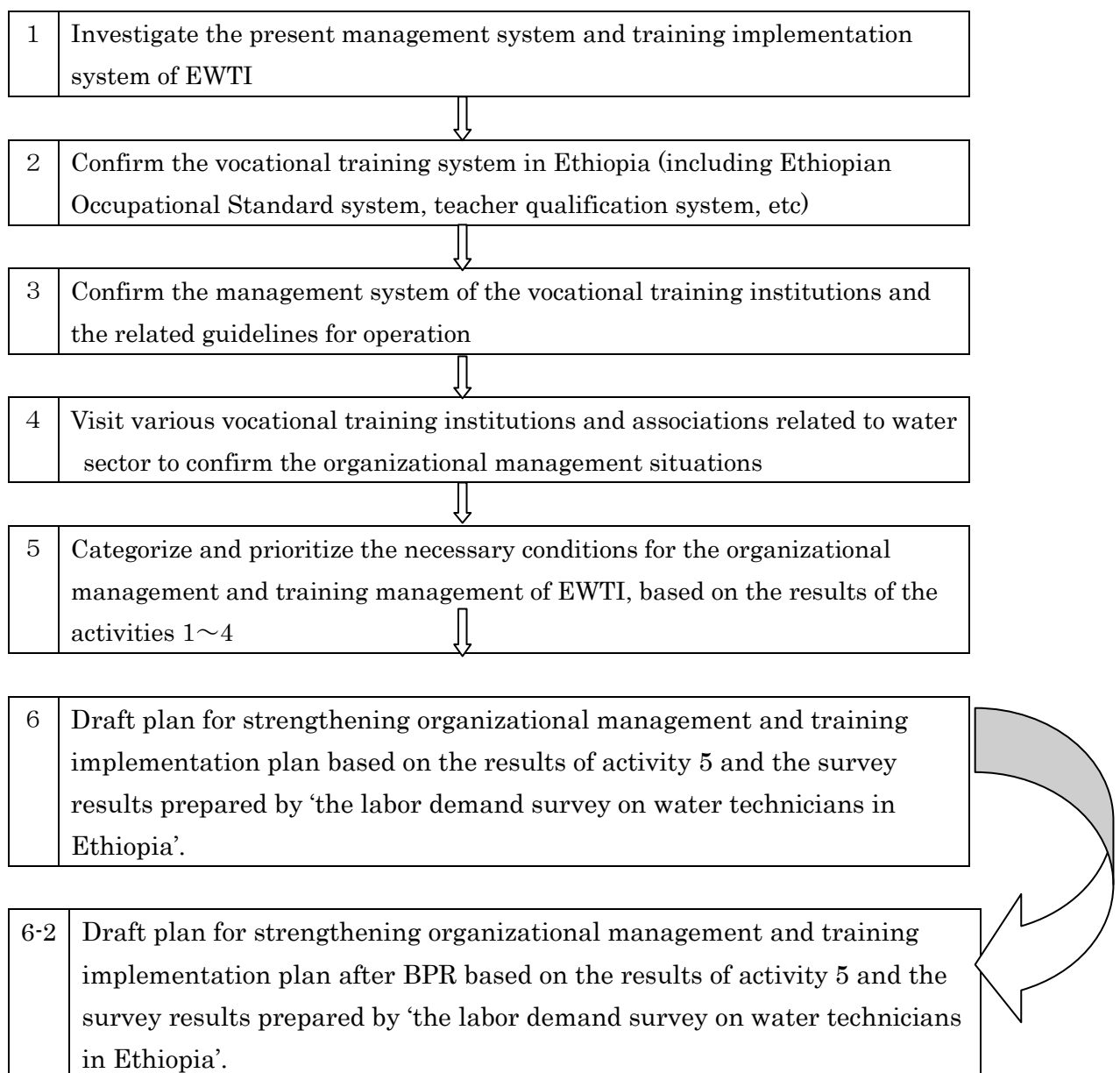
- (1) This project is implemented to assist the formulation of system preparation plan for EWTI to execute the management system preparation plan, trainers acquisition, teaching material preparation, based on the current status of occupational training services, and in order to achieve it, the work has to start from identifying the current state of occupational training services as a whole.
- (2) In providing the assistance in formulation of system preparation plan required by EWTI management system preparation plan, trainers acquisition, teaching material preparation, the needs of the beneficiary in Ethiopia (personnel currently involved in water development (including private sector) and its related activities as well as the personnel who will get involved in future) has to be kept in mind and the formulation of system preparation plan to execute the technical transfer service to meet such needs is to be supported.
- (3) To conduct a coherent activity, the beneficiary in Ethiopia (personnel currently involved in water development and its related activities as well as the personnel who will get involved in future) will remain the close cooperation and support with an expert of “Demand Survey on Technical and Vocational Education and Training” who surveys and analyzes the demands in personnel training in water sector of Ethiopia and execute the work by utilizing the survey results.

(4) In addition, C/P is a newly set-up organization, the entire work at site, starting from the inspection and analysis of current status to making the detailed system preparation plan, is conducted with C/P to strengthen the ability of C/P through such activities. Furthermore, it is continuously stressed that the created preparation system plan is to be conducted by Ethiopia counterpart in the future and for them to take the main initiatives.

1.1.4. Methodology of the Work execution

Original methodology for work execution is as follows.

However, following the implementation of BPR, activity No.6 is changed to 6-2.



1.1.5. Proposed Achievements

Based on the work execution, the following outputs are expected.

- 1) In order to perform the function and role demanded by EWTI, make preparation for management system, training execution system.
- 2) EWTI will collect information on its own (on the demand of personnel training in water sector as well as the water sector technology information), which will enable formulation and correction of work plan.
- 3) Improve EWTI personnel capability in plan formulation, execution and monitoring as well as evaluation.
- 4) Enhance the technology, skill of members in water sector to improve the water problem in Ethiopia thru steady water supply.

2. General Outline of EWTI

2.1 EWTI's basis for establishment, its vision, mission, etc.

EWTI is a newly-established institution which was developmentally reorganized from its position as MoWIE's project to Public Institute in August, 2013, and its basis for establishment, its vision, mission, etc. are as follows.

Basis for establishment	<p>EWTI was established with the following objectives based on Council of Ministers Regulation No.293/2013</p> <ol style="list-style-type: none"> 1. To facilitate the transfer of technology to those engaged in water development and related activities. 2. To provide practical training to capacitate the existing and potentially joining manpower of the sector in cooperation with other technical and vocational education and training institutions and higher education institution. 3. To produce and build capacity of instructors required by technical and training institutions.
Vision	<p>To be the “ Center of Excellence” of water sector in Ethiopia.</p> <p>The capacity of development of engineers and technicians engaged in the water sector is one of the most important issues to improve drinking water supply coverage and ensure food security through expansion of irrigation development not only in Ethiopia but also in other African countries. The EWTI has a vision to be a successful model to solve this critical and challenging issue in Ethiopia as well as other African countries.</p>
Mission	<p>To realize nationwide rapid development in the water sector through capacity building, research and study for technology transfer, specialized laboratory and competence service that improve the sector's overall implementation capacity.</p> <p>(The mission is to be the leading institute of human resource capacity development and technology transfer center in the fields of ground & surface water development and scheme management by providing updated practical training and technical & advisory services for public, private and non-governmental organizations already engaged or plan to involve in water related activities.)</p>
Objectives	<p>The Institute shall have the objectives to:</p> <ol style="list-style-type: none"> 1. Facilitate the transfer of technology to those engaged in water development and related activities; 2. Provide practical trainings to capacitate the existing and potentially joining manpower of the sector in cooperation with other technical and vocational education and training institutions;

	3. Produce and build capacity of instructors required by technical and vocational education and training institutions
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2.2 EWTT's sought-out roll and function (Ideal situation)

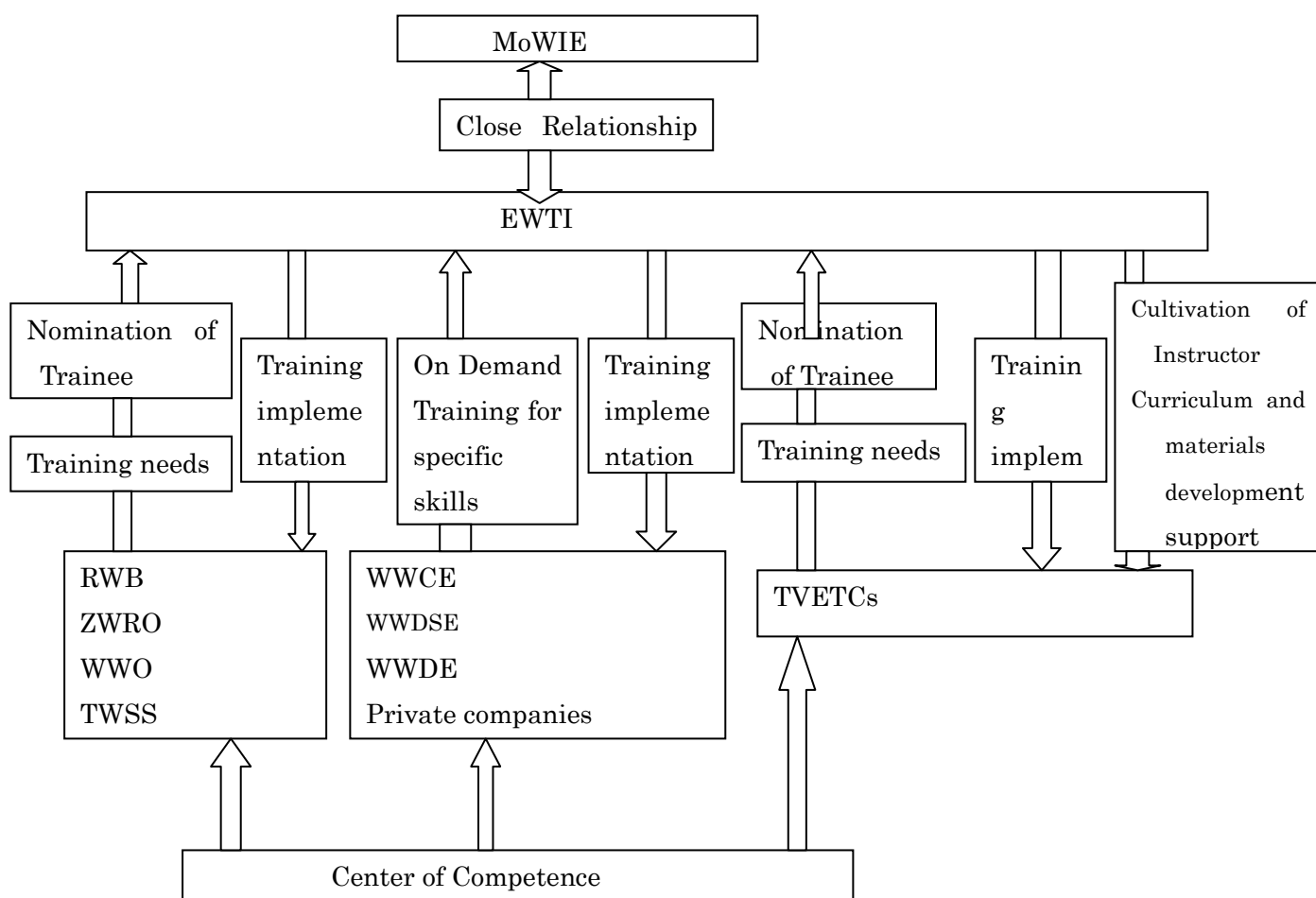
In the Article 6 of the Council of Ministers Regulation No. 293/ 2013, which is its basis for establishment, the Powers and Duties of the Institution are stipulated as follows (for the purpose of accuracy, the English sentences in the official announcement are shown).

1. prepare and conduct short-term practical trainings on courses designed as per international methods to fill identified skill gaps of manpower working at different levels in water development and related activities.
2. facilitate the transfer of technology that enable to fill the local gaps in the sector's development.
3. conduct short-term practical trainings of trainers on courses designed in line with the sector's qualification levels and new technologies to fill identified skill gaps of instructors working in technical and vocational education and training institutions.
4. produce instructors required by the technical and vocational education and training institutions that train in water and water related professions based on the demand of the sector's education and training.
5. conduct long-term training as per national technical and vocational education and training qualification framework on higher level programs in accordance with the manpower requirement of the sector.
6. conduct studies and researches that facilitate the growth of water resource development.
7. provide technical and consultation support to education and training institutions that produce graduates required by the sector in organizing training program and introduction to new technologies; and serve as center for professional competence evaluation;
8. establish and provide specialized laboratory services by identifying the gaps of other institutions operating in the sector.
9. cooperate with higher education institutions on human resource development in the sector; conduct joint research and assist in strengthening of local research and technology transfer capacity in the sector.
10. charge fees for the services it renders in accordance with the rate approved by the government.
11. own property, enter into contracts and sue and be sued in its own name.
12. perform such other related activities as are conducive to the attainment of its objectives.

This summarizes that what EWTT should be (required functions and roles) is to carry out water technology-related training as the central institution of the water sector.

Purpose of establishing EWTI	Functions/roles required for EWTI
To promote the transfer of technology to people engaged in water development and related activities	Implementation of the trainings/drills for existing workers in the water sector and the entrusted trainings/drills
To cooperate with other technical job training schools and higher education institutions to implement practical trainings to cultivate human resources who are working or going to work in the future in the water sector	Based on human resource demands, implement long-term trainings/drills of advanced program in accordance with the job training system (Article 6.5 in the above-mentioned)
To support the improvement in the ability of teachers at technical job training schools	Teacher training support Curriculum development support Teaching material development support Not just improving the ability of teachers, but improve the training implementation ability of the water-related departments of technical job training schools as a whole.

Also , EWTI's main operations necessary to implement from now on are categorized as follows.



2.3 EWTI's current organizational framework and activities

Currently, EWTI has an organizational framework shown in Figure-1 below.

It took over the operations of its predecessor, EWTEC, to implement following 3 kind of training course same as EWTEC implemented.

Training implementation have been carried out by the annual plan prepared that is based on Ethiopian calendar (fiscal year: July to next June).

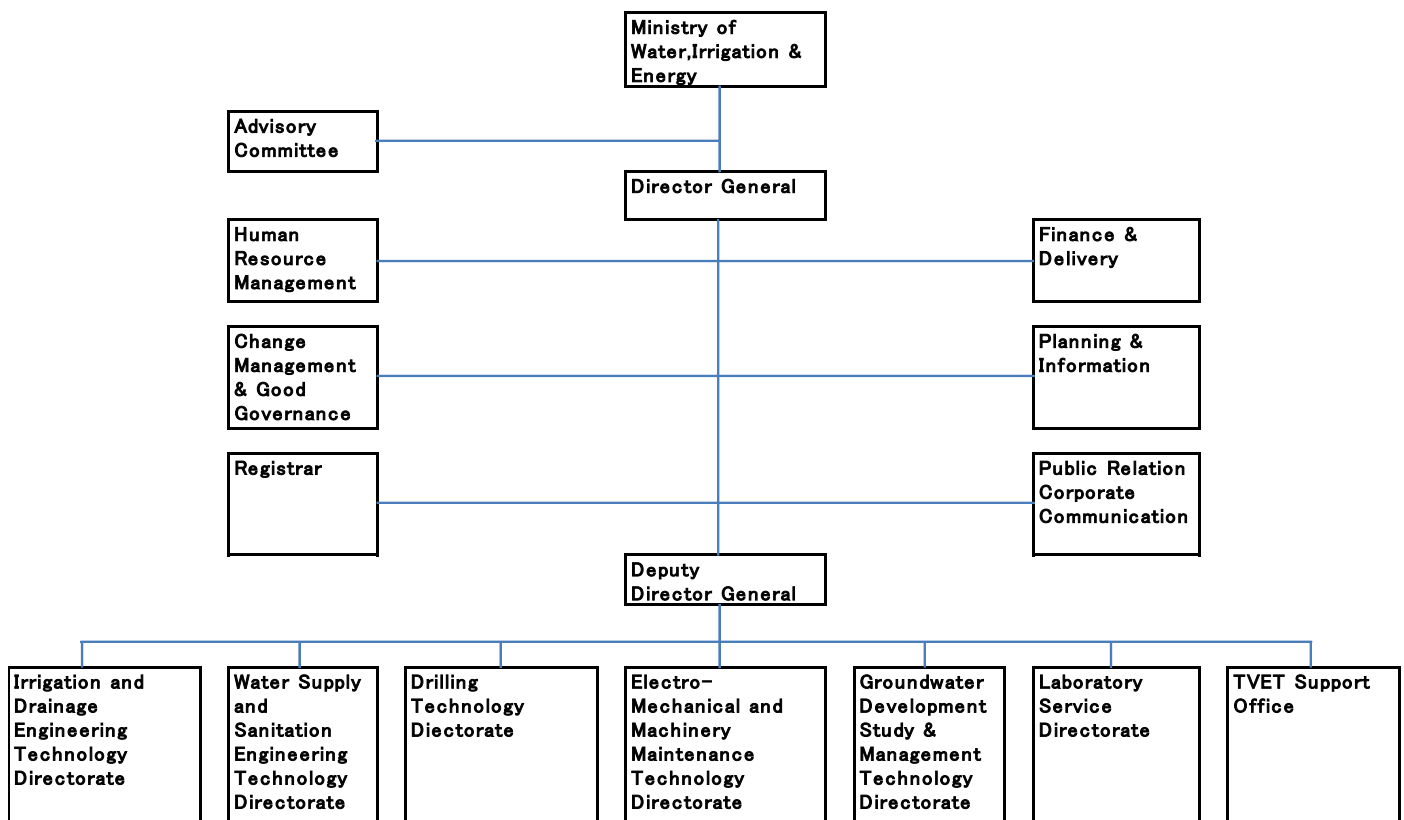
In addition, advanced courses have not been performed after the EFTEC3 end.

	Kind of Training Course	Training Course Name
1	Basic Course 8-12 weeks (non-conforming with EOS)	1. Groundwater Investigation (GWI) 2. Drilling Technology (DT) 3. Drilling Machinery Maintenance Technology (DMMT) 4. Water Supply Engineering (WSE) 5. Electro-Mechanical Maintenance Technology (EMMT)
2	Advanced Course 2-3 weeks	1. Groundwater Modeling (GWM: International) 2. Well Diagnosis/ Well Rehabilitation (WD/ WR) 3. Hydraulic System Maintenance (HSM)
3	Training for TVET 2-3 weeks	1. Electro-Mechanical Maintenance for TVETCs students (at each TVETCs) 2. Electro-Mechanical Maintenance for TVETCs instructors (at EWTI)

The participant requirements of each Basic course are as follows, and requirements for Advanced course are not determined.

	Training Course Name	Educational Qualification	Business experience
1	Ground water investigation	BSc in geology or hydrogeology or related fields	No experience required
2	Drilling technology	Grade 10 complete and above	No experience required
3	Drilling machineries maintenance technology	<ul style="list-style-type: none"> • TVETC graduates (level I-IV) • BSc in auto mechanics, mechanical engineering or related fields 	<ul style="list-style-type: none"> • More than two years for TVET graduates • No experience required for BSc holders
4	Water supply and sanitation technology (application of software such as SAP, water CAD, Auto CAD etc.,)	BSc in water engineering or related fields	No experience required
5	Electromechanical machineries maintenance technology	<ul style="list-style-type: none"> • TVETC graduates (level I-IV) • BSc in electricity or related fields 	<ul style="list-style-type: none"> • More than two years for TVET graduates • No experience required for BSc holders

Figure-1 EWTI's present organizational framework



2.4 Implementation of Business Process Re-engineering

The operation and management of EWTI have been carried out following the legacy of the project period.

However, after Mr. Zenebe Garedew was appointed to the DG in February 2015, he intended to proceed business process re-engineering (BPR) which significantly review the roles and business content of EWTI and the system of operation etc,

In addition, he put efforts to train of young personnel responsible for the future through the BPR, and to review and maintenance of the operation and management system.

BPR was completed the work in October 2015, and new organizational framework, job description of each job, salary standards etc. were created based on BPR. And these created standards etc. are now waiting for the approval from the ministry of civil service and the prime minister's office.

Although it is a BPR draft stage at present stage, significant modifications are not expected. Accordingly, It describe the outline of the BPR based on this content as follows.

(1) Composition of Business Process Re-engineering Study Report (Draft)

Introduction

Chapter one deals with the basic Concepts/Rationale of BPR study.

Chapter two explains methods of study in detail.

Chapter three presents different types and natures of organizational structure.

Chapter Four depicts EWTI's initial conceptual understanding with its responsibilities.

Chapter Five explained EWTI's Organizational structure.

Chapter six presented Roles and responsibilities of each core-process.

Chapter Seven illustrate the Institutes human resources needs with proposed salary scale.

Chapter Eight evaluate EWTI's organizational arrangements with key principles.

Chapter Nine list out assumed Strategic Issues with their proposed counter measures.

(2) Roles and Functions of EWTI after BPR

Based on the legal obligation of EWTI, major responsibilities will be as follows in Table-1.

The main changes cleared by BPR are that the main business of EWTI has been defined for four fields such as water technology education and training, research and technology transfer, special laboratory services and TVETCs support and competency assessment and accreditation. Accordingly, it is now clear the required Roles and Functions of EWTI which conventionally laxness.

EWTI's over all key responsibilities are listed in the following table as per the institute legal mandates;

Table-1 Major responsibilities of EWTI after BPR

	Desired Targets	Strategic Goals
Water Technologies Education and Training	• To conduct Curriculum Design and Evaluation	➤ Curriculum will be designed with active involvement of customers and stakeholders within 50 days
	• To produce required skilled manpower with adequate quality and quantity	➤ Regular training program will be given in 5 major subject areas to graduate 125 trainees every year
	• To facilitate on-demand training program to be given at their sites/locations	➤ Series of short-term training programs will be given in 7 water and irrigation related courses to increase the number of trainee to

		<p>800 in yearly basis.</p> <p>➤ Arrange different type of on-demand training program and increase the number of trainees to 100 in a yearly basis.</p>
	<ul style="list-style-type: none"> • To produce highly qualified and competent human resources equipped with required skills, knowledge and professional ethics • Establish consistent performance evaluation system • Provide Tutorial sessions 	<ul style="list-style-type: none"> • Giving practical trainings with applications of laboratory and other advanced supporting materials • Employee Advanced educational Teaching Methods • Use existing Construction Projects in the sector • Involve highly qualified Instructors with the support of international Evaluators to enhance quality of education by 100% and ensure full satisfaction of customers • Apply 50% with continuous assessment 50% with general examination • Arrange 2 Hr. extra Tutorial sessions to be given for trainees
	<ul style="list-style-type: none"> • To conduct Research and study that support the training programs 	<ul style="list-style-type: none"> • Every year one research outputs will be presented based on findings, which will be also serve as an input for the training programs
	<ul style="list-style-type: none"> • To conduct Impact Evaluation of the Training programs and Consultancy services 	<ul style="list-style-type: none"> • Impact Evaluation of the Training Program and Consultancy services will done once in every three years
	<ul style="list-style-type: none"> • To provide an advisory services for Customers upon their request 	<ul style="list-style-type: none"> • Customers will get the required advisory services within 3 weeks upon

		submission of their request
	<ul style="list-style-type: none"> • To engage in Extra Curriculum activities 	<p>Trainees will be engaged in :-</p> <ul style="list-style-type: none"> - Gender - HIV AIDS - Sport - Min-Media - Environmental Protection and Conservation and other related activities
Research and Technology Transfer	<ul style="list-style-type: none"> • To conduct Research and study to strengthen the sector 	<ul style="list-style-type: none"> • Every year the results of three research and study documents will be presented
	<ul style="list-style-type: none"> • To ensure Technology Transfer based on the needs of the sector 	<ul style="list-style-type: none"> • Every year one Technology will be selected, demonstrated and disseminated
	<ul style="list-style-type: none"> • To provide regular consultancy and technical support for customers upon request 	<ul style="list-style-type: none"> • Customers will get necessary consultancy and technical support for upon their request
Specialized Laboratory service	<ul style="list-style-type: none"> • To provide quality service for Water and soil samples test and analysis 	<ul style="list-style-type: none"> • To provide the result of Water sample test and analysis within 34.4 hour • To provide the result of submitted Soil sample test and analysis within 136.2 hours
	<ul style="list-style-type: none"> • To provide sample test and analysis service for different construction project in the sector such as Dams and irrigation schemes, for their inputs (soil, rocks, sand, gravel) 	<ul style="list-style-type: none"> • To provide the result of sample test and analysis for soil, rocks, sand, gravel within 149.45 hours.
	<ul style="list-style-type: none"> • To provide consultancy service for stakeholders up on their request 	<ul style="list-style-type: none"> • Stakeholder's will get necessary consultancy service upon their request
Technical support	<ul style="list-style-type: none"> • To provide necessary material and 	<ul style="list-style-type: none"> • EWTI will provide necessary

and Competency Assessment Service for TEVET in water sector	technical support for TVET's working in the water sector	material and technical support for 9 TVETs based on the findings of gap or need assessment
	<ul style="list-style-type: none"> • To conduct Impact Evaluation 	<ul style="list-style-type: none"> • Impact Assessment Study will be conducted once in very three years
	<ul style="list-style-type: none"> • To give Certificate for Occupational competency through COC assessment service for developing regions with Level one and three and for others with Level for four and five 	<ul style="list-style-type: none"> • Certificate for Occupational competency assessment service will be given for Training Institutes that have limited capacity in their locality with Level one and three • Occupational competency assessment service will be given for others Training Institutes with in EWTI with medium and higher Levels • Theoretical and Practical Competency Assessment will be given within 4 hr.
	<ul style="list-style-type: none"> • To give Competency Assessment Certificate within short period. 	<ul style="list-style-type: none"> • Occupational Competency Assessment Certificate will be given within 10 minutes

(3) Organizational Framework after BPR

Organizational Framework of EWTI after BPR is shown as figure-2, and organizational framework of Education and Training Directorate is shown as figure-3.

The main change pointed out is that the establishment of the Education and Training Directorate which manage overall training plan and implementation. Thus the traditional silos organizational framework which each department has its own training plan, carry out the operation and management are swept away, and non collaboration and knowledge sharing between the department caused from are seem to be avoided. This led to implement the training effective and efficiently.

Figure-2 EWTI's organizational framework after BPR

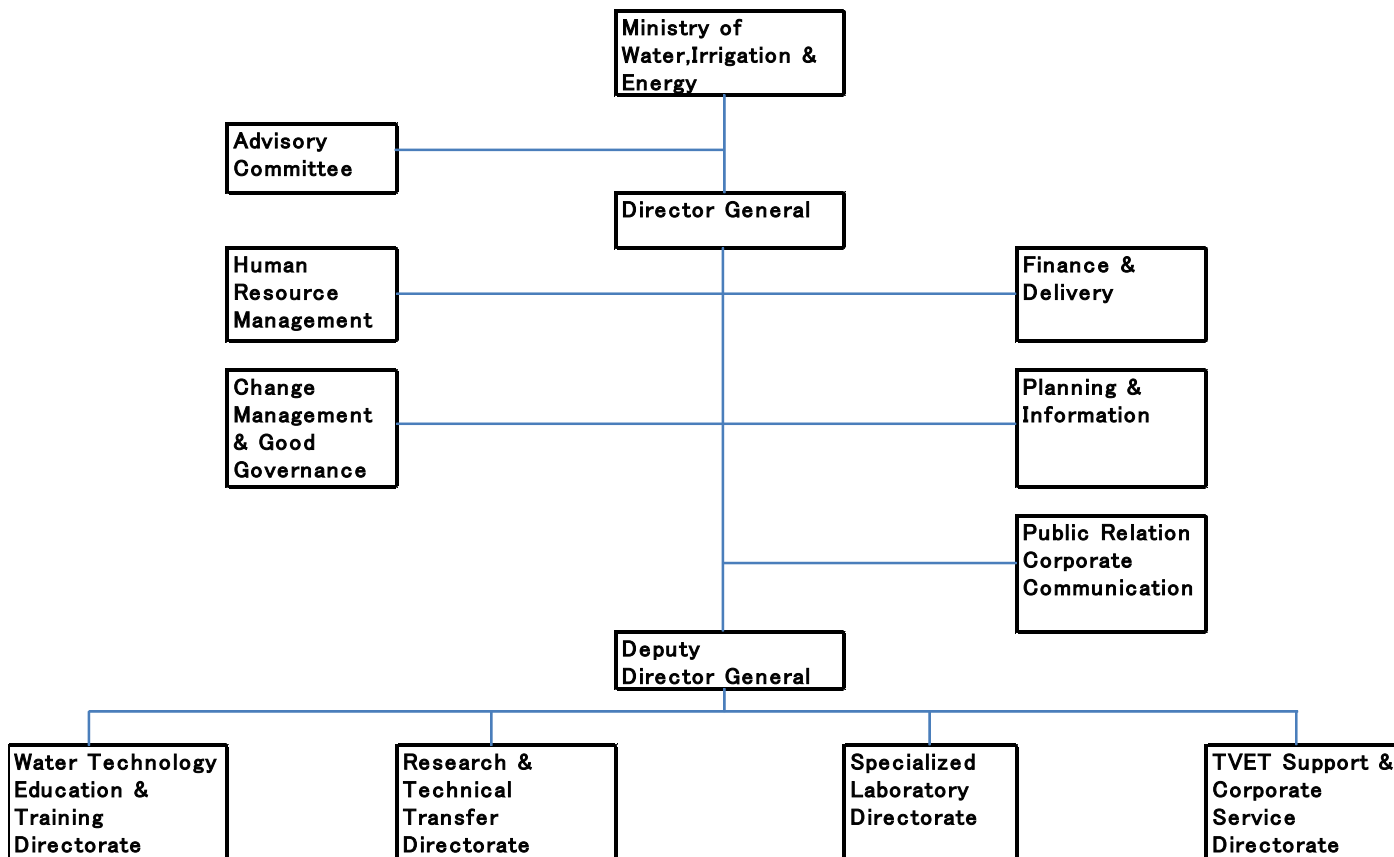
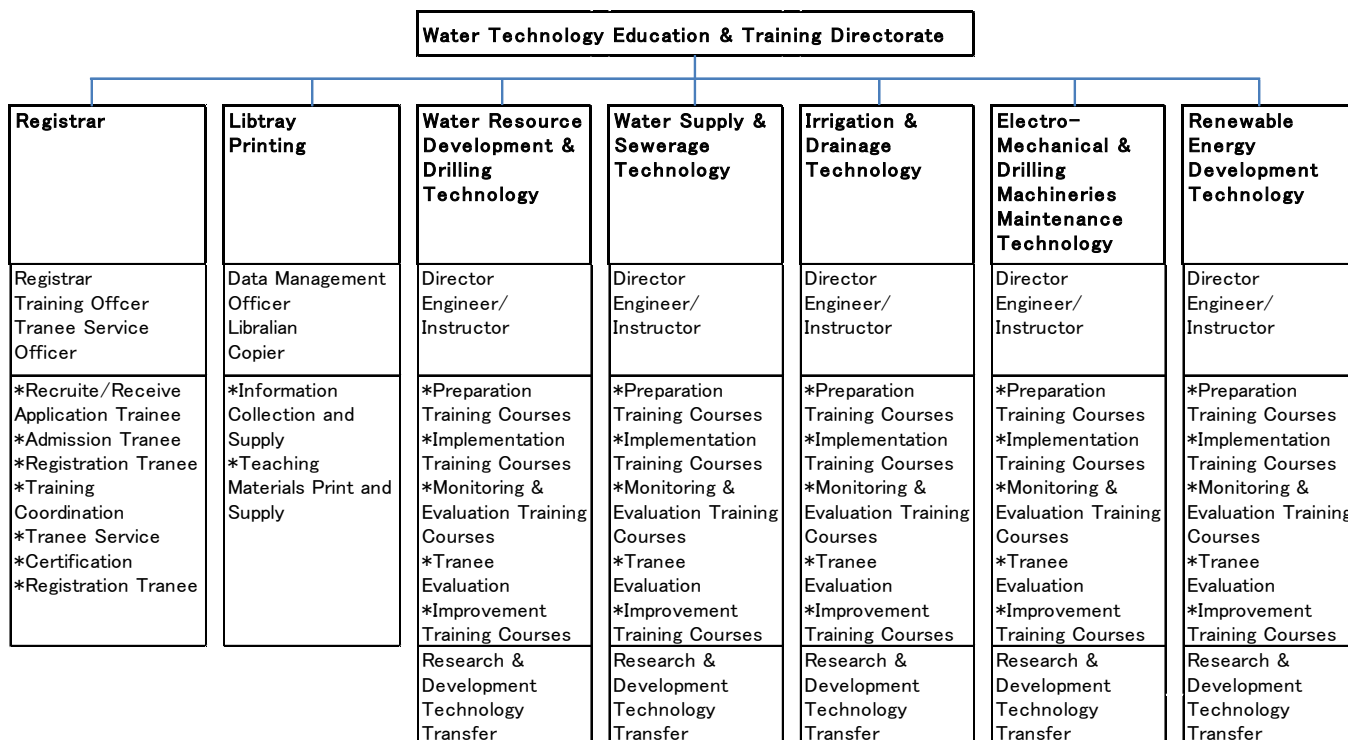


Figure-3 EWTI's Water Technology Education & Training Directorate organizational framework



(4) Main business content and processes

BPR describes main business and processes of EWTI. Above all, water technology education and training, TVETCs support and competency assessment service which are core business of EWTI are described as follows.

1) Water Technology Education & Training

	Kind of Training Course	Main operation
A	Regular Training	Training Need Assessment Curriculum Preparation/Design and Evaluation Recruitment Competency Assessment Impact evaluation
B	Short-term Training	Training Need Assessment Training Evaluation Impact evaluation
C	Continuous Education	Training Need Assessment Curriculum Preparation/Design and Evaluation Recruitment Training Evaluation Impact evaluation

It will be divided into three as described above for technology education and training, how to continue to organize and classification each training and training course that has been planned before BPR is an issue. In addition, the needs survey has been raised to the main operation of each business division seems to be good as which clarifies the purpose and goals of training, and the continuation is expected.

2) TVET Support

In order to provide the technical assistance necessary to the water sector-related TVETCs, there is a policy to implement the assistance by creating an action program stepping on the following steps. However, it is not been clear for specific business content.

- ① Conduct need/gap identification assessment study
- ② Search for financial sources based of the need assessment

- ③ Provide technical support as per the findings of the study
- ④ Follow up the outputs and Impact evaluation

3) Competency Assessment Services

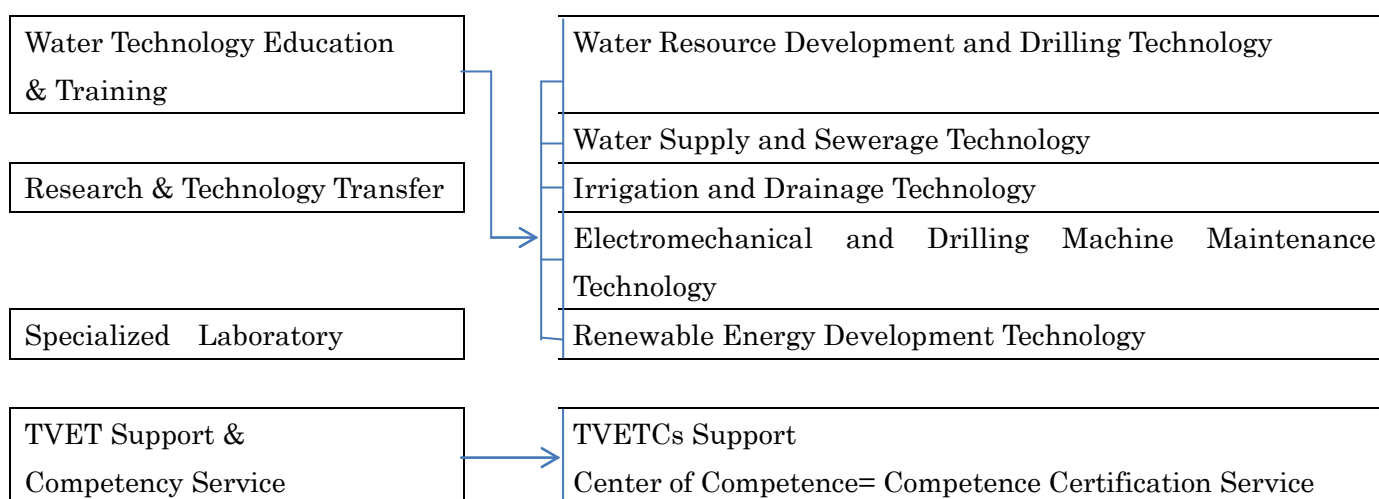
TVETC is also plays a competency assessment center of water sector, but it is not able to assess students who trained by himself. Assessor for assessment is insufficient and facilities and equipment for skill test implementation are also insufficient. Accordingly, competency assessment services have not been carried out satisfactorily.

EWTI implements competency assessment services at all level to complement present situations.

Although the following have been cited as the procedure for this competency assessment service implementation, specific development plan does not exist.

- ① Preparation of Performance measurement indicators
- ② Popularization of prepared measurement indicators
- ③ Collect Requests for Occupational Competency Assessment
- ④ Evaluation of Documents for Requests
- ⑤ Provision of advisory Services
- ⑥ Test/Examination (written, practice and oral)
- ⑦ Announcement of Assessment results and issue Certificate of Award

EWTI's main operations after BPR are summarized as follows.



Planned operation and activities before BPR

Operation		Contents
Regular Training Course		
Short Term Course Non-conforming with EOS	Basic Training Course	1. Ground water Management 2. Drilling Technology 3. Drilling Machinery Maintenance 4. Electrical Mechanical Maintenance 5. Water Supply Engineering
	Advanced Local Training Course	1. Well Diagnosis and Well Rehabilitation 2. Hydraulic System Maintenance 3. Software Application on Water Supply Engineering(CAD/SAP)"
	Advanced International Course	1. Groundwater Modeling 2. Isotope Hydrology(IH)
Long Term Course Conforming with EOS	Basic Training Course	1.Drilling Technology 2.Electrical Mechanical Maintenance
On Demand Training Course Non-conforming with EOS		1.Training for post graduate diploma National Metrology staff training 2.Tariff and Financial Management 3.NRW(Non Revenue Water) Management 4.Asset Management 5.Operation and Maintenance Management
TVET Support Conforming with EOS		1. Curriculum, Teaching Materials development support 2. Training for TVET 2-3 weeks 1).Electro-Mechanical Maintenance for TVETCs trainee (at each TVETCs) 2).Electro-Mechanical Maintenance for TVETCs trainers (at EWTI) 3. Competence Certification Service

(5) Business personnel plan

In BPR, it is described required operational personnel numbers together with qualification s work experiences and other skill requirement. Required business personnel for the water technology education and training, TVETC support and competency assessment are described as following Table-2.

The planned personnel arrangement and the number of personnel determined seem to

be essential to the work carried out, but how to employ the right person in the right place and to continue employment are an issue.

Table- 2 Required number of major staff after BPR

Directorate/ Department	Required No. of staff (No. of major staff)	Present No. of major staff	Major technical staff
Water Technology Education and Training Directorate	15 (9)	2	Director-1, Registrar-1, Record Officer-1, Training Officer-2, Lecturer-4(Pedagogy, Curriculum etc)
Water Resource Development and Drilling Technology Department	20 (16)	7	Dept. Head-1, Lecturer-12, Driller-5
Water Supply and Sewerage Technology Department	14 (10)	3	Dept. Head-1, Lectuere-11, (Construction management -2 person)
Irrigation and Drainage Technology Department	11 (7)	2	Dept. Head-1, Lectuere-6,
Electromechanical and Drilling Machine Maintenance Technology Department	19 (13)	9	Dept. Head-1, Electro- Lectuere-9, Mechanic-Lectuere-3
Renewable Energy Development Technology Department	10 (6)	0	Dept. Head-1, Lectuere-5
TVET Support and Competency Assessment Directorate	6 (6)	2	Director-1, Team-Leader-1, Officer-2, Competency Assess Expert-2

2.5 EWTI's 5 year operation plan

Overview of the 5 years plan of EWTI from 2015/7 to 2020/6 in conjunction with the planning of the water sector of a national plan of draft GTP II(Growth and Transformation Plan II), is described in the following.

Although this plan has been prepared based on BPR, there are some discrepancies against BPR contents such as training implementation plan, number of trainees etc. Accordingly, it is necessary to modify or change in the future.

	Target	Present situations and Future prospects (2015/12)
1	<p>Water Technology Education & Training</p> <p>2015: Total 530 persons</p> <p>Short –term Training 490 persons</p> <p>Long –term Training 40 persons</p> <p>2016-2020: Total 4,625 persons</p> <p>Short –term Training 4,000 persons (1,000/ year)</p> <p>Long –term Training 625 persons</p>	<p>Education and Training Directorate</p> <p>Basic 6 courses (13 time) 280</p> <p>TVET 140</p> <p>International 20</p> <p>JICA(GIS, Well Rehabilitation) 30</p> <p>(Total) 490</p> <p>5 Courses opened up to 2015/12</p> <p>Trainees are not fulfilled expected numbers</p> <p>Long-term course</p> <p>Drilling Technology 20</p> <p>Electro-Mechanical 20</p> <p>Preparation works for implementation is not to begin.</p> <p>Problems and issues to clarify and solve are many (for example, how to arrange cooperative training with Industry, who assess trainee, etc).</p>
2	<p>Competence Certification Service</p> <p>Five years: 2,550 persons</p>	<p>TVET Support & Corporate Service Directorate</p> <p>Necessary to set up Center of Competence but preparation work is not to begin.</p> <p>Problems and issues to clarify and solve are many.</p> <p>TVETCs needs survey is proceeding.</p>
3	<p>Technology transfer</p> <p>5 kinds</p>	<p>Research & Technical Transfer Directorate</p> <p>No one assigned for this.</p>
4	<p>Research & Development</p> <p>10 researches</p>	<p>Research & Technical Transfer Directorate</p> <p>No one assigned for this.</p>
5	<p>Supporting for TVETCs</p>	<p>TVET Support & Corporate Service Directorate</p> <p>TVETCs needs survey is proceeding.</p> <p>2016 hold Workshop and finalize how to support TVETCs</p>
6	<p>Specialized Laboratory</p>	<p>Specialized Laboratory Directorate</p> <p>Preparing draft for Application for Assistance to JICA</p> <p>Proposed amount is US\$ 13 mill but estimated around US\$ 5-8 mill (Equipment cost Abt US\$ 3 mill)</p>

3. Ethiopian Education system and TVET system

3.1 Ethiopian Education system and TVET system

The outline of the education system and TVET system is as Figure-4 on the next page shows.

The elementary education is divided into age 7-10 (Grade 1-4) and age 11-14 (Grade 5-8) and the elementary education completion examination is conducted by local governments at the end of Grade 8.

The secondary education is divided into the early secondary education for age 15-16 (Grade 9-10) and the late secondary education (preparation course for higher education) for age 17-18 (Grade 11-12). At the completion of Grade 10, Ethiopian General Secondary Education Certificate Examination (EGSECE) is conducted by the country (federal government) and those students who exceeded the standard value can go on to the late secondary education, Grade 11-12, which is the preparation course for higher education, and those students who fell below the standard value go on to TVETC or join in the labor market. Further, at the completion stage of Grade 12, Ethiopian Higher Education Entrance Examination (EHEEE) is conducted, and those students who exceeded the standard value can go on to higher education institution (university). Those students who fell below the standard value go on to TVET or training institution for teachers, or join in the labor market.

As a result of the TVET system reform in 2008, the country decided to make the ratio of students going on to the late secondary education to students going on to TVET 2 to 8, taking into account the balance between higher education and TVET, and adjusts the standard value at the time of EHEEE, taking into account the quota of higher education institution (university).

For students going onto TVET, they also sort, for the ratio of the number of students at each level in TVET, technical education/trainings as follows with the National Human Resource Demand Pyramid based on the human resource demand survey from each industrial sector and sort majors in order of grades.

Training level I~II : Training level III~IV : Training level V = 24 : 3 : 1

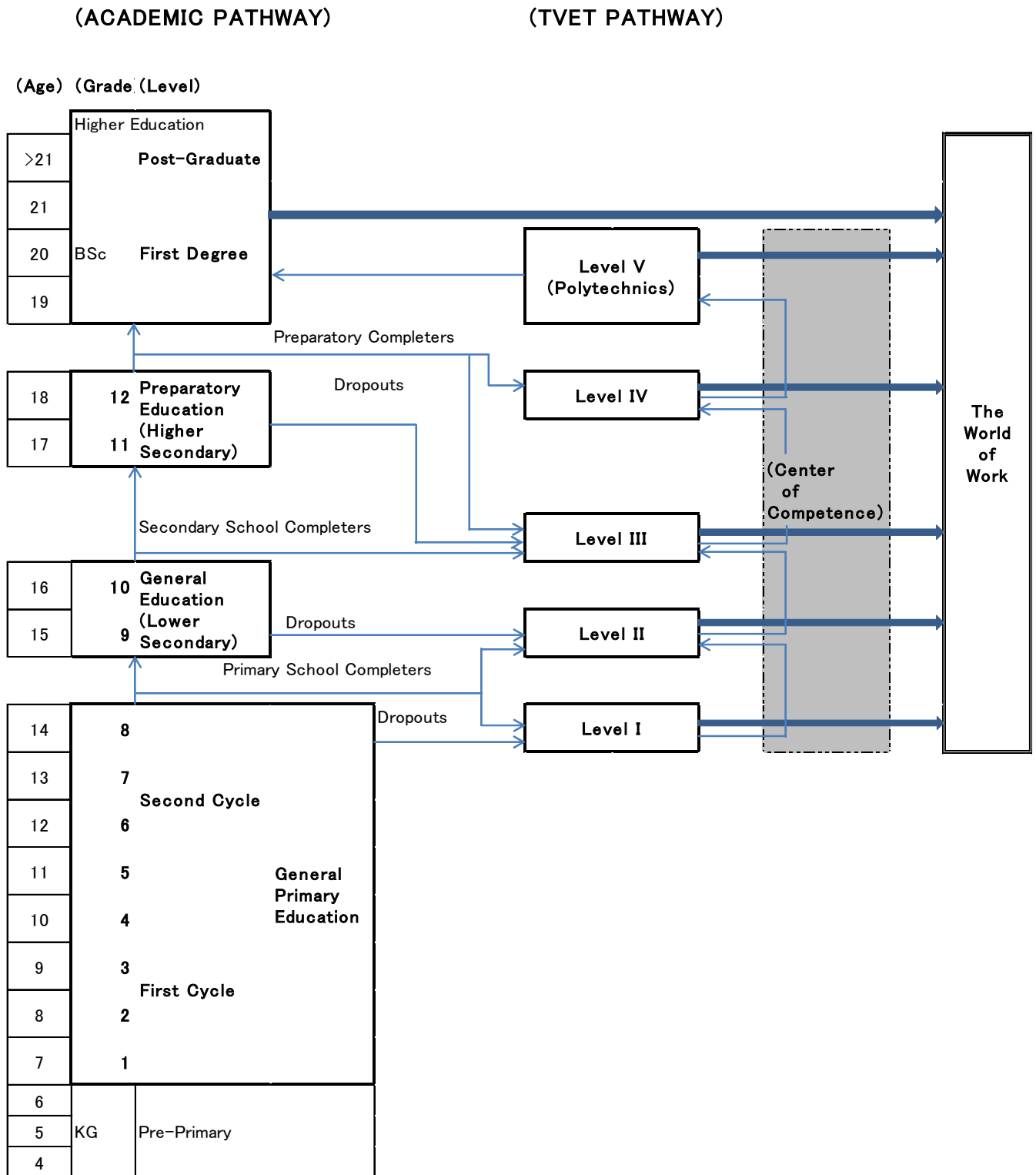
(These values are calculated from the above-mentioned questionnaire survey on human resource demand and they indicate that, for example, 3 field supervisors (Level III - IV) and 24 normal workers (Level I - II) are required for 1 manager of a certain factory.)

As a result of the TVET system reform in 2008, the Ethiopian TVET system was changed from the past “Grade 10 +1/ 2/3 system”, in which students enrolling in TVET were required to have completed the early secondary education and 1-3 year courses were prepared (qualification of diploma was given to those students who have completed the 3-year TVET course and earned the designated credits), to “Level I-V” system based on vocational ability criteria in order to expand the targets of TVET in addition to those students who have completed the early secondary education.

This is a transformation from Course based Training to Competency-based Training, and they

have introduced the Ethiopian National Qualification Framework (ENFQ) based on the Australian system and the Filipino curriculum in order to unify the vocational ability criteria.

Figure-4 The outline of the Education system and TVET system of Ethiopia



The Ethiopian TVET is supervised by the Federal TVET Agency, an affiliate of the Ministry of Education, and its actual operations are implemented by local governments' departments in charge of TVET or educational departments. The Federal TVET Agency's main responsibilities are the determination and publication of the vocational ability criteria suggested by the relevant ministries, the certification and evaluation of job trainers, and the ability evaluation and certification of trainees.

The purpose of TVET is to collaborate with small and medium-sized companies to cultivate human resources and entrepreneurs who have those skills and techniques required by the small and medium-sized companies. Therefore, the Outcome based Training based on the vocational ability criteria and the Cooperative Training in collaboration with industry including small and medium-sized companies (training centering on theories/disciplines at job training institutions: 30%, training centering on practical works by companies/industry: 70%) are implemented.

The training contents are formulated by ministries supervising respective industries in collaboration with industry, etc., and implemented in accordance with the curriculum created by each job training institution in conformity to the five-level "Ethiopian Occupational Standard (EOS)" determined and published by the Federal TVET Agency, and those who completed the trainings must acquire the ability certification at each level from the Center of Competence that is independent of each job training institution, etc.

Level V correspond to senior engineer class, Level III ~ IV correspond to engineer and technicians and Level I ~ II correspond to common labour.

EOS includes technical components, technical level criteria, evaluation guideline, etc. and its outline is as shown in the following Table-3.

Table- 3 Outline of EOS

Level	Knowledge	Skills	Competence
5	Demonstrates considerable depth of knowledge in one or more area(s); and ability to collect, collate, analyse and synthesise a wide range of relevant technical information	Demonstrates ability to select and apply considerable depth of knowledge, tools and technical and communication skills in variable contexts and formulate appropriate responses to unpredictable and complex problems	Manages resources, processes and routine and non-routine activities in vocational and professional settings and works with substantial accountability for personal and group outcomes in contexts that are subject to change

4	Demonstrates a broad knowledge base with substantial depth in some areas, ability to analyse information, apply key principles, theoretical concepts and abstract thinking	Applies a broad range of technical and/or scholastic skills, use appropriate tools, methods and technologies to determine solutions to both predictable and unfamiliar problems, in variable contexts	Works independently under broad guiding principles in unfamiliar contexts, within established parameters, exercising autonomy for planning, supervising and evaluating the work of others and group outcomes
3	Demonstrates a broad knowledge base in a specific area, incorporating technical concepts, and ability to analyse information and make informed judgements	Applies a range of cognitive, technical and communication skills, using appropriate tools to solve a limited range of predictable and unpredictable problems	Shows ability for self-direction, requiring supervision in known and moderately changing contexts, within established parameters, and individual and shared responsibility for group outcomes
2	Demonstrates basic operational, factual and procedural knowledge in specific fields and ability to use and interpret relevant information	Demonstrates ability to undertake defined activities using a moderate range of practical, cognitive and communication skills and tools to apply known solutions to solve familiar problems	Works on routine tasks in predictable and structured contexts under moderate supervision, demonstrating limited judgement and some responsibility for quality and quantity of output.
1	Demonstrates a narrow range of basic operational knowledge and cognitive skills for everyday life, further learning and initial work	Can carry out processes that are familiar and limited in range, demonstrating basic technical and communication skills using basic tools	Completes directed tasks that are repetitive and predictable in highly structured and stable contexts within narrow parameters and under close supervision

Regarding the problems, challenges, etc. of the TVET in Ethiopia, in the “job training demand survey” conducted in parallel with this survey, the problems, challenges, etc. of the TVET in Ethiopia are listed as in Table-4.

Table-4 Issues of TVET

1	Low awareness about the benefit of TVET
2	inadequate stakeholders’ participation in the management and delivery of TVET
3	lack of capacity and competence of trainers and experts to train and implement the new

	TVET strategy
4	inadequate monitoring and evaluation systems
5	low capacity to adopt and transfer technology,
6	inadequate labor market information system to assess labor market demand
7	weak information sharing and coordination system
8	shortage of teaching materials
9	inefficient utilization of resources and equipment

In addition, the problems, challenges, etc. of Cooperative Training are pointed out as in Table-5 by job training institutions and companies/industry.

Table-5 Issues with Cooperative Training

Vocational Training Institutions Side	Industry Side
1. Lack of Time (not 70%, only 30%) 2. More expenses of Students (transportation, accommodation etc.) 3. Lack of communication b/w College-Industry 4. Lack of trained Industry Trainers. 5. Lack of cooperation from Industry.	1. Lack of expected skill 2. Lack of expected knowledge 3. Lack of seriousness 4. Damage of facilities/ equipment 5. Bad behavior

3.2 The Water sector's TVET

In the water sector, 16 EOSs¹ are currently set out as in Table-6, curriculums in conformity with EOS are formulated by 9 TVETCs and trainings are implemented.

Number s described in the table are numbers of Unit of Competency.

Table-6 EOS for the water sector

	Occupational Standard	Level 1	Level 2	Level 3	Level 4	Level 5
1	Catchment Operations	6	5	12	6	
2	Dam Operation and Source Protection		5	9	7	
3	Electro-Mechanical Equipment/ Machinery Maintenance	8	7	6	4	
4	Groundwater Utilization		7	6	6	
5	Hydrometric Monitoring		7	6	6	

6	Irrigation and Drainage Designing and Construction		8	8		
7	Irrigation and Drainage System Operation and Maintenance		5	6	4	
8	Meteorological Forecasting				16	
9	Meteorological Observation		14			
10	Meteorological Technical Assistance			14		
11	Wastewater Collection and Treatment		6	5	5	
12	Water Supply Distribution		9	6	6	
13	Water Supply System Structure Construction	8	6	6	6	
14	Water Treatment		5	5	5	
15	Geotechnical Well Drilling	9	9	5	3	
16	Water Well Drilling and Construction	9	7	8	3	

■ Training delivered by TVETC

The 9 colleges that have departments of water sector and implement trainings are as shown in Table-7, but the details, etc. could not be investigated.

Currently, EWTI is conducting on its own accord the Needs Assessment on the details of those 9 colleges and their requests for EWTI, etc.

Table-7 9 TVETCs implemented the water sector related TVET

Name of TVETC		Region	Number of Students				Number of Teachers
			RWSS	SSID	EMT	Total	
1	Asela	Oromia	146	292	183	636	28
2	Woliso	Oromia	247	131	111	489	21
3	Bahir Dar	Amhara	169	156	148	473	17
4	Komborcha	Amhara	247	186	68	501	19
5	Meychaw	Tigray	169	89	171	429	22
6	Awassa	Southern People's	173	137	125	435	31
7	Melka	Afar	250	199	170	619	20
8	Jijiga	Somali	210	208	143	561	18
9	Asossa	Benishangul-G umusu	206	154	149	509	15

Source: 2009/12 The Project for Improvement of Equipment for Groundwater Development

In the “job training demand survey” conducted in parallel with this survey, the following problems, challenges, etc. of the water sector are listed.

- ①. Lack of skilled manpower
- ②. Lack of effective utilization of machineries
- ③. Lack of capacity building training
- ④. High turnover
- ⑤. Professionals changing their field to road and building construction, b/c low incentives
- ⑥. Low interest for TVET Instructors b/c low incentives
- ⑦. Low interest in safety rules (private)
- ⑧. Technicians unfairly evaluated by the management (private)/ less response from management (private, polytech)

In addition, at the time of conducting field survey on 3 TVETC colleges (Wolisso College, Asella College and Bahar Dar College), the following problems and challenges were listed.

In addition, at the time of conducting field survey on 3 TVETC colleges (Wolisso College, Asella College and Bahir Dar College), the following problems and challenges were listed.

Table-8 Problems and Challenges faced TVETC Woloso, TVETC Asela and TVETC Bahir Dar

TVETC Name	Problems and Challenges
TBET Woliso	<p>① Water-related departments are the following 6, but only 4 departments are currently offered.</p> <p>Water Supply Construction</p> <p>Water Distribution</p> <p>Water Treatment</p> <p>Irrigation Design & Construction</p> <p>Electro Mechanical Maintenance (cancelled)</p> <p>Ground Water Utilization (cancelled)</p> <p>②. The reason why Electro-Mechanic was cancelled is because they cannot formulate a curriculum in accordance with EOS. (The traditional curriculum cannot be revised in accordance with EOS.) In this regard, as EWTI is formulating a standard curriculum taking into account EOS, we have told them to contact EWTI and discuss with them.</p> <p>③. Regarding Ground Water, it has been cancelled since last year because there is only 1 Teacher (Before that, they had sent out 2 batches of graduates).</p> <p>④. Competence examination at each level cannot be implement. It is mainly because of the absence of examiners, but it is also because of inadequate</p>

	examination equipment.
TVET Asela	<p>①. As GTPII has not been approved by the Diet (to be approved within November), there is no freshman in the water-related departments. (Once GTPII is approved, they can expect freshmen via water-related departments and bureaus of states, prefectures and provinces.)</p> <p>②. There are problems of securing teachers, developing curriculums and conducting skill (level) examinations.</p>
TVET Bahir Dar	<p>①. Regarding the ongoing training system with 30% training institution and 70% Cooperative Training, there are various problems including ensuring the consistency of training, selection of practical work site, securing appropriate instructors at the site, means of transportation to the site, etc.</p> <p>②. Regarding trainees, until several years ago, children from local villages were able to receive support from the Ministry of Water to take the courses, but this support was cut off and dramatically decreased number of children from local villages are taking the courses and increasing number of children in the suburbs of College is taking the courses. This has made the number of newcomer water-related engineers from local villages decrease and there is also a problem of the job searching of people who completed the training.</p> <p>Regarding this matter, in the interview with the Amhara water ministry, there was the following statement and this problem was supported. “For both Technician and, Engineer, there is no problem in recruitment (they will be employed in the urban area and there are lots of applications). However, lots of people change jobs and we are always busy filling up. Their new employers are Public Corporations and private companies including drilling companies, construction companies, etc. offering higher salary.”</p>

3.3 The water sector’s TVET and EWTI

EWTI has implemented visiting instruction/training by EWTI staff, group trainings for teachers of TVETCs as support for TVETCs, and it was decided to strongly promote the support for TVETCs since BPR positioned the support for TVETCs as the core operation of EWTI.

Therefore, as mentioned above, EWTI is conducting on its own accord the Needs Assessment on the details of those 9 colleges and their requests for EWTI, etc., and it is planned to implement the support for TVETCs as follows, taking into account the survey results, etc.

EWTI implement Needs Assessment



EWTI prepares Survey Report



EWTI hold Workshop

Expected participants: EWTI, TVETCs, TVET Agency, Ministry, Private sector, JICA, Donors(possible)

Agenda: 1. Problems and Issues faced TVETCs

2. Solutions for Problems and Issues (How to solve)

3. How to implement Level IV and V TVET which are not implemented TVETCs
TVETCs can implement vocational training for Drilling technology which is in high demand for training

How to handle Electro-mechanical machine maintenance training course which is in high demand for training

4. What kind of Support EWTI can offer/ do

A. ToT for Trainers

A-1. Teaching methodology etc

A-2. Knowledge and Skills

B. Send EWTI's Instructor for teaching to TVETCs

C. Support curriculum and teaching materials improvement and development

D. CoC

D-1. Accreditation by EWTI

D-2. Support for Assessor cultivation and Equipment/ Places for Assessment



EWTI prepare Support/ Action Program for TVETCs

Necessary assistance from JICA: A. Knowledge and Skills development from Japanese Specialists

B. Equipment supply for EWTI and TVETCs

4. EWTI's currently implemented operations

4.1 Training courses currently implemented.

Only following (1) to (5) (short-term) basic courses have been carried out from 2014 to until December 2015 (the advanced course and ToT for TVETC lecturers have not been performed).

(1).Drilling technology

	Timing of implementation	Number of participant	Business experiences of participant	Ref.
1	12/ 7-2/10 /2014	10 (M:10, F:0)	0-5years:4, 6-10years:3, 10years:3	
2	4/12-6/18 /2014	10 (M:10, F:0)	0-5years:7, 6-10years:3, 10years:0	Ministry of Defense
3	11/ /2015-1/ /2016	15(M:15,F:0)	n.a	

(2).Water supply engineering

	Timing of implementation	Number of participant	Business experiences of participant	Ref.
1	11/ 4- 12/17/ 2014	19(M:18, F:1)	0-5years:10, 6-10years:6, 10years:3	
2	2/23- 4/ 3/2015	22(M:17, F:5)	0-5years:15, 6-10years:6, 10years:1	
3	10/ 1- 10/30/2015	23(M:17, F:6)	0-5years:14, 6-10years:2, 10years:7	AAWSA-7

Tot for TVETC Lecturer

	Timing of implementation	Number of participant	Business experiences of participant	Ref.(Participate TVETCs)
1	10/13-10/24/2014	18(M:15, F:3)	0-5years:14, 6-10years:4, 10years:0	Maiche-2, Awassa-2, Woliso-3, Asosa-2, Jijiga-3, Kenenis-2, B.Dar-2, Lusi-2

(3).Drilling Machinery maintenance

	Timing of implementation	Number of participant	Business experiences of participant	Ref.
1	4/2014	8 (M:8, F:0)	0-5years:5, 6-10years:1, 10years:2	Not clearly described in concerned documents
2	4/12- 6/18/2014	10(M:10, F:0)	0-5years:4, 6-10years:3, 10years:3	AAWSA-3, M/Defence-2
	11/ /2015-1/ /2016	11(M:na,F:na)	n.a	

(4).Electro-mechanical machinery maintenance

	Timing of implementation	Number of participant	Business experiences of participant	Ref.
1	11/ 4-12/11/2014	17(M:16, F:1)	0-5years:11, 6-10years:2, 10years-:4	
2	10/ 1-10/30/2015	29(M:26, F:3)	0-5years:12, 6-10years:12, 10years-:5	EWTI-1

(5).Groundwater development

	Timing of implementation	Number of participant	Business experiences of participant	Ref.
1	4/12- 6/18/2014	20(M:18, F:2)	0-5years:20, 6-10years:0, 10years-:0	全員学士、Geologist
2	12/ 7- 2/10/2014	17(M:15, F:2)	0-5years:12, 6-10years:3, 10years-:2	全員学士、民間・2
3	11/ /2015-1/ /2016	20(M:na,F:na)	n.a	

4.2 Present conditions for implementing training course

Current conditions monitored during stay in EWTI are as follows.

Item	Current status, problems, challenges, etc.	Special notes, references
Operational management	<p>(1). Business and service documents, manuals, guidelines, etc. have not been developed. Notes 1)</p> <p>(2). It is implemented in accordance with the annual activity plan, but it is currently as follows and it cannot be said that it is implemented in a planned manner.</p> <p>1).The implementation of training is not prepared in a planned manner.</p> <p>① .Implementation plans, etc. have not been created.</p> <p>② Training objectives are not clear and training contents have not been systematized</p> <p>③ Brochures on the commencement of courses are sent by mail to public institutions such as RWBs about a month before the commencement of courses.</p> <p>④ The brochure only has brief course requirements and it does not even have training outlines.</p>	<p>Notes 1)</p> <p>In EWTEC3, a training implementation manual was formulated and they were implemented in a planned manner based on the manual.</p> <p>They were also systematized as the training contents were modularized, but this module¹ is not used and training/drill contents have not been systematized.</p>

¹ List of Module formulated by EWTEC3 is as per Attachemnt-2.

	<p>⑤Teaching materials including textbooks used for the training are not prepared before the commencement of courses.</p> <p>2).During the implementation of training</p> <p>①They are not monitored in a planned manner.</p> <p>3).Training evaluation, improvement</p> <p>① Though questionnaire survey on trainees is conducted, it does not work as a survey which leads to improvement in contents, etc. (Not a survey on training contents but survey on instructors, etc.)</p> <p>②Aggregation, analysis, etc. of the questionnaire survey are not conducted.</p> <p>③ Many of training implementation reports, evaluation reports, etc. have not been prepared.</p> <p>System to reflect the results of past evaluation for future training is not established.</p>	
Lecturers/instructors, teachers and technical staff	<p>(1).Short of instructors/technical staff</p> <p>(2).High job turnover, extremely low retention rate of younger staff</p> <p>(3).They have not received any trainings, etc. on teaching methodology, etc.</p> <p>(4). As for expertise, they are BSc or higher and have considerable amount, but for Practical Skills, while Director has considerable amount from years of experience, most of the technical staff are young and have only 1-3 year experience, and it cannot be said that their techniques/skills are sufficient.</p> <p>(5).Human resource development plan including participation in OJT, external trainings, etc. are not prepared.</p> <p>(6).Their awareness as instructors/technical staff are extremely low</p>	
Equipment	<p>(1). Considerably prepared because of the past supports, but some of the equipment are aging or insufficient in quantity (in particular, rigs are out of date and obsolete) Notes 2)</p> <p>(2). It can be said that even system has not been</p>	<p>Note2)</p> <p>WWDE and private sector used latest Rig truck. EWTI can only train basic skills for</p>

	developed (training contents need to be modularized, and necessary equipment, etc. need to be prepared)	drilling using old rigs. Furthermore, there are no metrical equipment for water supply engineering.
Facility	(1).The administrative department and the training site are located in different places and it caused some inconvenience. Notes 3) (2).The dormitory is aging and only a limited number of trainees are accepted (40 people) Notes 3) (3).Only 1 Internet connection (concurrent usage is impossible) caused inconvenience for data collection and public relation activities etc. Notes 4) (4).Equipment for operational management including copy machine and printer etc. are aging and insufficient	Notes 3) New administration building and new dormitory building (quota: about 100 people) are scheduled for completion in June 2016. Notes 4) Web-site is opened in EWTEC3 but now is closed.
PR/ collaboration with other groups, industry	(1). The PR department has only 1 person and no effective PR activities seems to be conducted. (2).They are making efforts to collaborate with universities, etc., but it seems to be not in a planned manner (3).Few collaborations with industry and water sector related stakeholders.	

It is planned to implement long-term basic training courses in March 2016, which includes the Electrical Mechanical Maintenance Course to train electrical equipment-related technicians which are in high demand in the water sector and the Drilling Technology Course that cannot be established in TVETCs in terms of equipment (rigs).

These courses should be implemented in accordance with EOS because they will be job trainings (cultivation trainings) for new graduates, etc. to cultivate their ability as skilled labors by making them acquire basic skills and knowledge necessary for a job. Therefore, EWTI has already prepared the following curriculums and reference materials that had been created by private consultants supported by JICA.

Curriculums

- ① Construction Management Level V (including EOS 16 competences)
- ② Water Works Site Construction Management Level IV(including EOS 13competences)

- ③ Water Well Drilling and Construction Level I-III(including EOS 11, 9, 10competences)
- ④ Electro Mechanical Level I-IV (including EOS 10, 9, 8, 6cometences)

Reference materials

- ① Electro Mechanical Level II
- ② Water Well Drilling Level I
- ③ Water Work Site Construction Level IV

However, time allocation, etc. based on the curriculums have not been decided yet, and EWTI staff extremely lack awareness of and experience in EOS and cultivation training implementation. In addition, there are lots of problems and challenges to resolve, such as a method to implement the Cooperative Training and the Assessment of trainees that are required in the TVET system.

Therefore, it was confirmed by some staff members including DG to immediately formulate and execute a roadmap for establishment/implementation in order to overcome the current situation. (It was discussed and decided on December 7, 2015, by Registrar/Mr. Zewdu, Planning Director/Mr. GIRMA and Human Resource/ Mr. ALEMAYEHU.)

However, as mentioned below, according to the communication as of January 9, 2016, it was decided that the establishment of long-term courses would be postponed until the next fiscal year due to following reasons. (It is decided that short-term courses are implemented instead of long-term course.)

- ① Lack of capable Instructors. It takes about 2 months for reorganizing present organizational framework based on BPR, and it takes some times for training all the instructors both technical and methodological courses.
- ② In addition to Labor demand survey for the next five years, it is necessary to implement specific training need study.
- ③ High demand and feedback from the water sector to expand the short term training in relation to drought resistance works. Based on these situations, it is better to prepare and implement a training plan for two week Electro-mechanical and drilling technology in two rounds for 80 additional professionals.

5. Problems and challenges of EWTI

Based on the above findings, the challenges facing EWTI are summarized as follows.

1) Challenges of EWTI management organizational structure

	Challenge
1	<p><u>Operation/ Management system is not well established</u> After the current DG assumed his position, they have promoted Business Process Re-engineering and worked on the review/development of operation/management system including the nurturing of younger staff who will bear the future, but no visible effect/result has been achieved up to December 2015..</p>
2	<p><u>Traditional silos organizational framework</u> Taking over the organization in the era of EWTEC, its current situation shows vertically divided system, which lacks communication between departments, and it cannot be said that operations are implemented smoothly.</p>
3	<p><u>Advisory committee is not established</u> It was decided to set up a <u>Advisory committee</u> to reflect/utilize the evaluation/opinion, etc. of external relevant institutions, external intellectuals, etc. in the formulation of operational plans, etc., but it has not been established yet.</p>
4	<p><u>Pending arrangement for workplace environment</u> There is only one internet connection and office equipment including copy machines and printers etc. are in shortage as well, which requires early development of job environment in a tangible aspect.</p>
5	<p><u>Management of human resources and motivation of staff</u> Supervisors do not manage or instruct their subordinates. Except for a few workers, the majority of workers do not seem to work on their respective operations actively/in a positive way. There are challenges in the management of human resources.</p>
6	<p><u>Incomplete communication</u> We have to say that senior workers and staff members do not communicate with each other in a practical way. (It cannot be said that senior workers provide staff members with instructions, etc.)</p>
7	<p><u>Unclear division of duties</u> Operations are concentrated on a few workers and the division of duties remains unclear.</p>

8	<p><u>Unclear human resource development policy</u></p> <p>Abilities required in the course of their work have not made clear.</p> <p>Human resource development plans have not been formulated and have not been made clear.</p> <p>The direction, measure, etc., of human resource development have not been shown clearly to each worker.</p> <p>Technical staff/instructors are not trained in a planned manner.</p> <p>For newly hired workers, only a simple briefing of EWTI overview is provided and no training, etc. for new workers is implemented.</p> <p>No systematized human resource development including instructors has been developed.</p> <p>Workers only participate in ad-hoc trainings provided by governments, etc.</p>
9	<p><u>Business vision is not clear</u></p> <p>It cannot be said that the basic philosophy and policy concerning operations and services are not established, and they are needed to be established.</p>
10	<p><u>Pending arrangement for the public relations</u></p> <p>In EWTEC3 report as well, the enhancement of PR function is suggested as follows. "EWTI should assign a skilled person to take charge of public relations and continue disseminating information to all related organizations." On the other hand, EWTI currently has 1 Director who was employed at the beginning of this year and, though they are obliged to report their activities, etc. of the quarter, the half year and the year to the Ministry of Water and the Planning Directorate, it does not seem that they are actively releasing information to others. The PR department has not been developed.</p>
11	<p><u>Little awareness of safety and health management</u></p> <p>They have very little awareness of safety and health management. As the number of trainees in trainings/drills is increasing, the safety and health management system needs to be established immediately.</p>

2) Challenges of EWTI's operation implementation system

Challenge													
1	<p><u>Shortage of technical staff</u></p> <p>The current number of technical staff members in each department is as follows and the technical staff is in shortage.</p> <table border="1" data-bbox="220 1697 1437 1993"> <thead> <tr> <th>Directorate/ Department</th> <th>Present No. of technical staff</th> <th>Planned No. of technical staff with BPR</th> </tr> </thead> <tbody> <tr> <td>Water Technology Education & Training Directorate</td> <td>2</td> <td>9</td> </tr> <tr> <td>Irrigation & Drainage</td> <td>3</td> <td>11</td> </tr> <tr> <td>Water supply & Sewerage</td> <td>4</td> <td>14</td> </tr> </tbody> </table>	Directorate/ Department	Present No. of technical staff	Planned No. of technical staff with BPR	Water Technology Education & Training Directorate	2	9	Irrigation & Drainage	3	11	Water supply & Sewerage	4	14
Directorate/ Department	Present No. of technical staff	Planned No. of technical staff with BPR											
Water Technology Education & Training Directorate	2	9											
Irrigation & Drainage	3	11											
Water supply & Sewerage	4	14											

	Drilling Technology	5	16
	Groundwater Development	3	(consolidated by BPR)
	Electro-mechanical/ Machinery Maintenance	9	13
	Specialized Laboratory	5	11
	TVET support and Competency Assessment	2	6
2	<p><u>Lack of practical experienced technical staff</u></p> <p>The Director class of each department has considerable knowledge and techniques because of the past technical cooperation, but most of the other technical staff members have just been hired recently (around 1 year) and have a little experience in the water sector, lacking practical knowledge / experience.</p>		
3	<p><u>Unstructured training management</u></p> <p>Business and service documents, Guideline, Manual, etc., have not been developed. Directions/orders are not documented and most of them are given orally. The clarification, documentation, etc., of operating process has not been done.</p> <p>The training contents, etc., of EWTEC3 have not been revised/modified, etc., since they were taken over.</p> <p>The training objectives/contents have not been clarified and the targets have not been specified. It cannot be said that the trainings are efficient and effective as younger workers and workers with decades of experience are taking the same courses.</p> <p>In EWTEC3, there was a system with Japanese expert – Coordinator – Instructor, in which, based on the training implementation manual (IEC/teaching method manual), course guides, training modules, etc. were prepared and the trainings were planned and implemented, but currently it cannot be said that those are utilized continuously and it cannot be said that the trainings are implemented / managed in a planned manner. Also, well-experienced Instructor classes have flowed out and inexperienced young worker with around 1 year experience at EWTI is now working as Instructor and there are concerns about the operational management of courses, the aspect of practices, etc. The ability development of the young Instructor class is a pressing issue.</p> <p>We have to say that the quality management system has not been developed.</p> <p>A questionnaire survey on training contents, etc. is conducted among trainees after the implementation of training, but the survey contents still have a room for improvement and it does not seem that aggregation, evaluation, etc. are carried out.</p> <p>The results are not utilized for improving the next training courses. Further, reports, etc. after implementing trainings are not prepared.</p>		
4	<p><u>Pending arrangement for the knowledge management system</u></p> <p>Instructor classes with EWTEC3 experience have flowed out and inexperienced young worker</p>		

	<p>with around 1 year experience at EWTI is now working as Instructor and the Instructor does not know about (is not informed of) the manuals, modules, etc. prepared by Technical Cooperation P-3 and know-how, etc. accumulated so far have not been handed over.</p> <p>Only a part of the deliverables of Technical Cooperation is stored as a hard copy in the library and used as a training material, and no knowledge management system has been developed.</p>
5	<p><u>Pending arrangement for disclosure information-I</u></p> <p>Recently, EOS-based standard curriculum was formulated for Electro-Mechanical and Construction Management, but even the formulation itself has not been announced and the curriculum is not utilized effectively, which shows that the ability development system, model curriculums, teaching materials, etc. are not disseminated to other groups, etc. (As Woliso TVETC cannot develop EOS-based curriculums, the Electro-Mechanical course has been cancelled since this year.)</p>
6	<p><u>Pending arrangement for disclosure of information II</u></p> <p>EWTI's annual plans, etc. are not disclosed to Stakeholders of state Water Bureau, etc., and brochures on the commencement of / application for courses, including the course names (training contents, etc. are not included), period, requirements (only with academic background such as diploma and BSc, and years of experience, etc. are not questioned) are sent by mail, and about 10 days later, EWTI makes phone calls, etc. for verification and decides on trainees. The trainees are selected by states, etc. to take the courses. Therefore, it does not make a training service which takes into account the opportunity to access, the correction of disparities, etc.</p>

3) Challenges EWTI staff aware

During stay in EWTI, it is collected the challenge of EWTI from each directors and mid-level staffs by conducting interview.

The results of interviews are summarized as par attachment-6 and 7.

6. Suggestions to EWTI (Draft)

Suggestions to EWTI (Draft), based on the above-mentioned 4. Problems and challenges of EWTI and 5. BPR outline proposed by EWTI, are as follows.

1) Suggestions (Draft) concerning EWTI's management operation system, etc.

The suggestions are as follows, but most of them lead to the implementation of BPR formulated by EWTI and result in steadily implementing the organizational framework reform by BPR by setting priorities.

	Item	Proposed suggestions
1	Manager, organizational framework, development of operating environment, etc.	<p>1. In the future as well, it is hoped that managers focusing on management ability would be appointed to conduct his/her duties, without being easily obsessed with people from the Ministry of Water and seniority to choose the manager. In this regard, we will promptly set up a council for relevant institutions, external intellectuals, etc.</p> <p>2. The vision, mission and core operations were confirmed by BPR. In order to implement the core operations appropriately and smoothly, the planned organizational framework should be developed immediately.</p> <p>3. Job Description (division of duties) was documented and clarified by BPR. Taking it into account, we will immediately formulate and implement human resource cultivation plan and human resource development/management plan.</p> <p>4. By developing Business and service documents, Guidelines, Manuals, etc., and operating / managing each operating process with PDCA cycle, we should manage and implement systematized, clarified and organizational operations.</p> <p>5. New administration building and new dormitory building will be completed by June 2016, and we will secure the budget for the equipment, Internet connection, fixtures, fittings, etc., needed in the course of operation and develop the working environment.</p>
2	Further clarification of functions, roles and operation contents BPR clarified the functions, roles and operation contents, but there still	<p>1. It is necessary to discuss with the Ministry of Water, TVET Agency and people involved in TVET including TVETCs as well as people involved in industry, immediately organize those matters to be organized and further clarify the</p>

	<p>remain some matters to be organized as follows.</p> <ol style="list-style-type: none"> 1. The long-term courses should be implemented in conformity with EOS, but as the curriculum formulation, the selection of Cooperative Training partners and the institutions to implement the trainings for that cannot be the center of competence for the trainees who had trainings in such institutions, what should the competence certification for the trainees be? <p>Also, what should the separation from TVETCS implementing the same type of long-term courses?</p> <ol style="list-style-type: none"> 2. How should be respond to the fact that there is no TVETC which implements the trainings at the water sector EOS level of IV and V? 	<p>functions, roles and operation contents of EWTI.</p> <p>At a Workshop based on the result of the survey on TVETCs needs described in 3.3 the water sector's TVET and EWTI, those matters will be discussed and EWTI's operations will be clarified.</p>
3	<p>Collaboration with Stakeholders (relevant institutions, industry, etc.)</p>	<ol style="list-style-type: none"> 1 . Set up a council immediately and reflect/utilize the evaluation/opinions discussed in the council in operational management. 2. Be a regular member of WASH Program Sub-Group and ONE WASH National Program-related meetings to collect information concerning human resource cultivation challenges, plans, supports, etc., at WASH sector and formulate training plans based on the sector needs.
6	<p>Strengthening of the relationship with Public Relations, Stakeholders, etc.</p>	<ol style="list-style-type: none"> 1 . It is necessary to actively recruit staff members, proactively publish EWTI's operation contents and current situation by opening a Web-Site and issuing PR magazines, etc., and actively implement the strengthening of the collaboration with Stakeholders and industry. 2. For Stakeholders in the water-related state departments, etc., who dispatch trainees, disclose information, etc., actively in particular. Measures, etc., for that need to be formulated and implemented immediately.

2) Proposed suggestions to EWTI's operation implementation system and operation implementation

The suggestions are as follows. EWTI can work on the securing of technical staff on its own, but it is considered to be extremely difficult to implement on its own the development of operation implementation system and the development of operating process, considering the current capacity of EWTI. By gaining support from external experts, donors, etc., we should immediately work on the development of operation implementation system and the development of operating process.

	Item	Proposed suggestions
1	Securing and cultivation of technical staff	<p>1 . It is necessary to immediately secure technical staff needed for implementing the planned operations, appropriately examining their qualification, ability, etc.</p> <p>In particular, regarding Water Supply in charge of water supply and distribution department and Groundwater Development department which is the foundation of groundwater development, we have extremely few technical staff members at present, therefore, we will immediately employ technical staff members for them.</p> <p>2 . We should publish human resource cultivation plans and implementation measures for them to motivate the workers, etc.</p> <p>For example, tangible/intangible incentives including dispatch to a domestic graduate school and rewards could be considered, but in giving them, it is necessary to clarify that they are obliged to work for a certain period after being dispatched, etc.</p>
2	Operation implementation system development and operating process development	<p>1 . Immediately develop and establish the operation implementation system, seeking for supports from external experts, etc. as well.</p> <p>1-1. Planning Refresher Trainings, providing trainings for beginners, intermediate trainings and advanced trainings, and Skill-up Trainings with the aim of introducing the latest technology and improving techniques, for example, we will clarify the training/drill objectives and training contents, as well as plan and implement trainings which specify targets.</p>

		<p>1-2. In planning and operating the trainings/drills, process management methods, which provide the operation/management utilizing PDCA cycle in each process, will be developed/established.</p> <p>1-3. Develop a knowledge management system to develop and establish a system to utilize the accumulated know-how, etc. effectively and implement operations. Actively release the accumulated know-how, etc. to the outside and contribute to the technology improvement of the water sector as a whole.</p> <p>1-4. Establish a close relationship with people involved and beneficiaries, seek to understand their needs and implement operations from the perspective of beneficiaries.</p> <p>1-5. Work on the establishment of Urban water utility training course and Asset Management course, which are in high training/drill demand, in a positive way, and select the division and person in charge of the preparation for the establishment of new courses and implement the operation.</p> <p>2 . Seek for supports from external experts as well and immediately formulate the standard curriculum, module and fixed teaching materials, etc., for each department of water sector, taking EOS into account.</p> <p>3 . Seek for supports from external experts as well to improve the ability and techniques of EWTI's technical staff immediately.</p>
3	<p>Effective utilization of the results of Demand Survey on Technical and Vocational Education and Training</p>	<p>“Demand Survey on Technical and Vocational Education and Training” was implemented from May to November 2015 by a separate dispatched specialist, and Labor force demand survey over the next five years and a database of stakeholders are predicted and arranged.</p> <p>Accordingly, it is desired for EWTI to use the results of this survey effectively and efficiently for conducting preparation works for training and conducting training needs survey. (For details, refer to the report prepared by the specialist)</p> <p>However, it is necessary to keep in mind followings for utilization</p> <p>1. The results of this survey is only the labor force survey (what kind of technicians are demanded) and it is necessary for EWTI</p>

		<p>to prepare and implement the training course by conducting specific training needs survey in accord with this survey. Together with, it can be performed effectively and efficiently by utilizing the database established by this survey for conducting specific training needs survey.</p> <p>2. According to the results of this survey, it can be found that the higher labor demand for the electro-mechanical machinery maintenance, drilling and drilling machinery maintenance. Therefore, EWTI is desired to review the policy and contents of present short-term training course for the electro-mechanical machine maintenance, drilling and drilling machinery maintenance, and also to strengthen the capability of technical skills and teaching ability of the lecturer to meet the needs of the market.</p> <p>3. The result of this survey also including the demand of private sector for human resource development and it found that the private sector want to dispatch the labors for training courses conducting by EWT. Therefore, it is desired for EWTI to consider possible inclusion of the private sector for conducting the training.</p>
4	Support for TVETCs	<p>1 . Through TVETCs Needs survey, which is currently conducted, and a Workshop with people concerned based on the survey, immediately formulate the TVETCs support action program.</p> <p>2 . Regarding the action program, determine the priority order and methods for the support (implemented by EWTI on its own, and implemented by receiving support from donors).</p> <p>3 . Develop a system of the department in charge of support for TVETCs and secure necessary staff members.</p>
5	Others Development of trainee data Safety and health management	<p>1 . The electronic data of trainees who have taken training/drill courses at EWTEC and EWTI should be organized to develop a system in which the data can be utilized for performing operations in the future.</p> <p>2 . Immediately formulate and implement plans concerning safety and health management, and actively publish its meaning, contents, etc., to people concerned to diffuse the safety and health management.</p>

Attachment-1

EWTI and Hyman Resources Development in Water Sector

(From ONE WASH NATIONAL PROGRAM Program Document August 2013)

1.2.6 Program Components

The Program will include the following components:

Component 1: Rural and Pastoral WASH - Estimated cost: USD 1.03 billion (water supply) and USD 0.4 billion (sanitation and hygiene). Activities by the water bureaus will include construction of 55,865 new conventional water points and water supply schemes and rehabilitating 20,010 existing schemes. Furthermore, 42,529 household dug wells and community dug wells are expected to be constructed by households and communities through self supply.

Component 2: Urban WASH - Estimated cost: approximately USD 786 million for water supply and USD 95.7 million for sanitation improvements in urban areas. Main activities include study and design, capacity building and management support, environmental and resettlement safeguards, immediate service improvements and expansion and augmentation of water supplies. Sanitation and urban environmental improvements will include desludging equipment and facilities, management of wastewater and public toilets in selected locations.

Component 3: Institutional WASH - Estimated cost: USD 545.7 million. Activities include support to improving water supply and sanitation facilities and hygiene practices at health institutions, which will be the responsibility of the Ministry of Health (MoH) and regional and city health bureaus and woreda health office. The Ministry of Education (MoE) and regional and city education bureaus and woreda education offices will be responsible for planning and implementing WASH activities in schools. Regional/city water bureaus may provide technical assistance in the design, construction and supervision of water supplies in institutions. The indicated amount includes 11,415,542 USD to be used for water quality monitoring. Doing so is expected to increase economy of scale and ease out administration arrangements.

Component 4: Program Management and Capacity Building - Estimated cost: USD 90,028,152 for rural WASH component management and capacity building and USD 78,618,150 for urban WASH program management and capacity building. Furthermore technical assistance in self supply, supply chain, pastoral WaSH, M&E will be provided at a cost of USD 10,158,848.

This component includes support to improve skills and capacity of the Program's organizations and implementing parties at all levels to plan, manage and monitor Program activities through training, post-construction management support, equipment, tools, and support to monitoring and reporting. The Program will support a minimum staffing and resource package necessary to effectively implement the Program at all levels to be determined by a capacity assessment at federal, regional/city and town/woreda level.

Capacities of TVETCs and HSCs will be enhanced at an estimated cost of USD 11,977,590 through support to training of trainers, curriculum development and training equipment for workshops and

laboratories. Similarly, services from the Ethiopian Water Technology Institute (EWTI) will be used to train WASH professionals at an estimated cost of USD 3,655,308.

10.3 WASH Training Centers of Excellence

10.3.1 Ethiopian Water Technology Institute (EWTI)

A Proclamation was issued in June 2013 establishing the EWTI (formerly the EWTEC) as a research and training institute with an Advisory Board appointed by GoE. The Institute will offer higher-level training to graduates from TVETCs and other institutions as well as the private sector. The Institute also offers training to TVETC teachers. The Institute is also in a position to support the improvement of skills to micro and small enterprises that can in turn provide WASH products and services.

The Program will make use of the services of EWTI to provide training to WASH staff, TVETCs and the private sector to increase the availability of skilled personnel to provide services to the WASH sector.

10.3.2 TVETCs and HSCs

In the recent WASH capacity assessment it is observed that the Capacity Building Project has conducted capacity assessments of 16 TVETCs and HSCs through SNV and Water Aid. These assessments identified the following capacity gaps:

- * Limited and/or non-existence of essential physical and training resources, including equipment and tools, reference books, logistics and support facilities
- *Not adequately consulting relevant WASH stakeholders when planning training
- *Deficiencies in assessing and responding to their environments and developing appropriate training strategies and programs
- *Skill gaps among instructors in conducting practical training, with only a few teachers having completed teaching methodology courses
- *Limited knowledge of WASH policies and strategies

To further institutionalize and professionalize the training of much-needed skilled technicians for the WASH sector. The Program will seek to replicate and scale up the support to TVETCs and HSCs provided through UNICEF, SNV, Water Aid and other organizations to additional TVETCs and HSCs. This assistance will include support to curriculum development and lesson planning, teacher training and basic training equipment and tools for workshops and laboratories.

The Program will also support short-term professional and technical training by EWTI and other institutions to produce a cadre of trained WASH technicians with relevant knowledge and skills. Training modules can be prepared or adapted through technical assistance or collaborative arrangements among training institutions, including universities, in and outside Ethiopia.

The following diagram shows the organizational arrangements for the Program support to TVETCs and HSCs.

6. IMPLEMENTATION CAPACITY BUILDING

6.1. Human Resources Development

Human resources are the other basic input to materialize the plan. All implementation agencies need to have the necessary experts well trained and having adequate experience in the area of their specialty. The main responsibility of the government is to develop policies, legislations, strategic plans and the like and search for financial sources while the private sector would be involved in study, design, construction, operation and maintenance. Donors and CSOs provide financial and technical assistance. As the rural communities and urban utilities are beneficiaries of projects, they will have significant involvement in all project implementation cycle.

Accordingly, all stakeholders of the plan are required to have adequate and trained human resources to fulfill their responsibilities. Thus, the human resources plan considers the need of the government, the private sector, CSOs, urban utilities, and the community for study, design, construction, operation, maintenance and capacity building activities. Moreover, the plan considers meeting 95% of the government need and to deploy water extension workers at each kebele to assist the community self-supply engagement and operation and maintenance of community managed water supplies and train care takers and artisans which provide technical assistance to the community.

Total human resources required for the sector is depicted in Table 5. Accordingly, during the planning period overall 527,874 work forces are required of which 4,374 are higher and 13,000 medium professionals and the remaining 510,500 are artisans and care takers. The details are in Annex-4. It is planned that the higher and medium professionals would be trained by government and private sectors' universities and colleges while artisans and care takers would be trained by regions, zones, woredas and Woreda WaSH Consultants (WWCs). Moreover, the JICA supported water technology training center is considered to provide training in borehole drilling and other relevant skills.

Attachment-3
 GTP II Water Sector
 Human resources

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Table 5: Training and job opportunity creation plan

Sr. No	Description	Quantity	2008	2009	2010	2011	2012
1	Higher Professional	4,374	834	885	885	885	885
2	Medium Professional	13,000	2,600	2,600	2,600	2,600	2,600
3	Artisans and caretakers	510,000	92,100	92,100	112,100	107,100	107,100
	Total	527,874	95,534	95,585	115,585	110,585	110,585

Table 4.1: Annual based action plan for training and job opportunity creation

Sr. No	Profession and professional level	Total	2008	2009	2010	2011	2012	
A	High Level Professionals							
A-1	Water engineer	1,080	280	200	200	200	200	
A-2	Geologist	400	80	80	80	80	80	
A-3	Hydro-geologist	684	124	140	140	140	140	
A-4	Hydrologist	120	20	25	25	25	25	
A-5	Electro Mechanical engineer	850	170	170	170	170	170	
A-6	Sociologist	700	140	140	140	140	140	
A-7	Economist	140	20	30	30	30	30	
A-8	Chemist	200		50	50	50	50	
A-9	Biologist	200		50	50	50	50	
	(Sub total)	(4,374)	(834)	(885)	(885)	(885)	(885)	
B	Medium Level Professionals							
B-1	Water supply technicians	6,750	1,350	1,350	1,350	1,350	1,350	
B-2	E & M technicians	5,650	1,130	1,130	1,130	1,130	1,130	
B-3	Drillers	600	120	120	120	120	120	
B-4	Others							
	(Sub total)	(13,000)	(2,600)	(2,600)	(2,600)	(2,600)	(2,600)	
C-1	Artisans	10,500	2,100	2,100	2,100	2,100	2,100	
C-2	Care-takers	500,000	90,000	90,000	110,000	105,000	105,000	
	(Sub total)	(510,500)	(92,100)	(92,100)	(112,100)	(112,100)	(112,100)	
	Total	527,874	95,534	95,585	115,585	110,585	110,585	

Table 4.1 (a): Human Requirement of GTP-2 Based on Education Level/profession

Sr. No	Education level/profession	Base Year 2015 (Estimate)	Projection					5-years Total 2016-20
			2016	2017	2018	2019	2020	
1	Grade4 completed	198,000	90,000	90,000	110,000	105,000	105,000	500,000
2	Grade8 completed	4,500	2,100	2,100	2,100	2,100	2,100	10,500
3	Grade 10 completed							
4	Grade12/preparatory completed							
5	Graduated from TVT							
5-1	Level 1	360	520	520	520	520	520	2,600
5-2	Level 2	1,080	780	780	780	780	780	3,900
5-3	Level 3	1,080	780	780	780	780	780	3,900
5-4	Level 4	360	260	260	260	260	260	1,300
5-5	Level 5	360	260	260	260	260	260	1,300
6	Under Graduate(BSc)							
611	Water Engineer	125	196	140	140	140	140	756
612	Electro Mechanical engineer	25	119	119	119	119	119	595
613	Geologist	65	80	80	80	80	80	400
7	Post Graduate(MSc)							
7-1	Natural Science/Engineering							
711	Chemist	25	40	40	40	40	40	200
712	Biologist	15	40	40	40	40	40	200
713	Water Engineer	40	84	60	60	60	60	324
714	Electro Mechanical engineer	10	51	51	51	51	51	255
715	Hydro-geologist	20	124	140	140	140	140	684
716	Hydrologist	15	20	25	25	25	25	120
7-2	Social Science(MSc)							
721	Economist	10	140	140	140	140	140	700
722	Sociologist	20	20	30	30	30	30	140

添付資料-4 Modules prepared by Technical Cooperation Phase-3

	Groundwater Investigation 地下水管理	Drilling Technology 掘削技術	Drilling Machinery Maintenance Technology 掘削機械整備	Electrical Maintenances Technology Training 電気機械整備	WATER SUPPLY ENGINEERING 給水技術
Module 1	Groundwater Hydrology/ Occurrence and Movement of Groundwater Theory: 8 h ,Practice: 8 h	Introduction to Geology and Hydrogeology Theory: 12h, Practice: 2h	Basic Knowledge Theory: 50h, Practice: 16h	Basic Electricity & Electrical Measurements Theory: 12h, Practice: 8h	Introduction to Water Supply Engineering Theory: 2h
Module 2	Groundwater Investigation Methods Theory: 36 h, Practice: 11 days	Drilling Administrative Techniques Theory: 12h	Diesel Engine Theory: 17h, Practice: 12h	Basic Electronics Theory: 8h, Practice: 12h	Planning of Water Supply Theory: 8h
Module 3	Drilling technology and well management Theory: 12 h, Practice: 8h	Units of Measurements Theory: 6h, Practice: 2h	Rig Carrier Truck Theory: 15h, Practice: 8h	Electrical Machines & Control System Theory: 18h, Practice: 32h	
Module 4	Geophysical logging test Theory: 4h, Practice: 4h	Drilling machines and Tools Theory: 16h, Practice: 4h	Auto Electricity Theory: 13h, Practice: 3h	Submersible Pump Theory: 12h, Practice: 8h	Water pollution Theory: 4h, Practice: 2h
Module 5	Pumping Test Theory: 12h, Practice: 2 days	Drilling Technology Theory: 32h, Practice: 4h	Cable Tools (Percussion) Drilling Rig Theory: 8h, Practice: 4h	Introduction To Programmable logic controller Theory: 6h, Practice: 2h	Water Quality Management and Control Theory: 8h
Module 6	Ethiopian Geology and Hydrogeology Theory: 20h,	Function of the Drilling Machine Theory: 30h, Practice: 6h	Top Head Rotary Drilling Rig Theory: 36h, Practice: 39h		Purification Facilities Theory: 8h, Practice: 10h
Module 7	Ethiopian Geology and Hydrogeology Theory: 20h, Practice: 5 days	Drilling Data collection and report compilation Theory: 12h, Practice: 2h	Air compressor & DTH air hammer Theory: 16h, Practice: 6h		Basic Design Criteria of Water Supply Facilities & Tender Document Preparation Theory: 8h
Module 8-1	Groundwater modeling Theory: 8 h, Practice: 8h	Drilling Troubleshooting Theory: 12h, Practice: 2h		Maintenance Management Theory: 3h, Practice: 1h	Introduction to Construction Materials Theory: 4h, Practice: 20h
Module 8-2	GIS and remote sensing Theory: 8h, Practice: 8h				
Module 9		Drilling Rig Field Visits Theory: , Practice: 48h			Software Applications Theory: 4h, Practice: 16h
Module 10		Practical Drilling in the Field Theory: 8h, Practice: 120h			

添付資料-5 水セクターのEOS及びUnit of Competency
 Water Sector Occupational Standard and concerned EWTI's Department

Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
1 Catchment Operation		WRS CMO1 01 1109 Draw and Use Simple Maps, Plans / Drawings	WRS CMO2 01 1109 Operate Surface Water Systems	WRS CMO3 01 1109 Monitor Catchment Operation	WRS CMO4 01 1109 Develop Catchment Management Plan	
		WRS CMO1 02 1109 Apply Quality Standards	WRS CMO2 02 1109 Maintain Catchment Areas	WRS CMO3 02 1109 Monitor Implementation of Environmental Procedures	WRS CMO4 02 1109 Manage Catchment Operation	
		WRS CMO1 03 1109 Perform Housekeeping	WRS CMO2 03 1109 Operate Ground Water Regulation	WRS CMO3 03 1109 Monitor Surface Water System Operation	WRS CMO4 03 1109 Manage Ground Water Operation	
		WRS CMO1 04 1109 Work With Others	WRS CMO2 07 1109 Work in Team Environment	WRS CMO3 04 1109 Investigate Sustainable Water Cycle Management	WRS CMO4 04 1109 Manage Surface Water Operation	
		WRS CMO1 05 1109 Receive and Respond to Workplace Communication	WRS CMO2 06 1109 Participate In Workplace Communication	WRS CMO3 05 1109 Monitor Ground Water System Usage	WRS CMO4 05 1109 Manage Flood Mitigation Operation	
		WRS CMO1 06 1109 Demonstrate Work Values		WRS CMO3 06 1109 Monitor Operation of Potable Water System	WRS CMO4 06 1109 Utilize Specialized Communication Skills	
				WRS CMO3 07 1109 Monitor Dam Operation		
				WRS CMO3 08 1109 Establish Underground Utilities		
				WRS CMO3 09 1109 Design Basic Water System Model		
				WRS CMO3 10 1109 Apply Quality Control		
				WRS CMO3 11 1109 Lead Small Teams		

				WRS CMO3 12 1109 Lead Workplace Communication		
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Water Sector Occupational Standard and concerned EWTI's Department

Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
2 Dam Operation and Source Protection			WRS DOP2 01 1109 Conduct Dam Safety Inspection and Basic Monitoring	WRS DOP3 01 1109 Plan and organize work activities	WRS DOP4 01 1109 Plan and Organize Work	
			WRS DOP2 02 1109 Operate Surface Water Systems	WRS DOP3 02 1109 Implement and monitor	WRS DOP4 02 1109 Develop Surface Water Management	
			WRS DOP2 03 1109 Participate In Workplace Communication	WRS DOP3 03 1109 Monitor dam operations	WRS DOP4 03 1109 Manage Large Dam Safety Surveillance	
			WRS DOP2 04 1109 Apply OH&S in Work Environmen	WRS DOP3 04 1109 Monitor and implement dam	WRS DOP4 04 1109 Develop and Report Flood Mitigation	
			WRS DOP2 05 1109 Respond to Emergencies	WRS DOP3 05 1109 Design basic water system model	WRS DOP4 05 1109 Establish Quality Systems and Procedures	
				WRS DOP3 06 1109 Implement surface water management	WRS DOP4 06 1109 Develop Teams and Individuals	
				WRS DOP3 07 1109 Apply Quality Control	WRS DOP4 07 1109 Utilize Specialized Communication Skills	
				WRS DOP3 08 1109 Lead Workplace Communication		
				WRS DOP3 09 1109 Lead small teams		

Water Sector Occupational Standard and concerned EWTI's Department

Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
3 Electro-Mechanical Equipment/Machinery Maintenance	Electro-Mechanical & Drilling Machneries Maintenance Technology EWTI prepared standard Curriculum (by AG consul) I-10 ompetencies II-9 competencies III-8 competencies IV-6 competencies Learning Guide Level II	WRS EMM1 01 1109 Read and Interpret Working Drawings and Sketches	WRS EMM2 01 1109 Perform Installation Works	WRS EMM3 01 1109 Monitor Implementation of Maintenance Plan	WRS EMM4 01 1109 Prepare Electro- Mechanical Equipment Maintenance Plan	
		WRS EMM1 02 1109 Carry Out Measurements and Calculations	WRS EMM2 02 1109 Perform Tool and Cutter Grinding Operations	WRS EMM3 02 1109 Perform Electrical Motors and Transformer Rewinding	WRS EMM4 02 1109 Organize work Activities	
		WRS EMM1 03 1109 Use Hand Tools	WRS EMM2 03 1109 Prepare Technical Drawings	WRS EMM3 03 1109 Carry Out Heat Treatment	WRS EMM4 03 1109 Apply Quality Control	
		WRS EMM1 04 1109 Cut and Join Sheet Metal	WRS EMM2 04 1109 Perform Equipment/Machines	WRS EMM3 04 1109 Train Service Technicians	WRS EMM4 04 1109 Utilized Specialized Communication Skills	
		WRS EMM1 05 1109 Perform Bench Work	WRS EMM2 05 1109 Perform Machining Operations	WRS EMM3 05 1109 Lead Small Teams		
		WRS EMM1 06 1109 Work with Others	WRS EMM2 06 1109 Work In Team Environment	WRS EMM3 06 1109 Lead Workplace Communication		
		WRS EMM1 07 1109 Receive and Respond to Workplace Communication	WRS EMM2 07 1109 Participate in Workplace Communication			
		WRS EMM1 08 1109 Demonstrate Work Values				

Water Sector Occupational Standard and concerned EWTI's Department

	Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
4	Groundwater Utilization	Water Resource Development & Drilling Technology		WRS GWU2 01 1109 Locate and Protect Utility Services	WRS GWU3 01 1109 Operate Bore Fields and Groundwater Source Systems	WRS GWU4 01 1109 Plan and Organize Work	
				WRS GWU2 02 1109 Install Metering and Regulating Devices	WRS GWU3 02 1109 Monitor Water Extraction	WRS GWU4 02 1109 Manage Implementation of Groundwater Management Plan	
				WRS GWU2 03 1109 Inspect and Maintain Public Facilities	WRS GWU3 03 1109 Monitor Groundwater System Usage	WRS GWU4 03 1109 Manage Implementation of Environmental Policies on Ground	
				WRS GWU2 04 1109 Work In Team Environment	WRS GWU3 04 1109 Control Water Qualities	WRS GWU4 04 1109 Establish Quality Systems and Procedures	
				WRS GWU2 05 1109 Participate In Workplace Communication	WRS GWU3 05 1109 Lead Small Teams	WRS GWU4 05 1109 Develop Teams and Individuals	
				WRS GWU2 06 1109 Respond to Emergencies	WRS GWU3 06 1109 Lead Workplace Communication	WRS GWU4 06 1109 Utilize Specialized Communication Skills	
				WRS GWU2 07 1109 Demonstrate Work Values			

Water Sector Occupational Standard and concerned EWTI's Department

Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
5 Hydrometric Monitoring			WRS HYM2 01 1109 Sample and Test Water Sources and Quality	WRS HYM3 01 1109 Monitor Hydrometric Stream Discharge and Water Level	WRS HYM4 01 1109 Plan and Organize Work	
			WRS HYM2 02 1109 Operate Sedimentation Processes	WRS HYM3 02 1109 Commission/Decommission Hydrometric Stations/Sites and Facilities	WRS HYM4 02 1109 Manage Implementation of Environmental Policies and Programs	
			WRS HYM3 03 1109 Install and Maintain Hydrometric Instruments and Equipment	WRS HYM3 03 1109 Process Hydrometric Stream Discharge Data	WRS HYM4 03 1109 Manage Implementation of Hydrometric Plan and Programs	
			WRS HYM2 04 1109 Work in Team Environment	WRS HYM4 04 1109 Verify and Analyze Hydrometric Data	WRS HYM4 04 1109 Conduct Commissioning and Post Commissioning Activities	
			WRS HYM2 05 1109 Participate In Workplace Communication	WRS HYM3 05 1109 Lead small teams	WRS HYM3 05 1109 Establish Quality Systems, Procedures and Control	
			WRS HYM2 06 1109 Respond to Emergencies	WRS HYM3 06 1109 Lead Workplace Communication	WRS HYM4 06 1109 Utilize Specialized Communication Skills	
			WRS HYM2 07 1109 Demonstrate Work Values			

Water Sector Occupational Standard and concerned EWTI's Department

Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
6 Irrigation and Drainage Designing and Construction	Irrigation & Drainage Technology		WRS IDC2 01 1109 Install Irrigation and Drainage Water Conveyance System	WRS IDC3 01 1109 Investigate Sustainable Water Cycle Management		
			WRS IDC2 02 1109 Conduct Commissioning Activities	WRS IDC3 02 1109 Design Basic Water System Model		
			WRS IDC2 03 1109 Construct Open Earthen Channels or Drains	WRS IDC3 03 1109 Plan and Organize Work Activities		
			WRS IDC2 04 1109 Carryout Concrete Work	WRS IDC3 04 1109 Inspect and Report Catchments and Surrounding Areas		
			WRS IDC2 05 1109 Prepare and Restore Worksite	WRS IDC3 05 1109 Support Plant Operations		
			WRS IDC2 06 1109 Perform Minor Maintenance of Machines / Equipment	WRS IDC3 06 1109 Apply Quality Standards		
			WRS IDC2 07 1109 Participate in Team Environment and Workplace Communication	WRS IDC3 07 1109 Lead Small Teams		
			WRS IDC2 08 1109 Demonstrate Work Values	WRS IDC3 08 1109 Lead Workplace Communication		
7 Irrigation and Drainage System Operation and Maintenance	Irrigation & Drainage Technology		WRS IDO2 01 1109 Operate Basic Flow Control and Regulating Devices	WRS IDO3 01 1109 Monitor Implementation of Irrigation System Management Plan	WRS IDO4 01 1109 Develop Irrigation and Drainage System Management Plan	
			WRS IDO2 02 1109 Operate Irrigation Delivery System and Drainage Assets	WRS IDO3 02 1109 Inspect Condition of Surface Water System	WRS IDO4 02 1109 Manage Operation of Irrigation Delivery System	
			WRS IDO2 03 1109 Work in Team environment	WRS IDO3 03 1109 Monitor Maintenance of Irrigation Delivery Systems and Drainage	WRS IDO4 03 1109 Utilize Specialized Communication Skills	
			WRS IDO2 04 1109 Participate in Workplace	WRS IDO3 04 1109 Apply Quality Standards	WRS IDO4 04 1109 Develop Teams and Individuals	
			WRS IDO2 05 1109 Demonstrate Work Values	WRS IDO3 05 1109 Leads Work Place Communication		
				WRS IDO3 06 1109 Leads Small Teams		

Water Sector Occupational Standard and concerned EWTI's Department

Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
8 Meteorological Forecasting					WRS MTF4 01 1109 Manage Establishment and Operation of Meteorological Station Networks	
					WRS MFT4 02 1109 Operate Remote Sensing Stations	
					WRS MTF4 03 1109 Perform Data Processing and Data Quality Control	
					WRS MFT4 04 1109 Analyze and Interpret Weather Charts	
					WRS MTF4 05 1109 Analyze and Interpret Remote Sensed and Numerical Weather Prediction Products	
					WRS MTF4 06 1109 Monitor and Assess Weather and Climate Conditions	
					WRS MFT4 07 1109 Prepare and Issue Weather Forecast	
					WRS MTF4 08 1109 Prepare Aeronautical Weather Forecast	
					WRS MFT4 09 1109 Perform Media Weather Presentation	
					WRS MTF4 10 1109 Brief and Consult Users of Meteorological Information and Weather Forecas	
					WRS MTF4 11 1109 Assist In the Climate Monitoring and Prediction	
					WRS MTF4 12 1109 Assist in the Preparation of Agro- and Hydro- Meteorological Likelihood Impact	
					WRS MTF4 13 1109 Contribute in the Preparation and Dissemination of Meteorological Bulletins	
					WRS MTF4 14 1109 Train Meteorological Technicians	
					WRS MTF4 15 1109 Utilize Specialized Communication Skills	
					WRS MTF4 16 1109 Demonstrate Work Values	

Water Sector Occupational Standard and concerned EWTI's Department

Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
9 Meteorological Observation			WRS MTO2 01 1109 Manage Surface Meteorological Observations			
			WRS MTO2 02 1109 Record Aeronautical Observations			
			WRS MTO2 03 1109 Monitor Phenological Observations of Crops			
			WRS MTO2 04 1109 Perform Weather Related Animal Husbandry and Livestock Observations			
			WRS MTO2 05 1109 Undertake Upper Air Sounding			
			WRS MTO2 06 1109 Code, Decode and Plot Observation Data and Information			
			WRS MTO2 07 1109 Exchange Meteorological Data and Information			
			WRS MTO2 08 1109 Retrieve and Archive Meteorological Data and Information			
			WRS MTO2 09 1109 Perform Data Entry Operation			
			WRS MTO2 10 1109 Apply Quality Procedures			
			WRS MTO2 11 1109 Demonstrate Care and Safe Practices			
			WRS MTO2 12 1109 Work In Team Environment			
			WRS MTO2 13 1109 Participate In Workplace Communication			
			WRS MTO2 14 1109 Demonstrate Work Values			

Water Sector Occupational Standard and concerned EWTI's Department

Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
10 Meteorological Technical Assistance				WRS MTA3 01 1109 Plan and Organize Work Activities		
				WRS MTA3 02 1109 Establish surface meteorological stations		
				WRS MTA3 03 1109 Inspect and evaluate meteorological stations		
				WRS MTA3 04 1109 Maintain and calibrate meteorological instruments		
				WRS MTA3 05 1109 Receive & organize meteorological satellite imageries 2		
				WRS MTA3 06 1109 Process meteorological data		
				WRS MTA3 07 1109 Perform meteorological data quality control		
				WRS MTA3 08 1109 Compile meteorological data for aeronautical purposes		
				WRS MTA3 09 1109 Analyze weather charts and t-phi grams		
				WRS MTA3 10 1109 Identify and facilitate users' requests		
				WRS MTA3 11 1109 Apply Quality Procedures		
				WRS MTA3 12 1109 Lead Workplace Communication		
				WRS MTA3 13 1109 Demonstrate Work Values		
				WRS MTA3 14 1109 Lead Small Teams		

Water Sector Occupational Standard and concerned EWTI's Department

	Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
11	Wastewater Collection and Treatment	Water Supply & Sewerage Technology		WRS WCT2 01 1109 Perform waste water treatment processes	WRS WCT3 01 1109 Monitor wastewater treatment processes	WRS WCT4 01 1109 Develop Wastewater Collection and Treatment Management	
				WRS WCT2 02 1109 Perform wastewater collection processes	WRS WCT3 02 1109 Monitor wastewater Collection processes	WRS WTP4 02 1109 Organize Work Activities	
				WRS WCT2 03 1109 Perform Wastewater Quality Test	WRS WCT3 03 1109 Apply Quality Control	WRS WCT4 03 1109 Manage Implementation of Wastewater Collection and Treatment Management	
				WRS WCT2 04 1109 Work In Team Environment	WRS WCT3 04 1109 Lead Small Teams	WRS4 WTP 04 1109 Develop Individual and Teams	
				WRS WCT2 05 1109 Participate In Workplace Communication	WRS WTP3 05 1109 Lead Workplace Communication	WRS4 WTP 05 1109 Utilize Specialized Communication Skills	
				WRS WCT2 06 1109 Demonstrate Work Values			

Water Sector Occupational Standard and concerned EWTI's Department

	Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
12	Water Supply Distribution	Water Supply & Sewerage Technology		WRS WSD2 01 1109 Operate Water Reticulation and Distribution System	WRS WSD3 01 1109 Design Basic Water System Model	WRS WSD4 01 1109 Develop Distribution System Plan	
				WRS WSD2 02 1109 Control Water Quality in Distribution Systems	WRS WSD3 02 1109 Maintain Basic Dams and Water Storages	WRS WSD4 02 1109 Organize Work Activities	
				WRS WSD2 03 1109 Repair Water Distribution System	WRS WSD3 03 1109 Monitor Water Distribution Systems	WRS WSD4 03 1109 Determine Sustainable Water Cycle Management	
				WRS WSD2 04 1109 Work In Team Environment	WRS WSD3 04 1109 Provide and Promote Customer Services	WRS WSD4 04 1109 Manage Water Supply Distribution System	
				WRS WSD2 05 1109 Participate in Workplace Communication	WRS WSD3 05 1109 Lead Small Teams	WRS WSD4 05 1109 Develop Teams and Individuals	
				WRS WSD2 05 1109 Demonstrate Work Values	WRS WSD3 06 1109 Lead Workplace Communication	WRS WSD4 06 1109 Utilized Specialized Communication Skills	
13	Water Supply System Structure Construction	Water Supply & Sewerage Technology	WRS WSC1 01 1109 Read and Interpret Technical Drawings	WRS WSC2 01 1109 Install Water Pipelines	WRS WSC3 01 1109 Maintain Flow-Control and Devices	WRS WSC4 01 1109 Develop Construction Plan	
			WRS WSC1 02 1109 Perform Menstruation and Calculation	WRS WSC2 02 1109 Install Ground and Trench Support	WRS WSC3 02 1109 Maintain Drainage System	WRS WSC4 02 1109 Organize Work Activities	
		EWTI prepared standard Curriculum (by AG consul) Water Works Site Construction Management IV-13 competencies	WRS WSC1 03 1109 Use and Maintain Tools and Equipments	WRS WSC2 03 1109 Control Construction Site Water Table	WRS WSC3 03 1109 Maintain Dams and Water Storages	WRS WSC4 03 1109 Apply Quality Control	
			WRS WSC1 04 1109 Perform Manual Excavation	WRS WSC2 04 1109 Drain & Dewater Site	WRS WSC3 04 1109 Maintain Bulk Water Asset	WRS WSC4 04 1109 Manage Water Supply System Structure Construction	
		Learning Guide Level IV Construction Management Level V-16 competencies	WRS WSC1 05 1109 Carry Out Concrete Works	WRS WSC2 05 1109 Participate in Work Place Communication	WRS WSC3 05 1109 Lead Small Teams	WRS WSC4 05 1109 Manage Wastewater Collection and Treatment Structure Construction	
			WRS WSC1 06 1109 Demonstrate Work Value	WRS WSC2 06 1109 Work in Team Environment	WRS WSC3 06 1109 Lead Workplace Communication	WRS WSC4 06 1109 Utilize Specialized Communication Skills	
			WRS WSC1 07 1109 Receive and Respond to Workplace Communication				
			WRS WSC1 08 1109 Work with Others				

Water Sector Occupational Standard and concerned EWTI's Department

	Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
14	Water Treatment	Water Supply & Sewerage Technology		WRS WTM2 01 1109 Perform Water Treatment Processes	WRS WTM3 01 1109 Monitor Implementation Of Water Treatment Processes	WRS WTM4 01 1109 Develop Water Treatment Management Plan	
				WRS WTM2 02 1109 Perform Water Quality Testing	WRS WTM3 02 1109 Monitor Water Quality Testing Process	WRS WTM4 02 1109 Organize Work Activities	
				WRS WTM2 03 1109 Work in Team Environment	WRS WTM3 03 1109 Lead Small Teams	WRS WTM4 03 1109 Manage Implementation of Water Treatment Management Plan	
				WRS WTM2 04 1109 Demonstrate Work Values	WRS WTM3 04 1109 Apply Quality Control	WRS WTM4 04 1109 Develop Individuals And Teams	
				WRS WTM2 05 1109 Participate In Workplace Communication	WRS WTM3 05 1109 Lead Workplace Communication	WRS WTM4 05 1109 Utilize Specialized Communication Skill	

Water Sector Occupational Standard and concerned EWTI's Department

	Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
15	Geotechnical Well Drilling	Water Resource Development & Drilling Technology	WRS GTD1 01 1109 Set Up and Prepare For Drilling Operations	WRS GTD2 01 1109 Construct Monitoring Bores	WRS GTD3 01 1109 Monitor Implementation of GT Drilling Plan	WRS GTD4 01 1109 Develop Geotechnical (GT) Well Drilling Plan	
			WRS GTD1 02 1109 Assist Wire Line Core Drilling	WRS GTD2 02 1109 Perform Cable Tool Drilling	WRS GTD3 02 1109 Perform Pumping Tests	WRS GTD4 02 1109 Manage Implementation of GT Well Drilling Plan	
			WRS GTD1 03 1109 Assist Conventional Core Drilling	WRS GTD2 03 1109 Test Water Sources and Quality	WRS GTD3 03 1109 Train Operation Crew	WRS GTD4 03 1109 Utilized Specialized Communication Skills	
			WRS GTD1 04 1109 Assist Continuous Flight Auger Drilling	WRS GTD2 04 1109 Conduct Conventional Core Drilling	WRS GTD3 04 1109 Lead Small Teams		
			WRS GTD1 05 1109 Perform Basic Cutting and Welding	WRS GTD2 05 1109 Conduct Wire Line Core Drilling	WRS GTD3 05 1109 Lead Workplace Communicati		
			WRS GTD1 06 1109 Drive Rigs and Vehicles	WRS GTD2 06 1109 Conduct Continuous Flight Auger Drilling			
			WRS GTD1 07 1109 Work with Others	WRS GTD2 07 1109 Retain and Recover Soil and Rock			
			WRS GTD1 08 1109 Receive and Respond to Workplace Communication	WRS GTD2 08 1109 Work in Team Environment			
			WRS GTD1 09 1109 Demonstrate Work Values	WRS GTD2 09 1109 Participate in Workplace Communication			

Water Sector Occupational Standard and concerned EWTI's Department

Occupational Standard	Concerned EWTI's Department	Level I	Level II	Level III	Level IV	Level V
16 Water Well Drilling and Construction	Water Resource Development & Drilling Technology EWTI prepared standard Curriculum (by AG consul) I-11 ompetencies II-9 competencies III-10 competencies Learning Guide Level I	WRS WWD1 01 1109 Set Up and Prepare for Drilling Operations	WRS WWD2 01 1109 Construct Bores	WRS WWD3 01 1109 Monitor Implementation of Drilling Plan	WRS WWD4 01 1109 Develop Drilling Plan	
		WRS WWD1 02 1109 Assist Air Drilling	WRS WWD2 02 1109 Perform Air Drilling	WRS WWD3 02 1109 Train Operation Crew	WRS WWD4 02 1109 Manage Implementation of Drilling Plan	
		WRS WWD1 03 1109 Assist Mud Rotary Drilling	WRS WWD2 03 1109 Perform Cable Tool Drilling	WRS WWD3 03 1109 Apply Quality Standard	WRS WWD4 03 1109 Utilize Specialized Communication Skills	
		WRS WWD1 04 1109 Assist Cable Tool Drilling	WRS WWD2 04 1109 Perform Mud Rotary Drilling	WRS WWD3 04 1109 Monitor Construction Works		
		WRS WWD1 05 1109 Perform Basic Cutting and Welding	WRS WWD2 05 1109 Test Water Sources and Quality	WRS WWD3 05 1109 Perform Pumping Tests		
		WRS WWD1 06 1109 Drive Rigs and Vehicles	WRS WWD2 06 1109 Work in Team Environment	WRS WWD3 06 1109 Perform Rehabilitation & Regeneration of Wells		
		WRS WWD1 07 1109 Work with Others	WRS WWD2 07 1109 Participate in Workplace Communication	WRS WWD3 07 1109 Lead Small Teams		
		WRS WWD1 08 1109 Receive & Respond to Workplace		WRS WWD3 08 1109 Lead Workplace Communication		
		WRS WWD1 09 1109 Demonstrate Work Values				

Attachment-6 Problem and Challenges faced EWTI interview from the Directors

<p>Irrigation and Drainage Engineering Technology Directorate</p> <p>Director : Dr. Markos (EWTEC3 experienced)</p>	<p>Water Supply and Sanitation Engineering Technology Directorate</p> <p>Director: Mr. HAILEMICHAEL (EWTEC3 experienced)</p>	<p>Drilling Technology Directorate</p> <p>Director: Mr. GEREMEW (EWTEC3 experienced)</p>	<p>Electro-Mechanical and Machinery Maintenance Technology Directorate</p> <p>Director: Mr. ABEBE (EWTEC3 experienced)</p>	<p>Laboratory Service Directorate</p> <p>Director: Mr. ABEBE(GULMAN) (EWTEC3 experienced)</p>	<p>Groundwater Development Study & Management Technology</p> <p>Director: Mr. TAMIRU (EWTEC3 experienced)</p>
<p>1.Office and Facilities 2.Lack of Trainer/ Instructor (Cultivation and ToT) 3.Set up/ revision of Curriculum 4.Establishment international standard Laboratory 5.How to implement technology transfer (introduce new technology- adopt-appropriate technology dissemination to users) 6.Lack of equipment and materials</p>	<p>1.Lack of Human resource (Director himself necessary to do lecture at short training course.) 2.ToT short course ,Specialized fields 3.Equipment/ Instruments –Old and lack (exp. Total station, Leakage detector etc.) 4.Specialist (Jap. Specialist) for Water Supply and Sewerage</p>	<p>1.Equipment for drilling 2 Rigs (Old-1Japanese, 1USA donated from Japan) but only 1 Rig partially working Heavy maintenance necessary for 1 Rig Air compressors etc. 2.Human resources Additional person necessary for conducting long-term training course</p>	<p>1.Resources Human-Lack Intellectual staffs Financial resource 2.Equipment old (Regions using new equipment) For Training purpose equipment (not used for production site) Vehicle(site training) 3.ToT short-term capacity building training Training for training Institute management</p>	<p>1. Lack of knowledge for establishing and operation of latest Laboratory 2. Finance (but after establishment Labo, service charge expected) 3. Human resources (now recruiting staffs but they are less practical knowledges-school graduates, teachers etc.)</p>	<p>1.Lack of Human resource 2.ToT 3.Equipment –Old and few 4.Management skill for Directors</p>

Attachment-7 Problems and Challenges faced of EWTI interview from mid-career staff

Name Position	Mr. Kibron Public Relation Director	Mr. Aychilihum TVET Program Support Officer	Mr. Tsegaye Electro-Mechanical Team Leader	Ms. Alemork Electro-Mechanical Engineer/ Instructor
Background, etc.	Transferred to EWTI from a public textile corporation in 2015 BSc	Transferred to EWTI from the Ministry of Water in 2015 Worked as the Leader of education department at the Ministry of Water MSc	EWTI Transferred to EWTI from the Ministry of Water in 2014 Worked as a university lecturer before the Ministry of Water MSc	Transferred to EWTI from the Ministry of Water in 2014 Experienced business trips to China in relation to renewable electricity (wind power/solar light) BSc
Interviewed contents, requirements of supports, etc.	Lacking experience as Engineer/Instructor, needs Technical Support in both aspects of Specialized Technology and Teaching Methodology. Needs to strengthen the Management ability pertaining to Training Arrangement, Technology transfer, etc. In the sector of water, there is a significant difference among the ability of those concerned. Wants us to cooperate in the establishment of Special Laboratory that they are working on, supported by the government.	Person in charge of the TVETCs Needs Assessment for formulating EWTI's support measures for TVETCs. EWTI's ToT of Engineer/ Instructor is needed to support TVETCs. ToT from Pedagogy/ Methodology to expertise In order for EWTI to have CoC function for TVETCs, it is necessary for Engineer/ Instructor to have Assessor qualification. Needs Refreshment Course for Trainer upgrading/updating (BSc ⇒MSc)	Wants Technical Support in both tangible and intangible aspects (in particular, installation and inspection of pumps, electrical/electronic components, etc. of switch/board, PLC, SCADA, Drilling Rig) Needs instruction methods, Pedagogical course training. Wants to receive instructions on Maintenance Management System. Since equipment for training/drilling is aging and lacking, wants support for them.	Last year, as a support for TVETC, dispatched as an instructor to JIJIGA TVETC for 3 weeks, instructed the trainees. In EWTI, there is no particular training system including OJT. It is better to have a Capacity Development system for staff (ToT). Needs instruction methods, Pedagogical course training. Wants to receive Technology transfer support (Specialized details, for example, Training in renewal energy, etc.) Since equipment for training/drilling is aging and lacking, wants support for them.

Attachment-8 Analysis/Consideration of EWTI's Main Operations

	Training/Education					Support for TVETCs		CoC Operation
	Short-Term Trainings (less than 1 year)			Long-Term Trainings (over 1 year)				
Operation	Basic Courses	On Demand Course	TVETCs Training	Level IV, V Trainings	Electromechanical & Drilling	Visiting Instruction Support for TVETCs	Curriculum Development Support, Teaching Material Development Support for TVETCs	CoC (Center of Competence) Certification Operation
Implementation	Under implementation	Unimplemented	Under implementation	Unimplemented	Unimplemented	Under implementation	Unimplemented	Unimplemented
Contents of operation	Currently implemented trainings for the employed	Upon request of relevant institutions, etc., hold adhoc and train	Skill-up training for the teachers of TVETCs	Trainings of those levels which are not implemented at TVETCs	Electromechanical is in high demand It is impossible to implement Drilling at TVETC in terms of the equipment	In response to the request, dispatch instructors for the visiting instruction	Curriculum Development Support, Teaching Material Development Support for TVETCs	
EOS relations	No need to comply with EOS	No need to comply with EOS	No need to comply with EOS	Comply with EOS	Comply with EOS	Comply with EOS	Comply with EOS	Comply with EOS
Resource preparation status, etc.	No manual No curriculum No module No fixed teaching material, etc.	No manual No curriculum No module No fixed teaching material, etc.	No manual No curriculum No module No fixed teaching material, etc.	No manual No curriculum No module No fixed teaching material, etc.	No manual Curriculum No module No fixed teaching material, etc.	No manual Curriculum and others are taken in charge of by the TVETCs that requested		
Operation category	Original operation	Original operation	Original operation	Operation to be transferred to TVETCs once it became possible to implement it there. Trainings which are not even considered at the moment Need to be considered immediately	Electromechanical is implemented at TVETCs as well and it is considered that those supports for TVETCs are reasonable for this operation. As for Drilling, it will be determined after considering the coordination with private TVET institutions, but it needs to be implemented until then	Original operation	Original operation	Original operation There is no CoC which is able to certify Level I - V water-related competence. Since the institution that implemented the training cannot certify the competence of the trainees from such institution, the certification operation is much needed by TVETCs.
Problems	Training/drilling objectives and drilling contents are not clear, and the targets are not specified. Lack of experience in developing manuals, curriculums, modules, etc. Technical staff's lack of knowledge, technical capacity and experience	Lack of experience in developing manuals, curriculums, modules, etc. Technical staff's lack of knowledge, technical capacity and experience	Lack of experience in developing manuals, curriculums, modules, etc. Technical staff's lack of knowledge, technical capacity and experience	If EWTI is to implement CoC operation, there will be no institution to implement the competence certification operation for the trainees. Lack of experience in developing manuals, curriculums, modules, etc. Technical staff's lack of knowledge, technical capacity and experience	If EWTI is to implement CoC operation, there will be no institution to implement the competence certification operation for the trainees. Lack of experience in developing manuals, curriculums, modules, etc. Technical staff's lack of knowledge, technical capacity and experience	Technical staff's lack of knowledge, technical capacity and experience	Lack of experience in developing manuals, curriculums, modules, etc. Technical staff's lack of knowledge, technical capacity and experience	