



THE REPUBLIC OF SOUTH SUDAN

MINISTRY OF ELECTRICITY, DAMS, IRRIGATION & WATER RESOURCES



WATER SECTOR

IRRIGATION DEVELOPMENT MASTER PLAN

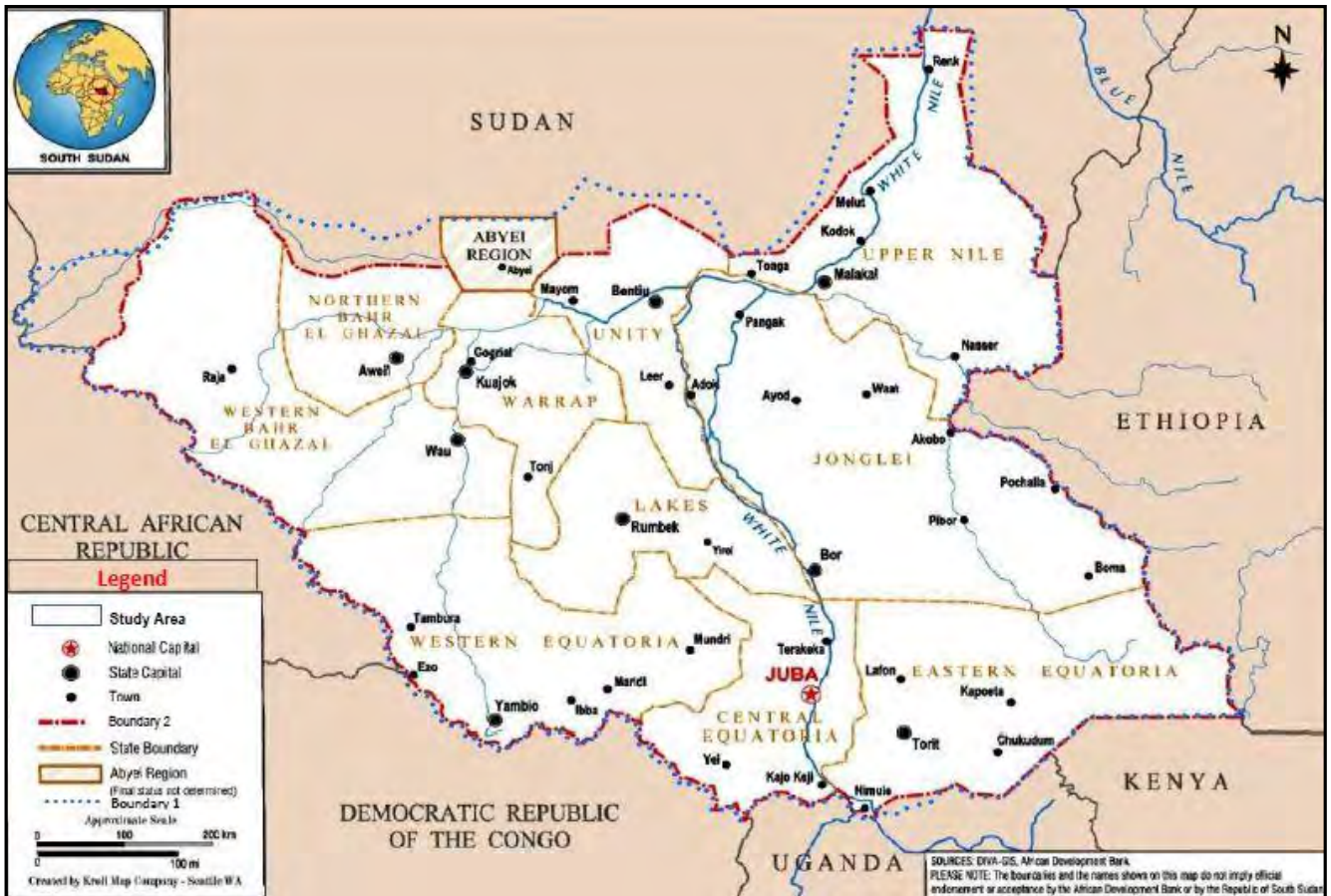
(FINAL REPORT)

ANNEX 4: HUMAN RESOURCES AND INSTITUTIONS

NOVEMBER 2015

THE PROJECT FOR IRRIGATION DEVELOPMENT MASTER PLAN IN THE REPUBLIC OF SOUTH SUDAN (RSS) LOCATION MAP

Map of the Republic of South Sudan



Location Map: Adopted from African Development Bank

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ANNEX 4: HUMAN RESOURCES AND INSTITUTIONS

1. OVERALL METHODOLOGY

Under institutions and capacity development as one of the IDMP elements, Human Resource and Institutional Development for Irrigation Programme (HRIDIP) is formulated for strengthening capacity of required human resource and institutions for future irrigation development and management. The methodology for formulating Human HRIDIP is shown in Figure 1.1 As the figure shows, HRIDIP will be formulated based on the gaps between the current situation and the future requirements. Capacity Need Assessment (CAN) surveys have been conducted as one of the identified methods for grasping the current situation of human resource and institutional capacities. The gaps have been identified by comparing the survey results with the required capacities, as shown in the following figure 1.1.

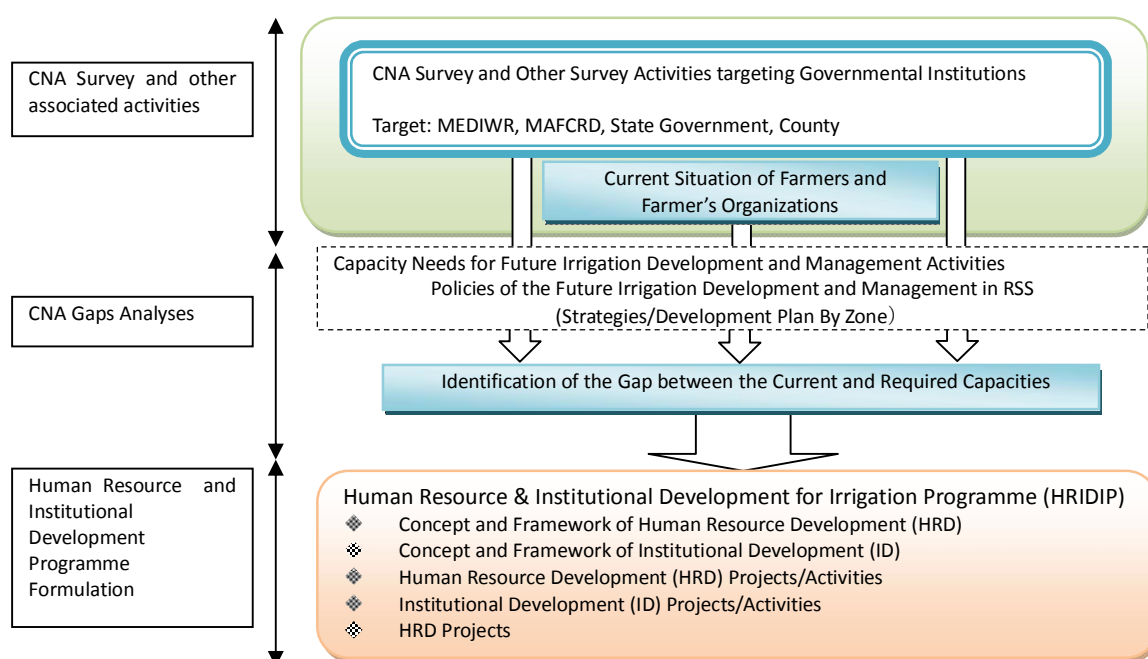


Figure 1.1 Methodology for Formulating HRIDIP

2. CURRENT SITUATION OF HUMAN RESOURCE FOR IRRIGATION DEVELOPMENT & MANAGEMENT

2.1 Methodology followed in conducting the CNA

At the first stage of CNA, National, State and County Institutions have been set as target groups for the current situation of irrigation development and management.

Different approaches have been applied for clarifying current institutional and human resource capacities at the national, state and local levels. At the national level, CNA survey and analysis aimed at mainly clarifying current situation of human resource. At the state and county levels, CNA surveys and analyses were conducted to clarify current situation of both institutional and human resource capacities. Regarding current capacities of Farmers and farmers' organizations for practicing irrigated agriculture, their situations were clarified through the results of field surveys for Aweil Rice Scheme and Northern Upper Nile Irrigation Schemes.

The CNA surveys were conducted by using prepared questionnaires prepared through the discussions among IDMP Task Team (TT), considering current activities of target institutions identified through hearing and literature surveys. The national-level CNA survey was conducted through questionnaire surveys without interview. On the other hand, the state-level CNA survey was conducted through interviews using questionnaires. The survey results were compiled and analysed by TT-members. The process of CNA surveys is shown in Figure 2.1.1 below.

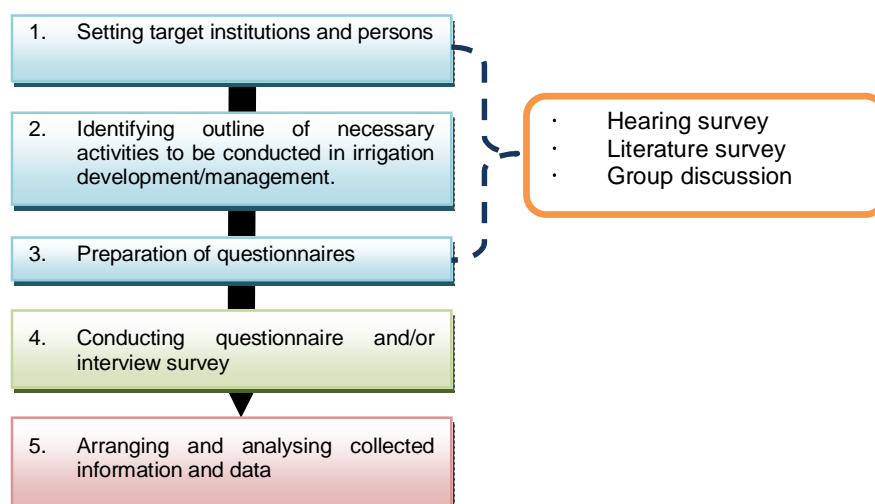


Figure 2.1.1 Process of CNA Survey

2.2 Results of the CNA Surveys

2.2.1 National-level CNA for MEDIWR Headquarters

MEDIWR is one of the main actors for current and future irrigation development in RSS. Thus, it is significant to identify the current human resource capacity regarding irrigation development and management. For identifying the human resource capacity, CNA survey for MEDIWR had been conducted.

(1) General Information

The national level of CNA survey for MEDIWR HQs started in November, 2012. The target directorates, departments and units were the ones related to irrigation development and management, which are shown in Table 2.2.1. The targeted officers were senior inspectors, inspectors, assistant inspectors and technicians who are allocated from Grade 6 to 10. The survey was conducted by distributing questionnaires that were developed by considering functions and specialties of each directorate, department and unit. The filled questionnaire sheets had continuously been collected until November 2013; and in total 30 questionnaire sheets were collected.

Table 2.2.1 Target Directorates and Units of MEDIWR HQs for CNA survey

Directorate	Unit	No. of Respondents ^{*1}
Hydrology and Survey	WIMS	5
	Hydrology	7
Irrigation and Drainage		5
Water Resource Management	Infrastructure	5
Planning and Programmes	Monitoring and Evaluation	4
	Budget / urban water/other	4

(2) General Profile of the Respondents

Age

The average age of respondents is 34.9 years old. 50 % of the respondents are aged 31 to 40 years old. Almost all the respondents are under 50 years old. Therefore, more than a half of the staff is in the most productive age group as referred to Table 2.2.2.

Table 2.2.2 Age Group of Respondents

Age Group	-30	31-40	41-50	51-
Number	8	15	6	1

Grade

The respondents who are assigned Grade 9 to 10 cover over a half portion of all the respondents. As shown in Table 2.2.3, the officers with low grades are in majority.

Table 2.2.3 Grades of Respondents

Grade	6	7	8	9	10
Number	2	1	6	16	2

Educational Background

The major formal educational backgrounds of the respondents are Bachelor's degrees and Diplomas as referred to Table 2.2.4.

Table 2.2.4 Educational Backgrounds of Respondents

Educational Background	PhD	Master's Degree	Bachelor's Degree	Diploma	Certificate	Other
Number	0	0	8	16	3	2

Basic knowledge of roles and responsibilities to work as a MEDIWR officer

Most of the respondents have the basic knowledge of their tasks in MEDIWR. However, there are a few officers who do not know what they need to do to work as a MEDIWR officer as referred to Table 2.2.5.

Table 2.2.5 Number of Officers who Understanding Basic Knowledge/Information about MEDIWR

Item	Some Knowledge	No knowledge
Vision of MEDIWR	22	5
Function and objectives of Directorates	27	2
Job description	26	3

(3) General Skills

The general skills required to conduct their tasks are "English", "Computer operation", "Presentation", "Project management skill" and "Technical". Those skills were captured with the questionnaires. Table 2.2.6 shows the result of surveys.

English Skill

Most of the respondents are quite confident in English. However, some officers have found it necessary to improve their English skills.

Computer skill

Over a half of the respondents think that their computer skills are good. Only three (3) respondents have given negative answers, such as "Fair". Especially, there are some needs for improvement of the skills related to GIS and other new software.

Presentation skill

Most of the respondents consider that their presentation skills are excellent or good. However, some respondents have left comments mentioning "Some workshops on presentation are needed", "I want to learn how to prepare the presentation" and so on.

Project management skill

Most of the respondents think their project management skills are excellent or good. However, some respondents have stated "Project management training will be of great use to improve their managerial skills", "Trainings or workshops related to project management skills are needed", etc.

Technical skill

Over a half of the respondents regard their computer skills as good ones. On the other hand, there are 4 negative answers of "Fair". Moreover, there are comments mentioning "Training on use of software in regards to data processing and analysis are required", "Training on M&E to enhance the capacity and performance for conducting the current job are necessary" and so on.

Overview of all the answers

Most of the answers related to the questions on general skills are "Good". The answers also show that the respondents have found it necessary to improve their capacities for solving a variety of challenges they are facing. A lot of comments on skills development needs have been described in the questionnaires. However, most of the respondents can conduct their normal daily activities with their current capacities.

Table 2.2.6 General Skills of Respondents

Category	English No.	Computer No.	Presentation No.	PM No.	T-Field No.
Excellent	11	8	9	5	7
Good	12	16	13	18	17
Fair	5	3	4	5	4
Poor	0	0	2	1	0

(4) Specialized Fields

Directorates and units have individual roles and responsibilities. It means each officer needs technical capacities according to the technical tasks of their directorates and units. Some components of questionnaires have been developed to capture specialized fields of each directorate and unit. Therefore, analysis of the specialized fields is carried out directorate by directorate and unit by unit.

Directorate: Hydrology and Survey Unit: Hydrology

- Total respondents are eight (8) officers.
- Only one (1) officer has basic knowledge of hydraulic analysis.
- Four (4) officers can operate topographic survey instrument, such as "Level", "Transit", "Total Station" and "GPS". Two (2) officers can operate only "Level".
- Four (4) officers have knowledge of database development by using PCs.

Basically, they have enough capacity to conduct daily river discharge measurement. However, capacities related to topographic survey, hydraulic analysis and pc operation need to be enhanced to execute their future tasks.

Directorate: Hydrology and Survey Unit: WIMS

- Total respondents are four (4) officers.
- Three (3) officers have experience and knowledge of GIS.

- Three (3) officers have experience and knowledge of database.
- Three (3) officers have experience and knowledge to operate SQL server
- Two (2) officer has experience of updating the MEDIWR website

One (1) officer is senior class engineer who has enough experience and knowledge to manage and operate the WIMS tasks. However, the other three (3) officers have to accumulate their working experience and knowledge of overall IT including GIS, database and IT hardware.

Directorate: Irrigation and Drainage

- Total respondents are five (5) officers.
- Two (2) officers have experience and knowledge of topographic survey, structure design and construction supervision.
- Four (4) officers have experience of construction supervision for civil works.
- One (1) officer has experience to develop construction documents.
- Four (4) officers do not have any experience to conduct community-based irrigation development.

It can be said that the two (2) officers need to develop technical capacity to conduct their current tasks.

Directorate: Water Resource Management Unit: Infrastructure

- Total respondents are five (5) officers.
- Two (2) officers have knowledge of hydrological high water analysis
- Three (3) officers can operate topographic survey instrument, such as öLevelö, öTransitö, öTotal Stationö and öGPSö. One (1) officer can operate only öLevelö.
- One (1) officer has experience of planning and designing hydraulic structures.
- All the respondents do not have any experience of developing construction documents.
- Four (4) officers have experience of construction supervision for civil works.
- Two (2) officers have experience of supporting state government for construction of water resource infrastructure.
- One (1) officer has experience of conducting facility assessment.

It can be said that three (3) officers have enough capacity to conduct their current tasks. However, the other two (2) officers need to acquire the further working experience and knowledge of overall hydraulic structure improvement.

Directorate: Planning Unit: Monitoring and Evaluation

- Total respondents are four (4) officers.
- Three (3) officers have knowledge of M&E using log-frame.
- One (1) officer does not have enough knowledge and experience of M&E.
- One (1) officer mentioned the needs of enhancing capacities for conducting M&E.

One (1) officer has enough capacity to conduct his/her current tasks. However, another one (1) officer needs to improve his/her working experience and knowledge of overall project M&E. Moreover, another one (1) officer pointed out necessities of introductory workshops or training on öProject Cycle Managementö

(5) Training

The trainings participated in and the future training needs were answered by the respondents and the results are as follows:

Trainings Participated in

All the respondents have experiences of having participated in some kind of trainings. The average number of training programmes attended per respondent is approximately two (2); the average period of the training is 1.8 months; and most of the training programmes indicated are in the field of Engineering, Hydrology and IT. This is because the majority of the respondents are assigned in the directorates whose roles and responsibilities require the staff to acquire these specialties.

Table 2.2.7 The Number of Trainings Participated in by Category

Type	Engineering	Hydrology	IT	M&E	administration
Number	19	17	13	1	5

The past trainings have been provided appropriately based on the specified fields of the respondents. Besides, the training periods are long enough to build technical capacities of each respondent. However, no training has been conducted focusing on the long-term human capacity development.

Training needs

The respondents mentioned that their basic training needs are mainly related to their current working fields as shown in Table 2.2.8. One (1) respondent stated a crucial point for capacity development, which is the necessity of continuous training including both periodical refresher training and individual training based on a long-term vision of capacity development.

Table 2.2.8 Opinions on Necessary Basic Training

Directorate	Opinion
Hydrology and Survey	To train all the staff on how to use the survey equipment in fields. That will let them be ready to do any work related to survey
	Water Resource Management
	Training of GPS software in regards to data analysis and procession
	Environmental Hydrology for Arid and Semi Arid Regions
	GIS & Remote Sensing
	Project Management and Planning
	Website design and database development
	Continuous training
	System security and management
	GIS and GPS software
Rural development	
Irrigation and Drainage	Irrigation models and Watershed Management
	GIS, remote sensing, hydrological modelling and water resource planning
	Routine maintenance and operation for Dike, Pumping Station and consolidation network
	Comprehensive training for irrigation system
Water Resource Management	Water Harvesting facilities and Dam design
	Training in haffirs, dike, micro dams to (refresh and up date training)
	Need to be trained more in field of hydrology, structure, environment and among the other requirements.
	Runoff Modelling
Planning	Basic M&E training

Also, the respondents mentioned that their advance training needs were related to enhancement and expansion of their current fields of work as shown in Table 1.2.9. Four (4) respondents mentioned the necessity of further educational opportunities for upgrading their educational backgrounds and specialization.

Table 2.2.9 Opinions on Necessary Advance Training

Directorate	Opinion
Hydrology and Survey	To send surveyors to universities to complete their degrees
	Training on Rural Development
	Advanced GPS and GPS software, GIS training
	Water Resource Management
	Upgrading in Survey Studies
	Master's degree in Hydrology
	GIS ICT (Information Communication Technology)
	ArcGIS servers administration, Web mapping design and management
Irrigation and Drainage	Advanced network program, degree and master program
	Applied research and technologies on irrigation
Water Resource Management	MSc in Water Resource Management and in hydrologic and river basin engineering
	Integrated Water Resource Management
	Project management, haffir and dike design and pricing
Planning	GIS
	Advance M&E
	Strategic plan and budget system

(6) Current Findings for Human Resource Development at MEDIWR HQs

The current findings for human resource development in this analysis are presented as shown below:

- 1) Most of the respondents answered that they could perform their roles stated in their job descriptions with their current capacities. Besides, their developed capacities are specified in their working fields. On the other hand, it is notable that only a few respondents seem to have sufficient knowledge and experience on the other working fields that MEDIWR covers. Considering the roles that MEDIWR has as a National-level government organization, officers need to be equipped with capacities (knowledge and skills) to conduct tasks of multiple working fields in the future.
- 2) There are a few respondents whose technical knowledge is limited. One of the reasons can be insufficiency of training and working experiences. Especially, provision of opportunities of on-the-job training is one of the essential means to improve technical capabilities.
- 3) Regarding the questions related to the necessary skills for the current work, the most common answer was "Good". In order to expand MEDIWR's service provision on irrigation development and management, it is essential to improve the fundamental capacities of MEDIWR's staff, such as computer and language skills, through training. Moreover, the capacity of project management is indispensable for irrigation development and management. The project management abilities need to be improved through combination of training and practice.
- 4) MEDIWR officers have participated in a number of trainings so far. The training programmes are related to their technical fields and have contributed to their abilities for carrying out the current activities. On the other hand, such training programmes have been mainly in ad-hoc manner i.e. that are provided occasionally. Training programs that are based on long-term vision on career development of MEDIWR officers are very limited. Hereafter, continuous provision of training programmes that are planned with long-term viewpoints of human resource development is essential to continuously enhance the capacity of MEDIWR's staff for the future irrigation development and management.

2.2.2. National-level CNA at MAFCRD Headquarters

MAFCRD is one of the main actors for current and future irrigation development and management in RSS. Thus, it is significant to identify the current human resource capacity regarding the irrigation development and management. For identifying the human resource capacity, CNA survey for MAFCRD was conducted from August 2013. TT members distributed and collected six (6) questionnaires of human resource capacity to supplement the CNA results.

(1) General Information

Mechanization department in the ministry is designated to be a main facilitator for promoting irrigation development and management. The target officers in the department were senior inspectors, inspectors, assistant inspectors and technicians who are assigned in Grade 6 to 10. The same survey method as the one conducted for MEDIWER was adopted. The filled questionnaire sheets were collected until November 2013. Six (6) questionnaire sheets were collected in total.

(2) General Profile of the Respondents

Respondents' age

The average age of respondents is 34.5 years old. 67 % of the respondents are of age 31 to 40 years old as captured in Table 2.2.10 below. Almost all the respondents are less than 50 years old. Therefore, the most officers belong to the most productive age group.

Table 2.2.10 Age Group of Respondents

Age Group	-30	31-40	41-50	51-
Number	0	4	1	1

Grade

The respondents who are assigned in Grade 7 to 9 cover all the respondents as in Table 2.2.11.

Table 2.2.11 Grades of Respondents

Grade	6	7	8	9	10
Number	0	2	1	3	0

Educational Background

The formal educational backgrounds of the respondents are Bachelor's degrees and graduate Diplomas as shown in Table 2.2.12. All the respondents have relatively high educational status.

Table 2.2.12 Educational Backgrounds of Respondents

Educational Background	PhD	Master's Degree	Bachelor's Degree	Diploma	Certificate	Other
Number	0	0	4	2	0	0

Basic knowledge of roles and responsibilities to work as MAFCRD officer

All of the respondents have the basic knowledge of their tasks in MAFCRD as shown in Table 2.2.13. However, there is an officer who does not know what he or she needs to do as a MAFCRD officer.

Table 2.2.13 Number of Officers who Understanding Basic Knowledge of MAFCRD

Item	Good Knowledge	No knowledge
Vision of MAFCRD	6	0
Function and objectives of department	6	0
Job description	5	1

(3) General Skills

The general skills that are required to conduct their tasks are English, Computer, Presentation, Project management and Technical. Those skills were captured in questionnaires as shown in Table 2.2.14.

English Skill

Most of the respondents are quite confident in English. However, three (3) officers recognize necessity to improve their English skills.

Computer skill

Over a half of the respondents think that their computer skill is good. Only one (1) respondent has given an answer of fair. Especially, there are some needs for improvement of the skills related to basic business software, such as Microsoft Excel and Microsoft Word etc.

Presentation skill

Five respondents consider that their presentation skills are good. However, one (1) respondent have left comments mentioning necessity to improve English skill and Computer skills.

Project management skill

All of the respondents think their project management skills are good. However, some respondents have stated They need to improve project management, project design and project proposal skills.

Technical skill

Five (5) respondents regard their computer skills as good. However, there are comments mentioning a need for More training on technical field skill, necessity to access formal further education opportunities (Bachelor and Master degrees) and so on.

Overview of all answers

Most of the answers related to the questions on general skills are Good. The answers also show that the respondents find it necessary to improve their capacities for solving a variety of challenges they face. However, most of the respondents can conduct their normal daily activities with their current capacities. A lot of comments on skills development needs have been stated in the questionnaires.

Table 2.2.14 General Skills of Respondents

Category	English No.	Computer No.	Presentation No.	PM No.	T-Field No.	Total
Excellent	1	0	0	0	1	2
Good	4	5	5	6	5	25
Fair	1	1	1	0	0	3
Poor	0	0	0	0	0	0
Total	6	6	6	6	6	30

(4) Specialized Fields: Working Experience

The department has mainly three roles: promotion of agricultural mechanization, soil improvement and irrigation development and management. Therefore, officers in the department have been assigned to cover these three (3) roles. Regarding the current activities of the six (6) respondents, four (4) staff are mainly engaged in mechanization, one (1) staff is engaged in soil improvement and the remaining one (1) staff is engaged in irrigation development and management.

Agricultural mechanization

- One (1) respondent has experience to promote agricultural mechanization for irrigation scheme and rain fed agriculture projects.

- One (1) respondent has experience in supervision of tractors and other agricultural machine operators.
- One (1) respondent is engaged in promotion of nationwide agricultural mechanization.

Four (4) respondents mainly promote agricultural mechanizations. Two (2) respondents have experience in implementation of field level projects. Basically, they have enough knowledge to manage agricultural mechanization under irrigation schemes. However, they do not have enough experience to carry out projects. Thus, some kinds of support functions need to be arranged for their future projects implementation activities.

Irrigation development and management

- Two (2) respondents have experience of conducting projects on agriculture production improvement under irrigation.
- Three (3) respondents have experience on operation and maintenance of irrigation facilities, such as pumps, intakes, canals, etc.
- Two (2) respondents have experience in irrigation water control operations.

A total of four (4) respondents have experiences to engage in irrigation development and management. They are not only in charge of irrigation but also mechanization and soil. Thus, it can be said that they have built fundamental capacities of irrigation development and management. Especially, it is notable that some officers have field experiences of supporting farmers. This is essential for promoting human capacities for future irrigation development and management.

Soil improvement

- Three (3) respondents have some experiences of farmer's support in agriculture improvement projects including irrigation projects.
- They conducted soil salinity and sodium test.

Soil condition is one of the essential elements for success of irrigation development. Therefore, they have valuable experiences. Especially, it is worth mentioning that one (1) respondent has been engaged in soil improvement for over twenty years.

Other agricultural development

- Three (3) respondents have experiences of farmer's training in relation to irrigation projects, such as projects for "Formation of Water Users' Associations (WUA) Training" and "Training of farmers on how to operate water pumps".
- Two (2) respondents have experiences of agricultural production improvement project under rain-fed.

Strengthening farmer's capacities is essential for participatory agricultural development and management. It can be said that these useful experiences and knowledge will be advantages to formulation and implementation of future irrigation development and management.

(5) Training

The trainings participated in and the future training needs were answered by the respondents and the results are shown below;

Trainings Participated in

All the respondents have experiences of having participated in some kinds of trainings. The average number of the training programmes participated in, are 2.8 per respondent as in Table 2.2.15. The

average period of the trainings is over 3 months. Therefore, the majority of the training programmes participated in are related to Agricultural Practice Extension for farmers, Agricultural mechanization and Irrigation. This is because the majority of the respondents are assigned in the department whose roles and responsibilities require the staff to promote these specialties.

Table 2.2.15 The Number of the Trainings Participated in by Category

Type	Extension	Mechanization	Irrigation	others
Number	3	2	4	8

The past trainings have been provided appropriately based on the specified fields of the respondents. Besides, the training periods are long enough to build technical capacities of each respondent. However, no training programmes have been conducted in the past focusing on the long-term human capacity development.

Training needs

The respondents mentioned that their basic training needs are mainly related to their current working fields (i.e. agricultural mechanizations, Irrigation and soil) as shown in Table 2.2.16. Some respondents answered that they need to improve basic skills, such as English, computer and communication.

Table 2.2.16 Opinions on Necessary Basic Training

Opinion
1) Water management for crop under irrigation and rain-fed
2) Irrigation facilities planning and design
3) Planning and design for irrigation canals
4) Operation and maintenance for irrigation facilities
5) Operation and maintenance for agricultural machines and attachments
6) Soil survey and analysis
7) Project Management
8) English language skills
9) Computer skills
10) Communications skills

The respondents mentioned that their advance training needs were related to enhancement and expansion of their current fields of work as shown in Table 2.2.17. Four (4) respondents mentioned the necessity of further educational opportunities for upgrading their educational backgrounds and specializations.

Table 2.2.17 Opinions on Necessary Advance Training and Further Education

Opinion
1) Irrigation facilities planning and design
2) Farm machinery and equipment management
3) Agricultural mechanization and equipment
4) Modern analysis technique for soil
5) Master's degree in Irrigation and agricultural mechanization

(6) Current Findings for Human Resource Development at MAFRD HQs

The current findings for human resource development in this analysis are presented as shown below:

- 1) Most of the respondents answered that they could perform their roles stated in their job descriptions with their current capacities. However, considering the roles that MAFCRD has as a National-level government organization, the officers need to be equipped with capacities (knowledge and skills) to conduct tasks of multiple working fields in the future.

- 2) There are a few respondents whose technical knowledge is limited. One of the reasons can be insufficiency of training and working experiences. Especially, provision of opportunities of on-the-job training is one of the essential means to improve technical capabilities.
- 3) Regarding the questions related to the necessary skills for the current work, most of the respondents answered that their skills were good. However, in order to expand MAFCRD's service provision on irrigation development and management, it is essential to improve the fundamental capacities (i.e. computer and English skills) of the staff further through training. Moreover, the capacity of Project Management is indispensable for irrigation development and management. The project management abilities need to be improved through combination of training and practices.
- 4) MAFCRD officers have participated in a number of training programmes so far. The training programmes are related to their technical fields and have contributed to their current activities. On the other hand, such training programmes have been mainly in ad-hoc manner that are occasionally provided only one time. Hereafter, continuous provision of training programmes that are planned with long-term viewpoints of human resource development is essential to enhance the capacity of MAFCRD's staff for the future irrigation development and management.

2.2.3 State-level Institutional CNA of the Water Sector

State and local governments will perform an important role in the irrigation development and management in the future. Thus, it is significant to identify the current capacity of the state and local level institutions regarding the irrigation development and management. For identifying the capacity, State-level CNA survey has been conducted. The targets of the state-level CNA survey were decided as follows.

Table 2.2.18 Targets for State-level CNA Survey

Target	Contents
1)Target States and counties	The whole 10 states of South Sudan and the counties within state capitals
2)Target Institutions	The Department of Water Resources and Irrigation and the Department of Agricultural Mechanization under the state governments
	Water and Agriculture Department under County Offices
	Renk Operation and Maintenance Office under MEDIWR (Only in Upper Nile State)
3)Target Human Resource	Technical and Administrative staff engaged in irrigation development or Agricultural Mechanization

(1) General Information

Interview results have been collected from 8 state-level departments under MEDIWR's line ministries/institutions. Regarding Eastern Equatoria State and Western Bahr el-Ghazal State, besides MEDIWR's line departments, these two states have also established departments in charge of Irrigation under ministry of agriculture.

(2) Roles of Directorates/Departments

There are three states that have irrigation development and management in their roles: namely, Central Equatoria , Lakes and Warrap States.

Table 2.2.19 State Institutional Roles

Category	states
1. Irrigation development and management	3
2. Water Supply for Domestic	5
3. Flood Control	2
4. Water Resource Management	3
5. Other	3

(3) Activities

There is only one state engaged in irrigation development and management activities, both currently and last year. More than 60 % of the states have been establishing their offices and organizations. Based on the current and last year activities as explained in tables 2.2.20 and 2.2.21, no activities is one (1) state; and no activities are four (4) states respectively. The number of the states that have no activities has reduced by 3 and has become only one.

Table 2.2.20 Current Activities

Category	No. of states
1. Irrigation development	1
2. Water Supply for Domestic	3
3. Flood Control	1
4. Water Resource Management	2
5. Office and Organization Establishment	5
6. No activities	1
5. Other	1

Table 2.2.21 Last Year's Activities

Category	No. of states
1. Organization Arrangement	1
2. Facility Improvement (Office)	1
3. Irrigation Development	1
4. Domestic Water Supply	2
5. Flood Control	0
5. Water Resource Management	1
6. No activities	4
7. Other	2

(4) Institutional Arrangement

1) Number of the Staff

The number of states staff under the target institutions is shown by category in Figure 1.4.1. The total number of staff is 120, Categorised as a) 14 management staff, b) 53 technical staff, c) 25 Administration staff and d) 28 support staff (e.g. Drivers, Clerks, etc.). The number of male staff is 95; that of female staff is 25.



Figure 2.2.1 Percent Categories of the Target State Institutions

2) Job descriptions and Annual Work Plans

Only a limited number of states have prepared job descriptions for each staff and annual work plans. Only one state, namely Central Equatoria State is the only state that has been equipped with job descriptions for each staff. Only two states have prepared annual work plans or action plans; namely Central Equatoria State that has an action plan from 2009 to 2012 and WES that has formulated annual work plans. The reason behind this is because most of the states are still in the process of organizational arrangement.

(5) Equipment and Facilities

1) Equipment

MEDIWR HQs distributed vehicles, office equipment (furniture and printers) and computers to each state. However, five target institutions answered that they do not have sufficient equipment. The other three institutions that have equipment pointed out the poor conditions of their vehicles. The respondents pointed out the following constraints on operation and maintenance:

- a) Shortage of funds
- b) Limited supply of spare parts
- c) Insufficient number of the technical personnel
- d) Difficulty in accessing county offices from State HQs due to the far distances or a lack of transportation (Pagarau scheme)

2) Facilities

Two states have facilities, such as guest houses and water laboratories for domestic water supply. Other than office space, shortage of budget was pointed out as the constraints on operation and maintenance.

(6) Operational Problems of the Target Institutions

The main problems on the operation and management of the target institutions are related to lack of equipment and facilities, shortage of budget, limited number and capacities of human resource and insufficient coordination between the states and MEDIWR.

The answers do not show the details. The reason may be that some of the target institutions are still under the establishment and do not have many activities (Thus they have not faced any specific problems).

1) Management Problems

The following problems in relation to management are identified:

- a) Limited means of transportation
- b) Limited number of communication facilities (such as the internet connection)
- c) Insufficient electricity supply
- d) Insufficient office equipment
- e) Limited human capacity
- f) Shortage of capital budget
- g) Limited operational budget
- h) Insufficient coordination between state and MEDIWR
- i) Limited supply of PC equipment

2) Current Activities Operational Problems

The following problems on performance of the activities are identified:

- a) Insufficient number of technical facilities
- b) Shortage of technical equipment
- c) Insufficient technical training opportunities
- d) Insufficient number of foreman personnel to support technical staff
- e) Limited number of technical Staff
- f) Limited technical capacities

(7) Future Plan

1) Future Plan for Service Improvement

Unity State is planning to identify and establish a new irrigation scheme. Central Equatoria State is planning to construct new water source facilities (Dam, intake, *Haffirs*). The main future plans

mentioned by the respondents are as follows:

- a) To identify and plan new irrigation schemes
- b) To construct new water resource facilities (Dam, intake, *Hafirs*)
- c) To enhance and construct flood control facilities
- d) To improve water resource management facilities & Equipment
- e) To enhance staff capacities
- f) To improve office space
- g) To improve transportation means
- h) To enhance O&M facilities and equipment

2) Future Plans for Improvement of Organizational Arrangement

The main future plans mentioned by the respondents are as follows:

- a) To allocate more technical staff to counties, payams and bomas
- b) To employ technical staff
- c) To improve the department of Water Resource Management and Irrigation

(8) Current Findings

According to the answers collected through the surveys, most of the target state institutions are not actively carrying out their activities. Five state institutions answered "office construction" as one of their main activities. Moreover, only one or two state departments have developed their annual work plans and clear job-descriptions for each staff. By considering this fact, it can be said that some state departments might not have any clear ideas of what to be done for the future irrigation development and management.

On the other hand, Central Equatoria State has developed a two-year action plan for irrigation development and management for the state in collaboration with MEDIWR. In addition, Central Equatoria State is conducting some specific activities for irrigation development and management. Other state institutions, which have not prepared any future irrigation action plans, need to develop their plans. MEDIWR's facilitation is essential for the formulation of the action plans as well as support from MAFCRD.

The quality and quantity of the equipment owned by the state institutions are in poor condition and limited. According to the results of the survey, many states commented "A lack of the transportation" as their problems, which have limited almost all states to access counties, irrigation schemes, river gauging stations and other places for providing services. Moreover, financial constraint is also a significant challenge for all the state institutions. Improvement of transportation is one of the top priorities of state department after mitigation of the financial constraint. Besides, enough equipment for irrigation development and management; and water resource management has not been allocated to almost all the states. It is necessary to improve the situation as is the case of transportation means.

Whereas there are several states having mentioned their future development objective as establishment of new irrigation schemes, concrete plans were not described in the collected questionnaires. Such states may have candidate sites for schemes in their mind. Assumingly, their institutional and human resource capacities of putting their plans into practices might be limited. Thus, it is ideal that MEDIWR's commitment for irrigation development and management needs to be activated more at the state level.

(9) Questionnaire Results from the Personnel

In total, 51 questionnaire results have been collected from 9 MEDIWRØ line state institutions related in Irrigation Development & Management/

Respondents' age

The average age of respondents is 37 years old. More than a half of the respondents belong to the age group of 31-40 years old. Only 16 % of the total respondents are young civil servants whose age is under 30 years.

Table 2.2.22 Age Group of Respondents

Age Group	-30	31-40	41-50	51-
Number	8	29	10	4

Grade

Respondents with the grade from 2 to 5 share approximately 12 % of the total. Technical Staff with grade from 6 to 10 share approximately 65 %. Supporting staff with the grade under 11 share approximately 24 % of the total.

Figure 2.2.2 Respondents' Grade Range

Working Period

98 % of the respondents have been working at the current office for less than 10 years.

Table 2.2.23 Working Period

Age Group	Less than 3	3-5	5-10	More than 10
Number	6	14	30	1
%	12%	27%	59%	2%

Education Background

The major formal educational backgrounds of the respondents are Bachelor's degrees and graduate Diplomas. More than a half of the respondents have completed a higher level education than diploma.

- 51 % of the respondents have completed up to graduate Diploma.
- 37 % of the respondents have completed up to Certificate.

Table 2.2.24 Educational Background

Requests	No.	%
PhD	0	0%
Master	1	2%
Bachelor	2	4%
Diploma	26	51%
Certificate	19	37%
Other	3	6%
Total	51	100%

(10) Current Job

1) Officially Mandated Functions or Job Description

Around 60 % of the respondents know key functions of the State Ministry, functions and objectives of their directorate and their job description. Overall, if officially written functions or duties have a closer

relation with their daily and personal duties, the larger number of the respondents has grasped them. However, 67% of the respondents have not perfectly understood their job description.

Table 2.2.25 Knowledge Level for Function/Objective/Job Description

Knowledge Level	Key function		Function & Objective Directorate		Job Description	
	No.	%	No.	%	No.	%
Good Knowledge	7	14%	12	24%	17	33%
Some Knowledge	33	65%	30	59%	32	63%
No Knowledge	11	22%	9	18%	2	4%
Total	51	100%	51	100%	51	100%

2) Current Activities

Only 8% of total activities relate to irrigation. Two respondents answered with specific irrigation activity: "Construction of the rice scheme office in Pagarau". Other three respondents answered for general management activities of irrigation development and management. Water resources activities are mainly river discharge measurement and recording. Other activities are mainly water supply and flood control.

Table 2.2.26 Current Activities

Current Act	Number	%
Any Irrigation act	5	8%
Water Resource	16	27%
Administration	14	24%
IT	4	7%
Other	16	27%
No Activity	4	7%
Total	59	100%

(11) Training Experience

1) Irrigation Project Planning

Six respondents out of fifty one responded that they have training experience of irrigation project planning. The Training duration was less than one year. The training contents are as follows:

- a) Design and Water Management
- b) Drainage and how to implement drainage system for excess water
- c) Irrigation Principle and Practice
- d) Construction of small channels

2) Irrigation Facility Design

Only two respondents out of fifty one responded have experience of training on irrigation facility design. One person was trained for "Water resources development and management (Irrigation) in India".

3) Cost Estimate

Two respondents out of fifty one have participated in a relevant training. The contents were "Economy of irrigation project which include bill of quantities and funding management".

4) Tender Bid

No respondents have any relevant training experience.

5) Construction Supervision

Five people out of fifty one responded that they have training experience. Four trainings out of 5 were more than 3 months. The major contents are as follows:

- a) Platform and spring construction
- b) Supervision of building execution for technician

6) Irrigation Facilities Operation and Maintenance

No respondents have any relevant training experience.

7) Supporting Farmers

Three respondents out of fifty one responded that they have attended relevant training. The major contents are a) methodology of new farming system and b) Agriculture awareness creation.

8) M&E

Only two respondents out of fifty one have participated in M&E training. The content is Evaluation of project indicators and project inputs and outputs.

9) IT

Ten respondents out of fifty one responded that they participated in IT training. The contents are as follows:

- a) Use of the internet
- b) Microsoft office (words , excel , PowerPoint & access)
- c) Programming & Networking
- d) Computer maintenance
- e) Computer installation

10) Financial Management

Five respondents out of fifty one responded that they attended some relevant training. The major contents are as follows:

- a) Preparation of budget
- b) Management of financial resources
- c) Documentation and auditing
- d) Banking training
- e) Accounting and finance

11) Received Trainings

33 respondents have some training experiences. 22 out of the 33 have attended two training programmes or more. The following table shows the contents of all the training programmes that the respondents attended. The largest number of the training programmes is regarding Hydrology. The share is 32 %. Only 1 % of the total training programmes are on IT which the respondents attended the least. 14 % of the training contents are on Engineering. 10 respondents attended some other training programmes. Other training programmes include the following trainings: a) Sanitation, b) English, c)

peace building, d) Environmental management and e) Community based water management.

Table 2.2.27 Received Training

Training Contents	No.	%
Engineering	10	14%
Hydrology	24	32%
IT	16	22%
M&E	1	1%
Administration	9	12%
Other	14	19%
Total	74	100%

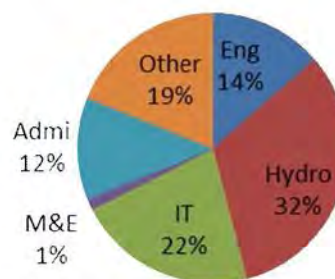


Figure 2.2.3 Share of Each Training programme

12) Remarks on Irrigation-related Training Experience State by State

The following table shows the number of human resources in each target state irrigation sub-sector institution who have experience of receiving each category of training related to irrigation. Overall, only a few staff that were surveyed this time have received essential training programmes for irrigation development and management.

Table 2.2.28 Number of Human Resources with Training Experience by State

State	Project Planning	Facility Design	Cost Estimate	Tender Bid	O&M
CES	1	1	1	0	0
LS	0	0	0	0	0
NBG	1	0	0	0	0
WS	0	0	0	0	0
UNS	0	0	0	0	0
US	0	1	0	0	0
WES	1	0	0	0	0
JS	3	0	0	0	0
WBG	0	0	0	0	0
Total	6	2	1	0	0

(12) Working Experience

1) Previous Working Experience

21 respondents (41% of the total) have some experience of working at some other organizations before becoming the State Ministry staff. Only one person was engaged in irrigation related activities in the previous job.

2) Previous Experience of Irrigation Development Project

Three respondents experienced irrigation development projects before becoming the State Ministry staff. Main roles are as follows:

- a) Design and supervision of water management facilities
- b) Supervision of water structures and O&M

3) Previous experience of Infrastructure Development Project

13 respondents (25%) have previous experience on infrastructure development project. The civil work was targeting the construction of the following facilities:

- a) Water intakes, canals and water controlling structures

- b) Boreholes
- c) Buildings
- d) Roads

4) Project Planning Experience

Only two respondents have working experience on Irrigation Facilities Design. The main types of the facilities are small irrigation facilities and crossing bridges.

5) Irrigation Facilities Design Experience

Only two respondents have working experience on Irrigation Facility Design. The main types of the facilities are small irrigation facility and crossing bridge.

6) Job Experience on Cost Estimate

Five respondents have experience in cost estimates. The cost estimates mainly targeted Drainage systems and houses.

7) Job Experience on Tender Bid

Only one respondent have job experience on tender bid. The target civil work was an intake facility.

8) Job Experience on Construction Supervision

Seventeen respondents (33%) have some job experience on construction supervision. The main facilities were dikes and crossing bridges.

9) Job Experience on Irrigation Facilities Operation and Maintenance

Five respondents have experience in operation and maintenance of irrigation facilities. The target facilities were Dams, Intakes, Canals, Gates, Dikes and other facilities.

10) Job Experience on Supporting Farmers

Only two respondents have job experience on Supporting Farmers. The main role is advising farmers on adopting a new farming system.

11) Job Experience on Monitoring and Evaluation (M&E)

Five respondents have job experience on M&E. Some answered that they had experience of project supervision and monitoring as well as M&E of a water facility construction.

12) Job Experience on Database Management/Information System

Five respondents have job experience on Database Management/Information System. Their main roles are as follows:

- a) Checking water point and dikes and Recording of water levels
- b) Encoding data and sending it to the database

13) Job Experience on Financial Management

12 respondents (24%) have job experience on financial management. The main roles are as follows:

- a) Financial report (e.g. Annual report for financial management)

- b) Budget preparation
- c) Staff pay sheet preparation

14) Remarks on Irrigation-related Working Experience State by State

The following table shows the number of human resources in each target state irrigation sub-sector institution who have a category of irrigation related working experience. Overall, only a limited number of the respondents have experience of being engaged in an irrigation development activity. Regarding Central Equatoria State, there is one experienced staff who has conducted almost all the activities of irrigation development.

Table 2.2.29 Number of Human Resources with Working Experience by State

State	Project Planning	Facility Design	Cost Estimate	Tender Bid	Construction Supervision	O&M	Supporting Farmers
CES	1	1	0	1	1	1	1
LS	0	0	0	0	1	0	0
NBG	0	0	0	0	1	1	0
WS	0	0	0	0	0	0	0
UNS	0	0	0	0	0	0	0
US	0	0	0	0	0	0	0
WES	0	1	0	0	0	2	0
JS	0	0	0	0	0	1	0
WBG	0	0	0	0	0	0	0
Total	1	2	0	1	3	5	1

(13) Training Needs

1) Basic Training

The most demanded basic training is on General Skills and IT. No one has requested training on M&E. All the basic training needs of the respondents are shown below.

Table 2.2.30 Basic Training Needs

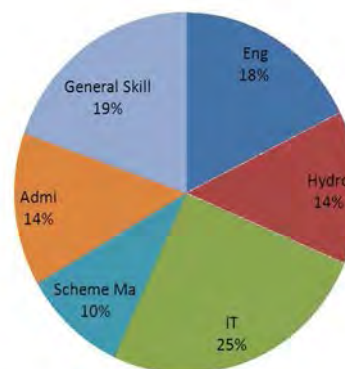
Kind of basic training	Number	%
Engineering	11	14%
Hydrology	13	16%
IT	18	23%
M&E	0	0%
Scheme Management	8	10%
Administration	11	14%
General Skills	19	24%
Total	80	100%

2) Advanced Training

The most demanded advanced trainings are IT and General Skills, which are followed by engineering. No respondents demanded M&E. All the advanced training needs are shown below.

Table 2.2.31 Advance Training Needs

Kind of advanced training	Number	%
Engineering	9	18%
Hydrology	7	14%
IT	13	25%
M&E	0	0%
Scheme Management	5	10%
Administration	7	14%
General Skills	10	20%
Total	51	100%

**Figure 2.2.4 Advance Training Needs****(14) Skills****1) English Skills**

63 % of the respondents answered that their English skills are good or even excellent. On the other hand, the remaining 37 % of the respondents need to improve their English skills.

2) Computer Skills

52 % of the respondents answered that their computer skills are good or even excellent. On the other hand, the remaining 48 % of the respondents need to improve their computer skills. 31 respondents demanded training on the following topics.

- a) Basic computer skills
- b) Civil Engineering software
- c) Microsoft office
- d) Database management
- e) Networking

3) Presentation and Communication Skills

49 % of the respondents answered that their presentation skills are good or even excellent. On the other hand, the remaining 51 % of the respondents need to improve their presentation skills. 29 respondents answered that they need training opportunities through either training courses, workshops or on their job to improve presentation and reporting skills.

4) Project Management Skills

36 % of the respondents answered that their project management skills are good or even excellent. On the other hand, the remaining 64 % of the respondents need to improve their project management skills.

5) Technical Field Skills

59 % of the respondents answered that their technical field skills are good or even excellent. On the other hand, the remaining 41 % of the respondents need to improve their technical field skills. 31 Respondents feel the necessity of training on irrigation equipment, survey instruments, river discharge measurement and water level, velocity Advance level, Mechanized irrigation, data/information recording, storing, procurement courses etc. Some demanded refresher trainings.

Table 2.2.32 Results of the Questionnaire on Skills

Category	English		Computer		Presentation		PM*		T-Field	
	No.	%	No.	%	No.	%	No.	%	No.	%
Excellent	8	16	4	7	4	8	2	4	10	20
Good	24	47	23	45	21	41	16	32	20	39
Fair	14	27	12	24	9	18	18	35	14	27
Poor	5	10	12	24	17	33	15	29	7	14
Total	51	100	51	100	51	100	51	100	51	100

*PM: Project Management

(15) Relationship with MEDIWR

1) Knowledge about MEDIWR's Technical Support

60 % of the respondents know that MEDIWR provides technical supports for state line ministries. Expectations of the respondents on MEDIWR's technical support are as follows.

Table 2.2.33 Acknowledgement of MEDIWR's Technical Support

Kinds of Support	No.
Training	19
Technical and office tools and equipment	7
Transportation equipment	1
Creation of Activity	7
Office Facility	1
Communication tools ex. Internet etc	1
Guideline and Technical assistance	5
Budget	1
Staff	0

2) Request for MEDIWR's Technical Support

More than 60 % of the respondents have some requests from MEDIWR. Their requests are as follows.

Table 2.2.34 Request for MEDIWR's Technical Support

Kinds of Support	No.
Training	23
Technical and office tools and equipment	12
Transportation	6
Creation of Activity	2
Office Facility	0
Communication tools ex. Internet etc	0
Guideline and Technical assistance	2
Budget	6
Staff Promotion & salary rise	2
Staff	3

(16) Current Findings

There are limited human resources that had working and/or training experience for irrigation development and management. On the other hand, there are some skilled engineers who have been engaged in irrigation development and management before independent. In the future, these competent engineers will be assigned in core positions of irrigation development (e.g. implementation of structures) and engineers with limited experiences need to develop their capacity through the projects implementation.

Almost all the respondents have not received training related to irrigation development and also have not experience in irrigation projects. Thus, they might lack not only technical and administrative

knowledge (e.g. Accounting, IT, etc.) but also basic knowledge of irrigation development and management. A future training plan needs to be considered in a comprehensive and medium-long term periodical manner.

Based on the current human resource capacity of the state government related to irrigation development and management, the state irrigation development projects cannot be implemented without MIEDIWR and MAFCRD cooperation and support. On the other hand, for the success of the national irrigation projects, the roles are to be divided between MIEDIWR, MAFCRD and State institutions. In addition, state staff need to access opportunities of on-job training by actively participating in the projects. In case of the general skills enhancement, the state institutions need to address the issue; and MIEDIWR and MAFCRD need to cooperate and support their line state ministries to deal with it.

2.2.4 Institutional Capacity of State Institutions related to Agricultural Mechanization

(1) General Information

Interview results have been collected from 10 state-level institutions under MAF line ministries, which are in charge of agricultural mechanization.

(2) Role of Directorates or Departments

The main roles mentioned by the respondents are as follows:

- a) Service delivery to the farmers by utilizing agricultural machines which are supplied by national government like Tractors
- b) Service delivery by utilizing agricultural equipment which is supplied by state government
- c) Provision of extension services
- d) Planning for provision of irrigation equipment, such as irrigation pumps and water pipes etc.
- e) Coordination and cooperation with other institutions

(3) Current Activities

No current activities related to irrigations were mentioned by the respondents. The main current activities of the target institutions are as follows:

- a) Facilitating mechanized agriculture for farmers
- b) Conducting training on mechanized agriculture for farmers
- c) Development of agricultural mechanization plans
- d) Coordination and cooperation with Development Partners

(4) Job description and Annual Work Plan

Seven interviewed institutions out of ten have been equipped with job descriptions for each staff and annual work plans or periodical action plans.

(5) Equipment and Facilities

1) Equipment

The main equipment that the target institutions have is shown in the table below. All the mentioned equipment is the one to support on-farm management for farmers. Two states have equipment for water intake (Water Pumps). One state, namely Lakes state, is promoting Ox plough in cooperation

with Norwegian People's Aid. Lakes State have been equipped with 1000 Ox ploughs. Most of the equipment is not in good conditions. Some tractors are not operational (some attachments are rusted.). The main constraints stated by the respondents are as follows:

- a) Limited supply of spare parts
- b) Insufficient number of mechanics
- c) Limited number of trained operators
- d) Shortage of tractors and other equipment
- e) Budget limitation

Table 2.2.35 State Own Equipment

Main Equipment	Tractor	Disc Plough	Planter	OX plough	Harrow	Water pump	Sprayer
Number of State with each main equipment	9	8	4	1	7	2	1
Average (No of equipment per state)	12	15	6	1,000	11	2	7
Total	119	116	25	1,000	79	4	7

2) Facility

According to the answers, no target institutions have workshops for maintenance of agricultural mechanization equipment.

(6) Problems on the Operation of the Target Institutions

1) Problems on the Management

The following problems on the management are identified:

- a) Limited transportation means
- b) Limited communication system (internet)
- c) Limited previous working document
- d) Systems for Accumulating knowledge and methodologies are not properly set.
- e) Limited facilities and equipment for conducting activities
- f) Limited number of Supporting staff, especially IT staff
- g) Financial constraints

2) Problem on the Operation of the Current Activities

The problems mentioned are mainly related to human resource capacities and also operation and maintenance of the equipment. The following problems on the management are identified:

- a) Limited number of technical staff
- b) Limited capacity of technical staff
- c) Limited training for technical staff
- d) Limited technical facilities and equipment
- e) Limited spare parts and tools for maintenance
- f) The power supply is not provided efficiently during the office working hours.

(7) Future Plan

1) Future Plan for Service Improvement

Some states are planning to develop irrigated agricultural schemes or to promote irrigated agriculture

practices for farmers. In this regard, the coordination between the stakeholders of irrigation development needs to be improved. The main future plans for service improvement are as follows:

- a) Improve agricultural mechanization scheme
- b) Improve workshop for equipment (agro-machines)
- c) Increasing the number of equipment (agro-machines)
- d) Development of Irrigation scheme
- e) Promotion of Irrigated agriculture practices for farmers
- f) Increasing the number of technical staff
- g) Improve office facility and equipment
- h) Enhancement of the staff capacity
- i) Extension and exercise of modern agricultural practices

2) Future Plan for Improvement of Organizational Arrangement

The main future plan mentioned is "Allocation of technical staff for counties for the further service deliveries".

(8) Current Findings

The main current activities of each state institution are the ones related to promotion of agricultural mechanization. Irrigation development activities are not actively conducted at the moment. In addition, they are providing direct support for farmers by lending tractors or through various types of extension services. Moreover, there are some state institutions that support irrigated agriculture by supplying water pumps, even though they are very much in the minority. Each state institution of Mechanization has accumulated experiences of on-farm support for farmers through the promotion of mechanized agriculture. The accumulated experiences can be utilized for the future irrigated agricultural development. However, they are not equipped with expertise regarding irrigation facility installation or other irrigation-development-related fields. Thus, regarding irrigation development, it is necessary for MAFCRD's line state ministries to coordinate with MEDIWR's line state ministries. The further and closer state-level cooperation will be required in the future.

The target state institutions have owned agricultural machineries, such as tractors, for promoting mechanized agriculture. However, they are facing problems of operation and maintenance of the machineries (e.g. shortage of fuels or spare parts). Since irrigation development produces greater benefits in combination with mechanized agriculture, the aforementioned problems need to be solved as soon as possible not only for activation of the current agricultural mechanization activities but also for the future irrigation development.

As is the case of the results of the CNA surveys targeting the state institutions in charge of irrigation development, some state institutions of agricultural mechanization answered that they were planning to formulate a new irrigation scheme as a future plan. Planning for irrigation schemes requires approaches from both technical knowledge and skills of irrigation and farming agriculture. In this regard, they need to improve the coordination with the state institutions of irrigation development and MEDIWR.

(9) Questionnaire Results from the Personnel & Institutions

Respondents' age

The average age of respondents is 40 years old. More than a half of the respondents belong to the age

group of 31-40 years old. Less than 10 % of the total respondents are young civil servants whose age is under 30 years.

Table 2.2.36 Age Group of Respondents

Age Group	-30	31-40	41-50	50-
Number	3	17	5	7

Grade

Respondents with the grade from 2 to 5 share approximately 28 % of the total. Technical Staff with grade from 6 to 10 share the remaining 72 %. Supporting staff with the grade under 11 share 0% of the total respondents.

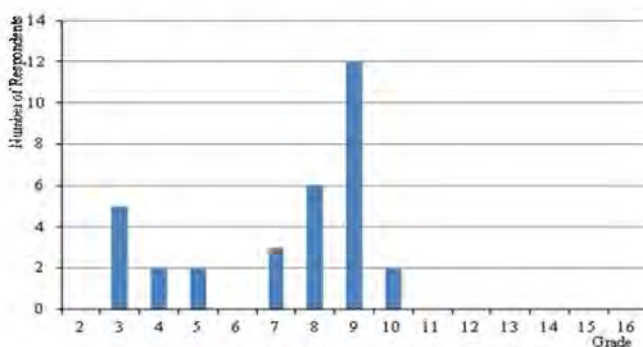


Figure 2.2.5 Respondents' Grade

Working Period

Approximately one third of the respondents have been working at the current office for 5- 10 years. Approximately 20% of the respondents have more than ten years of the working experience at the current office.

Table 2.2.37 Working Period

Working Period	Less than 3	3-5	5-10	More than 10
Number	9	6	11	6

Educational Background

The major formal educational backgrounds of the respondents are Bachelor's degrees, which is followed by graduate diploma level education. Around 90% of the respondents have completed a higher level education than diploma.

- 50 % of the respondents have completed up to bachelor's degrees.
- 38 % of the respondents have completed up to Diplomas.

Table 2.2.38 Educational Background

Education	No.	%
PHD	0	0%
MA or MSc	1	3%
BA or BSc	15	47%
Diploma	12	38%
Certificate	2	6%
Other	2	6%
Total	32	100%

(10) Current Job

1) Officially Mandated Functions or Job Description

More than 90% of the respondents know key functions of the State Ministry, functions and objectives of their directorate and their job description. However, more than 40 % of the respondents have not perfectly understood their mandated roles.

Table 2.2.39 Knowledge Level for Function/Objective/Job Description

Knowledge Level	Key function		Function & Objective Directorate		JOB Description	
	No.	%	No.	%	No.	%
Good Knowledge	19	59%	17	53%	15	47%
Some Knowledge	12	38%	12	38%	14	44%
No Knowledge	1	3%	3	9%	3	9%
Total	32	100%	32	100%	32	100%

2) Current Activities

Only 3% of total activities related to irrigated agriculture. Only one respondent answered an irrigated agricultural activity: "Supporting farmers on supplementary irrigation of vegetables". The largest number of activities is related to agricultural mechanization. 11 respondents mentioned it as one of their current activities.

Table 2.2.40 Current Activities

Requests	No.	%
Agricultural Mechanization	11	34%
Agriculture extension	9	28%
Irrigated Agriculture	1	3%
No activities	0	0%
Other	11	34%
Total	32	100%

(11) Training Experience

1) Agricultural Production Improvement under Irrigation

Seven respondents out of thirty two responded that they have training experience of Agricultural Production Improvement under Irrigation. Most of the training durations was less than one months. The training contents are as follows:

- a) On-farm management of crop production and supporting methods for community agriculture activities.
- b) Agriculture extension for crop production, Animal husbandry, irrigation for vegetables production and agro-forestry
- c) Tractor operation and maintenance, Agricultural equipment, Land preparation, planting, weeding, spraying, harvesting and storing
- d) Conservation Agriculture* and drip Irrigation System

*Conservation agriculture is defined as "a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment" (FAO 2007).

2) Agricultural Production Improvement under Rain-fed

Fourteen respondents out of thirty two responded they have experience of Agricultural Production Improvement Under Rain-fed.

- a) Farmer field school (FFS)
- b) Agro metrological system
- c) Agriculture development under rain-fed mechanization
- d) Forestry management

3) Irrigation Project Planning

Five respondent out of thirty two responded they have participated in the relevant training. The contents are as follows.

- a) Definition of irrigation (types of irrigation and etc.) and types of irrigation equipment, relationship between soil, plants and water, water harvesting methods
- b) Cost estimate of the Model Farms Project

4) Water Control

Three respondents out of thirty two responded have participated in the relevant training. The main training contents are òIrrigation principles, water sources, water harvesting, plant-water relationship and integration facility managementö.

5) Training Farmers on Irrigation Development

Five people out of thirty two responded they have relevant training experiences. The major contents are as follows;

- a) Small scale irrigation principles
- b) Field operation on irrigation systems

6) Monitoring and Evaluation

Fourteen respondents out of thirty two responded have participated in the relevant training. The main contents are as follows.

- a) Crop and Animal monitoring and evaluation
- b) M&E concept , project cycle and M&E guideline

7) Training Conducted

27 respondents have some training experiences. In average, two training programmes were received by each respondent. The following table shows the contents of all the training programmes that the respondents attended. Excluding training programmes that belong to other category, a largest number of the training programmes are regarding Agricultural Production & Skills, which is followed by agricultural mechanization training. Overall, various kinds of trainings have been received by the respondents. Some training programmes are the ones conducted in Yei Crop Training Centre.

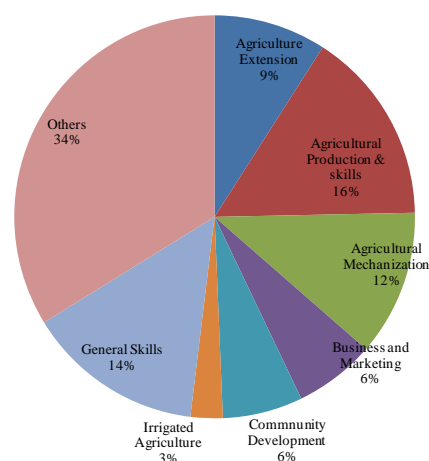


Figure 2.2.6 Share of Each Training Content

Table 2.2.41 Received Training

Training Category	No.	%
Agriculture Extension	7	9%
Agricultural Production & skills	12	16%
Agricultural Mechanization	9	12%
Business and Marketing	5	6%
Community Development	5	6%
Irrigated Agriculture	2	3%
General Skills	11	14%
Others	26	34%
Total	77	100%

8) Remarks on Irrigation-related Training Experience State by State

The following table shows the number of human resources in each target state agricultural machination sector institution who have experience of receiving each category of training related to irrigation. Except for water control, each state institution has some staff with each category of training experience. Only two respondents in Jonglei State have received trainings on water control.

Table 2.2.42 Number of Human Resources with Training Experience by State

State	Production Improvement	Project Planning	Water Control	Training farmers
CES	0	0	0	0
EES	1	0	0	0
LS	0	1	0	2
NBG	1	0	0	0
WS	0	1	0	1
UNS	0	0	0	0
US	1	1	0	1
WES	0	0	0	0
JS	2	2	2	1
WBG	1	0	0	0
Total	6	5	2	5

(12) Working Experience

1) Previous Working Experience

23 respondents (around 65% of the total) have some experience of working at some other organizations before becoming the State Ministry staff. They are mainly working as agricultural engineers or extension workers at other ministries, NGOs or private companies.

2) Agriculture Development Project under Irrigation before Working in the State Ministry

Eight respondents experienced Agriculture Development Project under Irrigation before becoming the State Ministry staff. The Main roles are as follows:

- a) Registration of the farmers, distribution of plots, distribution of water to canals, distribution of seeds, supervision of weeding and receiving the harvest.
- b) Measuring and Monitoring water level

3) Agriculture Development Project under Rain-fed before Working in the State Ministry

Eleven respondents (around 30%) have previous experience on Agriculture Development Project under rain-fed before becoming the State Ministry staff. The main contents are as follows:

- a) Trainer of Trainees
- b) Facilitation and Training for farmers

4) Agricultural Production Improvement under Irrigation

Four respondents (approximately 12%) have working experience on Agricultural Production Improvement under Irrigation. The main role is training farmers on methods of cultivating various kinds of vegetable and transplanting under the irrigation.

5) Agricultural Production Improvement under Rain-fed

Seventeen respondents (53%) have working experience on Agricultural Production Improvement under Rain-fed. The main roles are as follows.

- a) Rainfall data collection and analysis, and rainfall information dissemination
- b) Delivery of extension services, improvement of crop production and training the farmers
- c) Training of trainers on vegetable production
- d) Tractor operation for land development, maintenance of drainage channels
- e) Tractor rent service for communities

6) Irrigation Project Planning

Two respondents have experienced Irrigation Project Planning. The main role is provision of water pumps for irrigation to small farmers.

7) Irrigation Water Control

Seven respondents have job experience on Irrigation Water Control. The main roles are as follows.

- a) Training of farmers on methods of digging channels and the use of water equipment
- b) Meteorology and river discharge measurement and observation

8) Training/Supporting Farmers on Irrigation Water Control

Three respondents have job experience on Training/supporting farmers on Irrigation Water Control. The main facilities that they mentioned are Reservoir and Water canes & pumps. The main roles are as follows.

- a) Providing trainings for farmers regarding irrigation using water pump and watering canes
- b) Training and supervision of farmers on digging ponds around water hand pumps
- c) To assist the farmers in water equipment operation

9) Training/Supporting Farmers on Irrigation Development

Five respondents have experienced Training/supporting farmers on irrigation development. The main role is Extension services to community farms, such as training of farmers (farmerø field school) and provision of tools and seeds.

10)Monitoring and Evaluation (M&E)

Twelve respondents (38%) have job experience on M&E. The main roles are as follows.

- a) Training of staff on M&E methods
- b) Preparation of M&E forms
- c) M&E for projects through field visit (monitoring the work progress and evaluation of the work activities according to the plans)
- d) Monitor the preparation and demarcation of Agriculture land
- e) Monitor the labours and farmers working in the project and their performance
- f) Monitor the budget spending for project operation

11)Remarks on Irrigation-related Working Experience State by State

The following table shows the number of human resources in each target state agricultural mechanization sector institution who have each category of irrigation related working experiences. Overall, each state institution has some staff who have working experiences on production improvement under irrigation in particular. Regarding other irrigation related activities, not so many respondents in each state institution have relevant experiences. Namely, Lakes, Northern Bahr El Ghazal and Jonglei State have a couple of staff with experience of each irrigation development activity.

Table 2.2.43 Number of Human Resources with Working Experience by State

State	Production Improvement	Project Planning	Water Control	Supporting farmers	
				Water Control	Other support
CES	0	0	0	0	1
EES	0	0	0	1	0
LS	2	1	2	1	0
NBG	2	1	1	0	1
WS	0	0	0	0	1
UNS	2	1	1	0	0
US	2	1	0	0	1
WES	1	0	0	0	0
JS	2	0	3	1	1
WBG	1	0	0	0	0
Total	12	4	7	3	5

(13) Training Needs**1) Basic Training**

The most demanded basic training is on General Skills (43%). It is also notable that 6 respondents out of 32 have requested training on irrigation or irrigated Agriculture. All the basic training needs of the respondents are shown below.

Table 2.2.44 Basic Training Needs

Training Category	No.	%
Agriculture Extension	2	5%
Agricultural Production skills	4	10%
Agricultural Mechanization	8	19%
Irrigation or Irrigated Agriculture	6	14%
General Skills	18	43%
Others	4	10%
Total	42*	100%

*The total number of the respondents is 32. However, multiple answers were allowed.

2) Advanced Training

The most demanded advanced training programmes are advanced agricultural mechanization and also General Skills (26% each), which are followed by Agricultural Production skills. No respondents demanded Agriculture Extension. All the advanced training needs are shown below.

Table 2.2.45 Advanced Training Needs

Training Category	No.	%
Agriculture Extension	0	0%
Agricultural Production skills	7	20%
Agricultural Mechanization	9	26%
Irrigated Agriculture	3	9%
General Skills	9	26%
Others	7	20%
Total	35*	100%

*The total number of the respondents is 32. However, multiple answers were allowed.

(14) Skills**1) English Skills**

75 % of the respondents answered that their English skills are good or even excellent. On the other hand, the remaining 25 % of the respondents need to improve their English skills.

2) Computer Skills

Over 50% of the respondents (53%) answered that their computer skills are fair or even poor, whereas the remaining 47% felt confident in their relevant skills. The topics of computer skill training demanded by the respondents are as follows.

- a) Basic training in computer (Microsoft office, etc)
- b) Using computer to analyse and process the metrological data
- c) Database management

3) Presentation and Communication Skills

69 % of the respondents answered that their presentation skills are good or even excellent. On the other hand, the remaining 31 % of the respondents need to improve their presentation skills. 19 respondents answered that they need training opportunities through training courses, workshops or practices through their jobs to improve presentation skills.

4) Project Management Skills

72 % of the respondents answered that their project management skills are good or even excellent. On the other hand, the remaining 28 % of the respondents need to improve their project management skills. Some respondents mentioned the necessity of Leadership and project management training and experience of project management.

5) Technical Field Skills

All the respondents answered that their technical field skills are good or even excellent. However, 12 respondents demanded training on the following topics.

- a) Mechanical engineering and agricultural engineering
- b) Water harvesting facility construction
- c) Meteorology system
- d) Mechanization
- e) Refresher training on technical skills
- f) Irrigated agriculture
- g) Forestry

Table 2.2.46 Result of the Questionnaire of Skills

Category	English		Computer		Presentation		PM		T-Field	
	No.	%	No.	%	No.	%	No.	%	No.	%
Excellent	6	19%	6	19%	9	28%	5	16%	8	25%
Good	18	56%	9	28%	13	41%	18	56%	24	75%
Fair	6	19%	14	44%	9	28%	8	25%	0	0%
Poor	2	6%	3	9%	1	3%	1	3%	0	0%
Total	32	100%	32	100%	32	100%	32	100%	32	100%

(15) Relationship with MAFCRD and MEDIWR

1) Experience of Working with MAFCRD

Twelve respondents (38%) have some experiences of working with MAFCRD. The major experiences are as follows.

- a) Cooperation for Training of farmers

- b) Cooperation for establishment of demonstration farm
- c) Coordination for training opportunities
- d) Facilitation of Agriculture trade intermediation by collaboration with MAFCRD
- e) Coordination for Aweil Irrigation Rice Scheme

2) Request for MAFCRD and MEDIWR's Technical Support

Twenty respondents (62%) have some request for MAFCRD and MEDIWR. Their requests are as follows. 30 % of all the requests are on training opportunities for state staff. Notably, 36 % of the requests are on provision of irrigation equipment and facilities (including new scheme establishment).

Table 2.2.47 Technical Support Requests from MAFCRD and MEDIWR

Requests	No.	%
Agriculture training	2	6%
Irrigation training	3	9%
Other Training or capacity development	5	15%
Equipment and Facility Irrigation	12	36%
Equipment and Facility Agriculture	5	15%
Technical support for agriculture or guideline(policy)	1	3%
Support for Service delivery to farmers	2	6%
Staff	2	6%
Office Equipment and office space	1	3%
Total	33	100%

(16) Current Findings

Based on the survey results, the largest number of the staff of the state mechanization institutions belongs to the age group of 31-40 years old. A great number of staff have accumulated working experience at the state institutions for more than 10 years. Thus, it can be judged that the capacities of the target staff for the State-level CNA are basically sufficient for conducting their current jobs. Besides, there are some staff who have been engaged in irrigation development through Aweil irrigation rice scheme or Northern Upper Nile Irrigation Schemes (NUNIS), even though the number is limited.

Moreover, the CNA surveys have clarified that other staff who were not the target of CNA survey this time also have some variable experience on irrigation development. MAFCRD and MEDIWR need to consider both methods of sharing the variable experiences and knowledge of these human resources with the stakeholders of irrigation development and utilization of these human resources nationwide. Moreover, they also need to take actions for sharing the experiences and knowledge and the utilization of such variable human resources.

Approximately 50 % of the respondents have received training on water control, agricultural production improvement (including irrigated agriculture) and agricultural extension for farmers, such as Farmers Field School (FFS). These training experiences are expected to become useful knowledge to support farmers on farm for the future irrigation development. However, most of the training programmes were conducted on an ad hoc basis. Thus, in implementing irrigation development in the future, it is essential to consider the necessity of conducting refresher training on the above-mentioned topics. Moreover, since there are a lot of staff who have not been the target of these training programmes, a comprehensive and long-medium term training plan needs to be formulated in the future.

Based on the current human resource capacity of the state government, the state irrigation development projects cannot be implemented without MAFCRD and MEDIWR's cooperation. On the other hand, for the success of the national projects implemented by MAFCRD and MEDIWR, the roles are to be divided between MAFCRD, MEDIWR and State governments. In addition, state officers need to obtain opportunities of on- job training by actively participating in the projects.

In addition, the state institutions need to address the general skill enhancement. MAFCRD and MEDIWR need to support their line state ministries to deal with the issue.

2.2.5 County-level Institutional CNA Survey of the County Water Sector

(1) General Information

Interview results have been collected from four institutions under the counties within state capitals, the targeted institutions are "Public health office in Aweil Municipal council, Northern Bahr el-Ghazal state", "Rural Water Supply and Sanitation-Gogrial West County, Warrap State", "Department of water and sanitation -Juba County, Central Equatoria State" and "Water Department-Rumbek Center County, Lakes State".

(2) Roles of the Institutions

All states have roles for domestic water supply, sanitation and hygiene. Irrigation development and management are not mentioned in their roles.

(3) Activities

The main activities of the four institutions are mainly related to domestic water supply such as "bore hole drilling", "construction supervision for domestic water supply facilities", "O&M for water supply facilities" and "training for water users committee for hygiene and sanitation". There are no significant irrigation development and management activities currently.

(4) Institutional Arrangements

The number of the county staff under the target institutions is shown by category in the figure below. The average number of the staff in each institution is a) seven (7) technical staff, b) three (3) Administration staff and c) one (1) supporting staff (e.g. Drivers, Clerks, etc.).

Table 2.2.48 Number of the State Staff under the Target Institution

Type	Technical staff	Administration Staff	Supporting Staff
Total	27	10	3
Average	7	3	1

Only one (1) county institution has prepared job descriptions for each staff. Moreover, three (3) counties have prepared annual work plans.

(5) Equipment and Facilities

All the institutions have equipment for construction and maintenance of small scale domestic water supply, such as hand pumps and also they have tool box for repairing of the water supply equipment and facilities. A half of the institutions that have equipment pointed out the poor conditions of their tool boxes. There are no facilities other than office space. The following constraints are mentioned regarding operation and maintenance.

- a) Limited capacity of technical staff

- b) Insufficient training opportunities for technical staff
- c) Insufficient supply of spare parts for maintenance

(6) Target Institutions Operational Problems

The main problems on the operation and management of the target institution are related to a lack of equipment and facilities, shortage of budget, limited number and capacities of human resources. The following problems on the management are identified:

- a) Insufficient transportation
- b) Insufficient facilities that store hand pumps and equipment

Limited human capacity (quality and number) is the main problem on the operation of the current activities.

(7) Future Plan

Two counties have some plans to develop new projects and to establish new institutions for future irrigation development and management. Almost all other answers are related to domestic water supply development and operation.

(8) Current Findings

According to the answers collected through the survey, all the target institutions have not conducted activities related to irrigation development and management, which they have not even mentioned in their roles. Also, human resource allocation and other institutional arrangements are only adopted for domestic water supply development and operation. With this fact, county institutions need to reconsider and improve their institutional arrangements and human resources allocation for future irrigation development and management.

(9) Human Resource Capacity of County Water Sector Institution

All the three respondents are less than 40 years old. Two of the three respondents are Technical Staff with the grade of 8 and 9. The remaining one (1) is a financial officer with the grade of 12. All the three (3) respondents have been working in a county office for 3-5 years. Moreover, all the three respondents have completed up to the certificate level of education.

1) Current Job

All the three (3) respondents know the functions and objective of their department and their job description. However, one (1) respondent does not know the key function of the county office, whereas the rest of the respondents have some knowledge. No activities mentioned in relation to irrigation are currently carried out. The main activities of the county offices are related to domestic water supply and sanitation as shown below.

- a) Operation and maintenance of borehole
- b) Collection of water fees
- c) Hygiene awareness

2) Training Experience

The total number of the training programmes that the three (3) respondents have received are seven (7) and four (4) out of seven (7) are related to engineering. The remaining three (3) are related to IT,

administration and other field (teaching skills). The main contents of the trainings are "Water facility construction", "sanitation" and "Pump mechanic".

3) Working Experience

The following working experiences are mentioned by the respondents.

- a) One (1) respondent has experience for infrastructure development project. The main role is supervision of construction work, management of material supply and payment for the work.
- b) One (1) respondent has some experience for hand pumps procurement
- c) One (1) respondent has some experience for supervision of boreholes instillation.
- d) Two (2) respondents have some working experience on Database Management/Information System. Their main roles are collection and encoding of the boreholes data and information.
- e) One (1) respondent have some working experience on financial management. The main role is preparation of financial reports and payment lists.

4) Training Needs

Regarding basic training needs, one (1) respondent demanded some training on technical skills regarding irrigation and drilling works. Other two (2) respondents stated administration (financial management) and general skills (English and computer skills) as their basic training needs.

On the other hands, as for advanced training needs, one (1) respondent demanded advanced technical skills training on water resource management. The remaining two (2) respondents stated advanced financial management skills as their advanced training needs.

5) Skills

The self-evaluation of the skills of the respondents is as follows.

- a) Two (2) respondents answered their English skills are good. However, the remaining one (1) respondent feels there is necessity of improving English skills.
- b) Regarding computer skills, all the three (3) respondents answered that their computer skills are fair or even poor. They demands training on Basic computer skills and Microsoft office.
- c) All the three (3) respondents answered that their presentation skills are good. However, they need further training opportunities.
- d) Only respondent answered that his project management skills are good. On the other hand, the remaining two (2) respondents need to improve their project management skills.
- e) All the respondents answered that their technical field skills are good. However, they all want to improve their technical field skills on farm water management or other fields.

6) Request for MEDIWR's Technical Support

Two (2) respondents have some request for MEDIWR. They requested MEDIWR to provide the following support.

- a) Establishment of department of irrigation at county level
- b) Training the technical staff at county on irrigation activities
- c) Creation of Irrigation activities at county level

7) Current Findings

Human resources in the county institutions have seldom participated in irrigation projects nor received

training on irrigation development and management so far. Thus, for involving county institutions in irrigation projects, it is necessary to enhance their basic capacities regarding irrigation development and management based on a long-term vision.

2.2.6 Institutional Capacity of County Agriculture Sector Institution

(1) General Information

Interview results have been collected from six institutions under the counties within state capitals. The county institutions are as follows;

Table 2.2.49 Name of Target County Institutions

Institution Name	State
Department of agriculture Torit County	Eastern Equatoria
Agriculture Aweil Municipal Council	Northern Bahr el Ghazal
Department of Agriculture Malakal County	Upper Nile
Agriculture office-Gogrial West County	Warrap
Department of Agriculture Yambio county	Western Equatoria
Department of Agriculture and Forestry Bor County	Jonglei

(2) Roles of Directorates/ Departments

All the institutions have roles for supporting farmers for improvement of agricultural practices on farm level. There is no mentioning of irrigation development and management in relation to their roles.

(3) Activities

The main activities of the four (4) institutions are mainly related to on-farm agricultural extension technology and provision of agricultural inputs to farmers. Only one (1) institution responded "No current service delivery".

(4) Institutional Arrangements

The number of the state staff under the target institutions is shown category by category in the figure below. The average number of the staff in each institution is a) seven (7) technical staff, b) two (2) Administration staff and c) one (1) supporting staff (e.g. Drivers, Clerks, etc.). Three (3) county institutions have prepared job descriptions for each staff. Four (4) counties have prepared annual work plans.

Table 2.2.50 Number of the County Staff under the Target Institution

Type	Technical staff	Administration Staff	Supporting Staff
Total	40	12	7
Average	7	2	1

(5) Equipment and Facilities

Three (3) county institutions have tractors and their attachments. Almost all the county institutions have been equipped with motorbikes as their means of transportation to the sites. There is no facilities except office space; moreover, almost all the institutions that have equipment pointed out the poor conditions of their equipment except for the newly allocated equipment. The following constraints were mentioned on operation and maintenance.

- a) Insufficient training access for technical staff
- b) Insufficient supply of spare parts for maintenance
- c) Financial constraints

(6) Target Institutions Operational Problems

The main problems on the operation and management of the target institutions are related to the Limited number of equipment and facilities, shortage of budget, the limited number and capacities of human resources. The following problems on the management are identified:

- a) Limited transportation means
- b) Limited number of necessary equipment
- c) Lack of offices space in payams

Lack of human resource capacity (quality and number) is the main problem on the operation of the current activities.

(7) Future Plans

Almost all the institutions have inclination to improve their current roles and activities. One (1) institution has a plan to include extension of irrigated agriculture for farmers in their activities.

(8) Current Findings

According to the answers collected through the survey, all the target institutions have not conducted activities related to irrigation development and management. On the other hand, they have experiences on extension of on-farm agricultural technology for farmers, especially demonstration farm development and operations. In this fact, their past experience may be adopted in future irrigation development and management under supporting MAFCRD and/or State institutions. However, the current human resource allocation and other institutional arrangement are done for conducting current activities, such as promotion of rain-fed agriculture. Thus, for future irrigation development and management, the county institutions need to rearrange their institutional and human resource set-up.

(9) Human Resource Capacity of County Agriculture Sector Institution

1) Age

The average age of respondents is 44 years old. More than a half of the respondents belong to the age group of over 40 years old. Two (2) respondents out of thirteen are young officers whose age is under 30 years.

Table 2.2.51 Age Group of Respondents

Age Group	-30	31-40	41-50	51-
Number	2	3	4	4

Most of the respondents (eight respondents out of thirteen) are Technical Staff with grade from 6 to 10. The remaining five (5) respondents are supporting staff with the grade under 11. Moreover, approximately 70% of the respondents have been working at the current office for more than 10 years. Three (3) respondents (23%) have working experience of less than three years.

Table 2.2.52 Working Period

Working Period	-3	3-5	5-10	10-
Number	3	0	1	9

The major formal educational backgrounds of the respondents (6 respondents) are Certificate. Four (4) of the other six (6) respondents (46%) have completed a higher level education diploma and two (2) respondents have completed bachelor's degrees.

2) Current Job

More than 60% of the respondents do not know key functions of county offices. On the other hand, most of the respondents know functions and objectives of their department and their job description.

Table 2.2.53 Knowledge Level for Function/Objective/Job Description

Knowledge Level	Key function		Function & Objective Directorate		Job Description	
	No.	%	No.	%	No.	%
Good Knowledge	5	38%	8	62%	10	77%
Some Knowledge	0	0%	0	0%	1	8%
No Knowledge	8	62%	5	38%	2	15%
Total	13	100%	13	100%	13	100%

No activities in relation to irrigation were mentioned by the respondents currently. Their main activities are related to Agriculture Mechanization and Extension.

Table 2.2.54 Current Activities

Category	No.
Agricultural Mechanization	4
Agriculture extension	5
Irrigated Agriculture	0
No activities	1
Other	3
Total	13

3) Training Experience

Ten (10) respondents out of thirteen (13) have some training experiences. In total, twenty two (22) training programmes have been received by all the thirteen (13) respondents. The following table shows the contents of all the training programmes that the respondents attended. The most received training programmes are on Agricultural Production & Skills. One (1) person received training on Irrigated Agriculture. In addition, only one general skill training programme has been received. Some training programmes are the ones conducted in Yei Crop Training Centre.

Table 2.2.55 Training Experience

Training Categor	No.	%
Agriculture Extension	3	14%
Agricultural Production & skills	8	36%
Business and Marketing	2	9%
Community Development	2	9%
Irrigated Agriculture	1	5%
General Skills	1	5%
Others	5	23%
Total	22	100%

4) Working Experience

The respondents have the following working experiences.

- Three (3) respondents have working experience on Agricultural Production Improvement under Irrigation.
- Four (4) respondents answered that they had some working experience on Agricultural Production Improvement under Rain-fed. The main roles are mechanized rain-fed and extension service provision for farmers.

- c) Two (2) respondents have job experience on Training/supporting farmers on Irrigation Water Control. The main facilities that they have mentioned are Wells and the main roles are training, mobilization and grouping of farmers.
- d) One (1) respondent has experienced Training/supporting farmers on irrigation development and management. The main role is provision of advice and training for farmers.
- e) Two (2) respondents have job experience on M&E. The main roles are Collection of data on farmer's performance of crop production.

5) Training Needs

The most demanded basic training is on Agricultural Production skills (40%). It is also notable that four (4) respondents out of thirteen (13) have requested training on irrigation or irrigated Agriculture. All the basic training needs of the respondents are shown below.

Table 2.2.56 Basic Training Needs

Training Category	No.	%
Agriculture Extension	1	7%
Agricultural Production skills	6	40%
Business and Marketing	0	0%
Community Development	0	0%
Irrigation or Irrigated Agriculture	4	27%
General Skills	3	20%
Others	0	0%
N/A	1	7%
Total	15*	100%

*The total number of the respondents are thirteen. However, multiple answers were allowed

On the other hand, the most demanded advanced training programmes are Agri-business and Marketing, which are followed by Irrigated Agriculture and General Skills (21% each). All the advanced training needs are shown below.

Table 2.2.57 Advanced Training Needs

Training Category	No.	%
Agriculture Extension	0	0%
Agricultural Production skills	2	14%
Business and Marketing	4	29%
Community Development	1	7%
Irrigation or Irrigated Agriculture	3	21%
General Skills	3	21%
Others	1	7%
N/A	0	0%
Total	14*	100%

*The total number of the respondents is 13. However, multiple answers were allowed.

6) Skills

The self-evaluation of the skills of the respondents is as follows.

- a) Eleven (11) respondents (85%) answered that their English skill are good or even excellent. On the other hand, the remaining two (2) respondents need to improve their English skill.
- b) Over 50% of the respondents (52%) answered that their computer skill are good or even excellent, whereas the remaining 48% felt the necessity of improving their relevant skill
- c) 54 % of the respondents (7 respondents) answered that their presentation skills are good or even excellent. On the other hand, the remaining 46 % of the respondents need to improve their

presentation skills.

- d) 46 % of the respondents (6 respondents) answered that their project management skills are good. On the other hand, the remaining 54 % of the respondents need to improve their project management skills.
- e) All the respondents answered that their technical field skills are good or even excellent. However, almost all the respondents demanded training on irrigation and agriculture production or other technical fields.

7) Request for MAFCRD's and MEDIWR's Technical Support

Five (5) respondents (38%) have some request for MAFCRD and MEDIWR. Their requests are as follows.

- a) Support for rehabilitation and activation of irrigate schemes (old channels or etc)
- b) Training for staff or farmers on irrigation knowledge and skills
- c) Tools for cultivation or containers for irrigated farms

8) Current Findings

Most of the respondents have over 10 year working experiences of being engaged in agricultural development. Judging from this fact, it can be said that the county institutions are equipped with human resources that have accumulated experiences and knowledge on provision of direct support for farmers. Therefore, in implementing irrigation development and management projects, it is necessary to utilize their locally accumulated knowledge on supporting farmers from the planning stage. Furthermore, even in the implementation stage, involvement of the human resources allocated in the county institutions in charge of Agriculture need to be considered for making irrigation development and management projects more effective.

2.2.7 Institutional Capacity of MEDIWR Renk Irrigation Operations Office

(1) General Information

The institutional interview result has been collected from Renk Irrigation Operation and Maintenance Office under MEDIWR.

(2) Role of the Renk Irrigation Operation Office

The Renk office has three roles as mentioned below:

- a) Operation and maintenance of the schemes facilities
- b) Training of farmers on how to monitor water in the schemes
- c) Coordination of irrigation operations with MAFCRD on ground (at the scheme/farm level)

(3) Activities

The main activities mentioned by the respondents are preparation of the necessary machines for operation of the irrigation facilities at the schemes. The shortage of fuel or spare parts limits the activities; however, no official plans and actions from national government (MAFCRD and MEDIWR) to reactivate the irrigated agriculture in the scheme.

(4) Institutional Arrangement

The total number of staff at Renk Operation and Maintenance Office is 25: a) two (2) management

staff, b) six (6) technical staff, c) two (2) admin staff and d) others (Messengers and cleaners etc). Job Description and Annual work plan have not been prepared for the Renk irrigation operations office.

(5) Equipment and Facilities

All the equipment except two desktop PCs are in a good condition and available equipment in Renk operation and maintenance office are as shown in table below:

Table 2.2.58 Number of the Equipment

Name of Equipment	No. of equipment
Vehicle	2
Bulldozer	1
Generator	1
Desktop	2

The available facilities are in good condition, but the irrigation pumps are not in use because there are no operation activities currently. as shown in table below .

Table 2.2.59 Number of the Facilities

Name of Facility	No. of Facilities
Office	1
Irrigation Pump station (plus irrigation pumps)	16

(6) Renk Irrigation Operation Office Management Problems

The main problems on the operation and management of the Renk Irrigation operations office are related to the limited number of officers, technician, limitation of operation cost, insufficient supply of fuel for irrigation pump and others. Regarding operation of the current activities, the main problems are insufficient training access for the staff regarding water use or water control in the schemes.

(7) Future Plan

1) Future Plan for Service Improvement

The Renk irrigation operations office is planning in future to resume the irrigation operations office to establish and rehabilitated n office in each pump station. For the service delivery, they are planning to obtain some new equipment, such as four bulldozers for cleaning canal, two tracks and two winches.

2) Future Plan for Improvement of Organizational Arrangement

The main future plans mentioned by head of the office are ðassignment of ten (10) engineers to Renk irrigation operations office for supervision of schemesø operationsö and ðAssign one engineer and three (3) technicians in each irrigation pump station (16 engineer and 48 technicians in total)ö.

(8) Current Findings

There are some action plans of National Government (MAFCRD and MEDIWR) to reactivate irrigated agriculture in the scheme. However, these action plans do not clearly indicate time frame and necessary human resources, equipment and budgets for each activity. Therefore, it is necessary for MEDIWR HQ and Renk irrigation operations office to revise these action plans in cooperation with MAFCRD so that the plans can be put into action soon after mitigation of financial constraints.

(9) Human Resource Capacity of MEDIWR Renk Irrigation Operations Office

1) General Information

The average age of respondents is 54 years old. Five respondents out of six (6) belong to the age group of over 40 years old. Only one (1) respondent is young civil servants whose age is under 30 years. There is no respondent with the grade from 2 to 9. Five (5) respondents out of six are Technical Staff with grade 10. The remaining one (1) respondent is supporting staff with the grade 12. Five (5) respondents out of six have been working at the current office for the period of nine (9) years, and the remaining one (1) respondent have been working less than three years. Two (2) respondents have completed certificates, but education backgrounds of four (4) other respondents are not clear.

2) Current Job

a) Officially Mandated Functions or Job Description

Only 67% of the respondents know key functions of MEDIWR HQ, and functions and objectives of their institution. All the respondents know their job description. Overall, if officially written functions or duties have a closer relation with their daily and personal duties, the larger number of the respondents has grasped them. However, all the respondents have not perfectly understood the key functions of the Renk irrigation operations office and the functions and objectives of their institution.

Table 2.2.60 Knowledge Level for Function/Objective/Job Description

Knowledge Level	Key function		Function & Objective Directorate		Job Description	
	No.	%	No.	%	No.	%
Good Knowledge	0	0%	0	0%	1	17%
Some Knowledge	4	67%	3	50%	5	83%
No Knowledge	2	33%	3	50%	0	0%
Total	6	100%	6	100%	6	100%

b) Current Activities

Three (3) activities out of the total are related to irrigation: such as pump mechanics, irrigation technician. And other three (3) respondents are conducting administration or supporting activities.

c) Activities Reports

All the respondents currently have responsibility of making periodical activities reports. The most of the reports are prepared on a weekly or monthly basis.

3) Training Experience

One (1) respondent out of six (6) responded he has participated in training on procurement process. Another one (1) respondent has some training experiences in administration.

4) Working Experience

All respondents responded that they have some experience of project planning. One (1) respondent out of six has experience of procurement process. Moreover, three (3) respondents out of six responded that they have experience on operation and maintenance of irrigation schemes. The main roles are "Mechanic of maintenance for irrigation pumps" and "Canal/gates operation or water control in schemes" One (1) respondent out of six has ever provided support for farmers. The main role is "Opening the gate and providing guidance for farmers on how to manage the water in farm".

5) Training Needs

Three (3) respondent demanded basic training opportunities on general, skills such as English and other demanded training on scheme management. On the other hand, only two (2) respondents demanded advance training opportunities on administration and general skill respectively.

6) Skills

All the respondents answered that their English skills are fair or poor. Regarding computer skills, one (1) respondent answered that his computer skills is excellent, and the other remaining five (5) respondents consider their computer skills are fair or poor. All the respondents answered that their presentation skills are poor. And they need to improve their presentation skills. Only two (2) respondents answered that their project management skills are good. On the other hand, the remaining four (4) respondents need to improve their project management skills. Only one (1) respondents answered that his technical field skills is very good, one (1) with good field skill. On the other hand, the remaining four (4) of the respondents need to improve their technical field skills.

7) Current Findings

The average age of the respondents are over 40s years. They have experience of operation and maintenance of irrigation facilities in Renk Irrigation schemes. Their experience can be great asset for the operation of the office as well as living materials for young engineers. However, the current number of young staff in Renk irrigation operations office is limited. Thus, for the sustainability and future development of the scheme, it is necessary to consider further allocation of young staff in Renk irrigation operations office.

Judging from the results, the basic skills of the staff, such as English, Computer and irrigation facility operation skills (pump operation and maintenance, etc), are limited. Thus, MEDIWR HQ needs to consider the enhancement of their basic skills. Moreover, it is also essential to consider sending trainers to Renk when conducting these basic skill training programmes

2.2.8 Current Situations of Farmers' Organization

Most of South Sudanese famers have not practiced agricultural activities under irrigation. Famersø organizations that conduct operation and maintenance have been established only for irrigation schemes in Aweil and Renk. The capacities of the famersø organizations have been analyzed based on field survey for the cooperative under Aweil Irrigation Rice Scheme (AIRS) conducted by IDMP in 2013 (Phase II).

(1) Outline

Aweil Rice Farmers Cooperative Society was started in March 2012 with the support of the Scheme Management, which assisted initial subscribers to draw up a constitution and to hold briefing meetings with prospective members. After extensive consultations, the members agreed on a constitution for òAweil Rice Farmersø Cooperativeö. The Cooperative was then registered under the Cooperative Act, 2011, by the Department of Cooperative Development, Northern Bahr el-Ghazal State in Aweil City (certificate no. 6, March 2013). Regarding membership, the main qualifications for membership are being a rice farmer who has signed a tenant agreement with the management AIRS and being over 18 years old. Cooperative members operate an irrigated farm of two (2) feddan each although some farmers have been allocated 4-6 feddan on the basis of their capacities. Membership is voluntary but all the farmers of AIRS are expected to join after paying SSP 50 initial registration fee and SSP 120 annual subscription fee.

(2) Objectives

As stated in the Constitution, the primary objectives of the Cooperative are to contribute to food security by producing irrigated rice sustainably as well as to improve members' general economic welfare. Followings are other objectives:

- 1) Fighting hunger in Northern Bahr el-Ghazal State and extending the same to other States;
- 2) Helping farmers to acquire farming skills;
- 3) Encouraging children to go to school;
- 4) Linking farmers with institutions that might provide technical and financial support in rice production as well as in other income generating activities; and
- 5) Providing an opportunity to bring the communities engaged in irrigated agriculture together so that they can know each other better.

(3) Roles of the Cooperative

Since its establishment, the Cooperative has discharged the following roles and responsibilities:

- 1) Creating awareness among farmers on cropping calendar and cultivation practices;
- 2) Collecting annual subscription fee at the rate of 10 SSP/month or 1 sack (70kg) of paddy /year (all the members have paid for last year);
- 3) Allocating loans to farmers using funds in the Cooperative bank account;
- 4) Assisting the scheme managing office on removing and cleaning bushes, broken woods, grasses and sediment from canals;
- 5) Assisting the scheme managing office on maintenance of the broken dykes; and
- 6) Assisting the scheme managing office on monitoring water level in scheme and report to the management office.

(4) The Current Activities of the Cooperative

According to the interview, their current activities are as follows:

- 1) Assisting the Scheme management in supervising water distribution;
- 2) Mobilizing farmers for weeding and clearing tertiary canal and other water channels; and
- 3) Assisting the Scheme management to de-silt some secondary canals using food for work supported by WFP.

(5) Members and Governance Structure of the Cooperative

Up to the time of the 1st site visit held in May 2013, the Cooperative had 447 members (247 men and 200 women). To facilitate communication within the Cooperative organization, the registered members are organized into three(3) groups on the basis of the three(3) Payams that are neighboring AIRS: namely, Aweil, Maduany and Udhum.

The constitution of Cooperative has provided for a governance structure and procedures, including frequency of members' meetings, election and dismissal of management committee. The Committee has 15 members, in addition, there are three(3) sub-committees by seven(7) members from each of three(3) Payams that are associated with the Scheme. Moreover, the Cooperative is affiliated to the Farmers' Union of Bahr El Ghazal State. In the past the latter has played a useful role in resolving any serious disagreements between farmers and the scheme management (e.g. regarding cancellation of leases for underperforming farmers).

(6) The Budget Sources of the Cooperative

The budget sources of the Cooperative are the membership fees and the subsidies from MAFCRD. In 2012, the Cooperative collected membership and subscription fee amounting to SSP 22,300 and received a subsidy of SSP 5,000 from the National MACRD.

(7) Facilities and Equipment of the Cooperative

At present, the Cooperative office is temporarily located at the joint office of the Farmers Union and the Chamber of Commerce. However, the Committee is planning to build a cooperative office at a suitable location within the irrigation Scheme.

(8) Support from Other Institutions

The cooperative received the following supports from other institutions in the past:

- 1) AIRS management office assisted in preparing the Constitution of the Cooperative. In addition, the managing office supports members on planning and coordinating activities relating to paddy rice production;
- 2) National MAFCRD gave the Cooperative a subsidy of SSP 5,000 in 2012; and
- 3) WFP supported the members in de-silting secondary canals through a food-for-work programme.

(9) Main Challenges facing the Cooperative and its Members

The Cooperative and its members are presently faced with the following major issues:

- 1) Improved varieties are not available, compelling farmers to rely on old varieties supplied from research/demonstration farm;
- 2) Owing to budgetary constraints, the Scheme does not supply members with fertilizers particularly Triple Super Phosphate (TSP, which induces high paddy yields) and Urea as well as other agro-chemicals; and
- 3) Insufficient and unreliable supply of irrigation water because intake and canals are silted.

(10) Future Plans of the Cooperative

According to the chairman, the Cooperative has ambitious plans, which include below:

- 1) Acquiring good quality seeds;
- 2) Erecting shelters in the fields;
- 3) Purchasing an assortment of farm machinery (tractors, combine harvester, loader);
- 4) Moving the Cooperative Office to a suitable location within the Scheme;
- 5) Constructing a store for products in Aweil Town;
- 6) Exporting rice to international markets; and
- 7) Expanding the Scheme (Last year area under irrigated rice was 1,500 feddan; this year 3,000 feddan is expected).

(11) Current Findings

Currently, the cooperative seeks their own activities, because only two (2) years have passed since the establishment and cooperative members have not created profits from their agricultural activities under the scheme. Even under those situations, The Cooperatives have conducted some activities, such as distribution of fertilisers for the members and irrigation canal maintenance by themselves. Therefore,

it can be assumed that the cooperative are capable of creating and conducting their own activities to generate profits under the scheme management support.

Establishment of farmerø organizations that implement operation and maintenance for irrigation is one of the essential elements for success of future irrigation projects. Considering the current situations of the AIRS farmerø organization, it is expected that famerø organizations can be established and might be become a main actor in future irrigation development. Since famers in general do not have any experience for establishing and managing functional organizations, appropriate assistance is essential for forming them. Moreover, AIRS farmerø organization was established based on communities of traditional village. Thus, for the establishment under irrigation projects in future, AIRS model should be applied.

2.2.9 Current Situations of Farmers

(1) Common Features regarding the Capacity of the Farmers in Aweil

According to the report on the socio-economic baseline survey undertaken in March 2008 targeting 300 farming households in Aweil (Joseph Kariuki, 2009), the common features regarding the capacity of the farmers in this region is shown below.

1) Average Household Size

Size of household is eight (8) in average, which is reasonable scale for labour availability, since the size gives a broad indication of the labour potential, though age distribution is not clearly identified.

2) Education among Household Members

The level of education is generally low with high illiteracy rate, particularly for the women.

3) Experience of Irrigation Scheme

A few farmers had experience for irrigation with duration of 4.8 years in average.

4) Livelihoods and Incomes

In terms of livelihoods and incomes, most of households are dominated of agriculture and animal husbandry. Seasonal fishing is also common especially after the floods. Approx. only 30% of the households interviewed, have regular employment with low level while a great number of households have no regular income sources with high levels of poverty.

According to the report in 2008 and 2009, most of the households had more than one(1) source of food, of which main sources were either (a) their own food crops, (b) purchases of food or (c) their own livestock products. On the other hand, duration of households who had enough food is for 5.6 months/year in average mainly in September to February. Conversely, duration of no food is for 4.3 months/year. Households coped with food shortage by either (a) animal selling, (b) borrowing from relatives/friends, (c) hunting, (d) reducing consumption of food or (e) slaughter of livestock.

5) Access to Financial Services

8 out of 10 households did not use any financial services which are indicating poverty and a lack of service providers. Informal financial service providers are available such as money lenders and merry-go-rounds.

6) Expenditure

While main expenditures of household are related to food purchases such clothes, education of children and medical bills, only a small number of households is affected by purchasing of tractors and machinery with huge amount.

7) Support from Governments, Donors and NGOs

Significant support to farmers comes from UN bodies (FAO, WFP, etc.) and numerous NGOs active in the region. NGOs have been provided certified seed and basic farm equipment for communities but the numbers of provisions are still limited. Training on farming practices has also been provided by NGOs. A much more systematic support framework is required in terms of seed, fertilizers and pesticides and mechanization services. Regarding extension services, not only the number of households getting extension services was very small (5% of the sample households) but also the number of the visits per households was also relatively small, fewer than 5 visits per year. Support in terms of research is practically non-existent.

(2) General Features of the Farmers outside AIRS

1) Cropping Pattern outside AIRS

IDMP-TT interviewed representative farmers from three (3) farmer groups outside AIRS. Figure 4.5.1 shows the major crops and general cropping pattern outside AIRS by the interview survey. The cultivation is under rain-fed and almost all of crops are sowed in May.

Month	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Rain												
Crops												
Sorghum	×	○				□						
Maize	×	○				□						
Sesame	×	○				□						
Groundnuts	×	○					□					
Hibiscus	×		○									
Okra	×	○										
Pumpkin	×	○										
Watermelon					○		□					

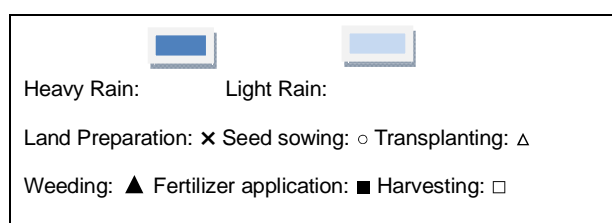


Figure 2.2.7 Cropping Pattern outside AIRS (Source: IDMP-TT)

From the groups interviewed, the crop production of Malgoldit Group in 2012 is shown in Table 1.6.1. The number of the members of this group is 11 and there are 45 workers within the group. In this year the number of the members has increased up to 54 people. Their land belongs to community (Aweil Central County). To focus on the cereals (i.e. sorghum and maize), the yield of maize has more than four (4) times of Sorghum. But farmers still put the priority in cultivating sorghum as it is their traditional staple food. In addition, the unit price of maize is also higher than sorghum. With regard to comparing sesame to groundnuts, sesame is more profitable than groundnuts since the yield of sesame is low but the unit price is very high. Moreover, as a very profitable crop, watermelon in just one (1) feddan earns SSP 8,000 of gross cash income.

Table 2.2.61 Crop Production by Magoldit Group in 2012

Crop	Cropped Area (fed)	Production (Yield)	Sold Amount	Unit Price	Gross Cash Income (SSP)	Market Remark
Sorghum	60	80bag: 8,000kg (133kg/fed)	60bag (6,000kg)	300 SSP/bag	18,000	WFP through MAF Affected by flood
Maize	10	60bag: 6,000kg (600kg/fed)	50bag (5,000kg)	450 SSP/bag	22,500	WFP through MAF
Sesame	50	160bag: 12,000kg (240kg/fed)	140bag (10,500kg)	650 SSP/bag	91,000	WFP through MAF
Groundnut	100	1200bag: 90,000kg (900kg/fed)	500bag (37,500kg)	150 SSP/bag	75,000	WFP through MAF 600bag: paid for worker
Hibiscus	5	30bag: 2,250kg (450kg/fed)	25bag (1,875kg)	10 SSP/44kg	426	Local market
Eggplant	0.5	For workersqhome consumption	-	-	-	-
Water melon	1	2 lorry	2 lorry	4,000 SSP/lorry	8,000	Local market
Okra	5	40bag: 3,000kg	20bag (1,500kg)	600 SSP/bag	12,000	Local market

(note: 1 bag for sorghum and maize: 100kg, others 75kg), Hibiscus: 1 kantara = 44kg

Source: Aweil site visit by IDMP-TT, May 2013

2) Farming Practices

Some farmers bore costs for 1) using tractor for land preparation, 2) hiring labour for sowing, weeding, harvesting, and transporting, and 3) storage for crops. Most of farmers do not use fertilizers, pesticides and/or insecticides for crops though crops are damaged by mosaic virus, fungus, insect etc.

3) Opinions from the Farmers on AIRS

IDMP-TT asked farmers outside AIRS for their opinions on AIRS. The following are the responses:

- 1) Some farmers answered that they can contract with AIRS, but the main staple food is still sorghum. They stated that the allocation of their labour for sorghum crop should not be hindered. A female farmer said that if she grew rice, she would be forced to buy sorghum with her limited resources. Moreover, others answered that if you do not have money, you cannot become a tenant farmer of AIRS.
- 2) A farmer said that he cultivated rice for 49 feddan in 2008 but the whole crop was lost due to flood (equivalent to SSP 7000). He protested it is risky to cultivate rice with no guarantee. Although the flood affected his crop, the Government could not give support.

2.2.10 General Features of Tenant Farmers in AIRS

(1) Cropping Calendar of Rice in AIRS

Figure 1.6.2 shows typical cropping pattern of rice in AIRS. Generally, the rainy season is from May to November. When the rainy season with a period of approximately one and a half month passes, soil gets somewhat saturated and then seed sowing starts. So the timing of sowing depends on rainfall. In some days later of emergence, farmers implement the first weeding; then they take water, first for irrigation, into the field to approximately 50 cm (the height of the knee). After a week when the water level becomes as low as ankle-depth, they irrigate again as before. This irrigation is continued till October. Rice seeds are directly sown on the field. Nursery preparation and transplanting of seedling are not practiced.

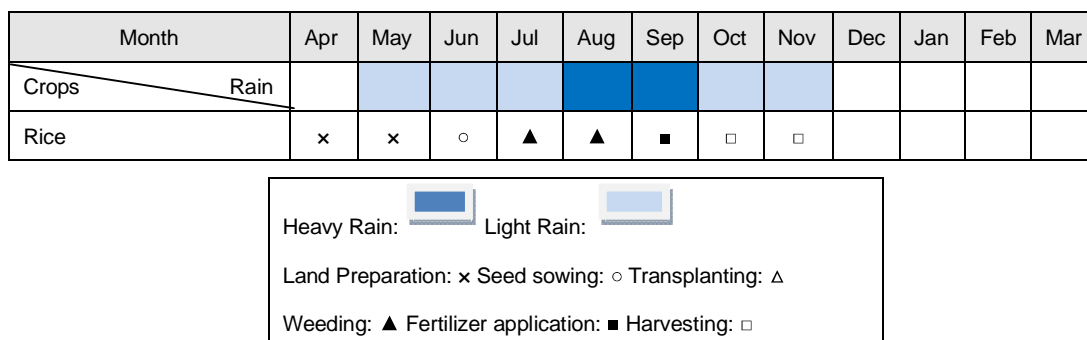


Figure 2.2.8 Cropping Pattern of Rice in AIRS (Source: IDMP-TT)

(2) Production Cost and Farming Practices

According to an interviewee who cultivates 2 feddan inside AIRS, the production cost of 1,750 kg rice, which is equivalent to 25 bags, is as shown in Table 1.6.2. In addition to the production costs, according to the tenants' share cropping agreements 2012-2013 prepared by AIRS managing office, the tenant farmers need to give 48% of the produced rice to AIRS managing office.

Table 2.2.62 Cost of Rice Cropping in AIRS (SSP)

Labour						Fertilizers
Weeding	Harvesting	Collecting	Loading	Threshing	Weighing	
300	400	-	-	250	-	78

Source: IDMP-TT, May 2013

Moreover, the tenant farmers have the land not only in AIRS but also outside the Scheme to cultivate sorghum, maize, sesame, ground nuts etc. Farm sizes outside the Scheme vary from two (2) feddan to more than twenty (20) feddan. Some farmers own livestock such as cattle, goat, sheep and chicken for the dowry of marriage of their sons or self-consumption.

(3) Issues for Rice Production

Significant issues for rice production in the Scheme are the low yield level. The records and field interviews to farmers or AIRS managing office reveal the current low yield of rice production. According to the managing office the yield in year 2012 varied from 0.35 ton/fed to 1.12 ton/fed or 0.83 ton/ha to 2.67 ton/ha. Rice farmers in the Scheme interviewed by the Task Team gave the following figures for their yield as shown in Table 2.2.63:

Table 2.2.63 Rice Yield Level of Interviewed Farmers in AIRS

Farmer	2011		2012	
	Production sack (kg)	Yield Kg/ha	Production sack (kg)	Yield Kg/ha
A	60 (4,200)	1,667	70 (4,900)	1,944
B	11 (770)	917	21 (1,470)	1,750
C	6 (420)	250	26 (1,820)	1,083
D	16 (1,120)	1,333	22 (1,540)	1,833
E	16 (1,120)	1,333	20 (1,400)	1,667

According to them, they started contracting with the Scheme from 2009 and their yield level is getting better as they get experienced on rice farming and Urea was available this year (2012/2013). However, their yield level is still as low as less than 2 ton/ha.

Not only water management improvement but also agronomical approach will be required according to the causes of low yield given by the farmers. The causes of farming practices according to farmers' field activities reported by them are as follows.

- 1) Fertilizers (TSP and Urea) are not used (not available).
- 2) Pesticides are not used (some damages by pests).
- 3) Weeding is not done.
- 4) Variety of rice has grown wild (mixture of variety resulting in low quality).
- 5) There is no rotation system (loss of soil fertility without fertilizing); Water management is not properly done.
- 6) Transport: 11 km from town, they use bicycle. Some women come by bus near the Scheme and walk for four(4) km

(4) Opinions from the Farmers in AIRS

IDMP-TT asked the tenant farmers for their opinions on AIRS. The following are the responses:

- 1) MAFCRD needs to provide fund, tractors, spare parts & services of equipment for the scheme.
- 2) It is necessary to encourage investors to come to the scheme. In 2012, an investor from India

came and purchased one sack of rice through MAFCRD.

- 3) Regarding irrigation system, it is necessary to clear canals and to improve gates.
- 4) It is desirable for AIRS managing office to provide Loan/Credit services.
- 5) AIRS managing office needs to teach farmers how to open gates and how to rehabilitate dikes.
- 6) Some farmer considers it unfair that 48 % of the rice products are taken by the AIRS managing office in the end after they spend money and energy in rice cultivation.
- 7) The roads in the scheme need to be maintained by the State Ministry of Physical Infrastructure.

(5) Current Findings

South Sudanese famers have managed agricultures with traditional and subsistence farming practices. Therefore, they do not have enough experience and knowledge for market-oriented management and modern agricultural practice. Moreover, the availability of finances is very limited to participants in the existing irrigation schemes, such as AIRS and/or Renk irrigation schemes. Famers' capacities of agricultural practices in general are assumed to be limited by considering their low crop yield. It is because knowledge on modernized agricultural practices such as utilization of fertilizers and agricultural chemicals have not sufficiently been given to famers in the past agricultural extension support for farmers. Besides, since their primary objective of agriculture management is self-consumption, they do not have any interests for qualities and yield of their agricultural products. In future irrigation development, basic training for modernized agricultural practices needs to be conducted for famers' capacity enhancement. In addition, most famers do not have any knowledge and practices of irrigated agriculture. The concerned governmental organizations and/or implementation institutions need to provide opportunities for them to know benefits of irrigation schemes and obligations of participants. Furthermore, since most famers are illiterate, it is also necessary to tackle this matter for their capacity development.

Last but not least, most famers do not have any capacity for capital investment, and they cannot invest for their new economic activities. Supporting institutions need to consider establishing financial support system for famers in future irrigation development.

1) Capacity Needs Assessment of the Stake holder Groups

Irrigation development consists of two main pillars: one is deployment of water delivery facilities; and the other is agricultural management under irrigation. Thus, roles of central level ministries can be divided in the framework of the two pillars: MEDIWR is mainly in charge of irrigation facility design and construction; and MAFCRD is mainly in charge of supporting famers for agricultural services and on-farm water management. Besides, the same roles related to irrigation development are also allocated at the state level: state governments of agriculture as the line ministry of MAFCRD have roles of famers' support; and state governments of infrastructure as the line ministry of MEDIWR have roles of design and construction of facilities.

Table 2.2.64 Outline of Governmental Institutions' Role

Role	Level	Institution
Infrastructure Construction	Central	MEDIWR
	State	Stats Ministry of Infrastructure
	County	Physical Infrastructure/Public Works Department
Support famers agricultural management	Central	MAFCRD Training institutions
	State	St. Min. of Agriculture
	County	Agriculture Department

In addition, as shown in the figure below, various activities are done by different organizations/actors for irrigation development. It should be noted that beneficiary farmers as well as farmer organizations have key roles as a main actor for irrigation development (see the figure below).

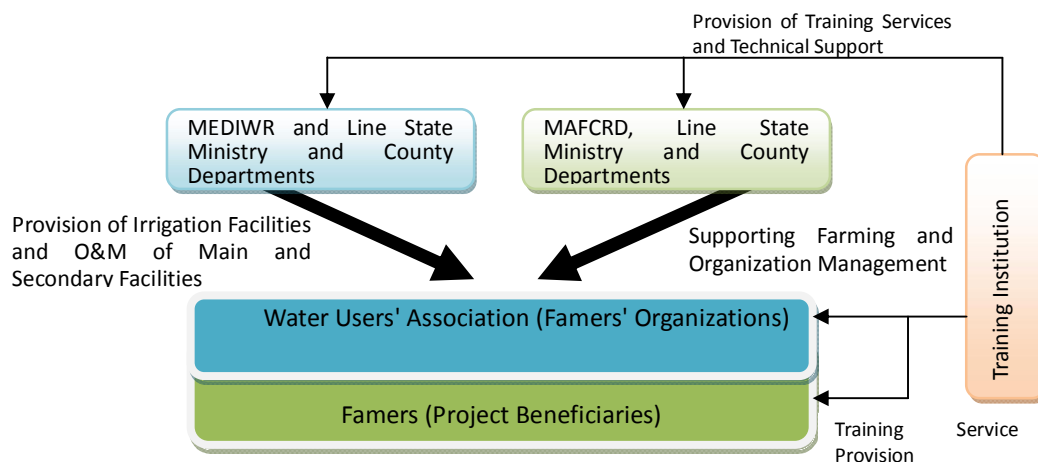


Figure 2.2.9 Stakeholder Groups in Irrigation Development and Management

Table 2.2.65 Major Roles of Stakeholders

Stakeholder	Major Roles
MEDIWR	<ul style="list-style-type: none"> " National Irrigation Project Plan Formulation (in terms of Facility design and construction) " Irrigation Facility design Construction for National Projects " Irrigation Facility Operation and Maintenance for National Projects " Support for Water Users' Associations Activities in National Projects " Coordination with Other Water Resource Users " Project Monitoring and Evaluation (Approach by Facilities Utilization) for National Projects " Support for State Ministries and Other Organizations/Institutions
MAFCRD	<ul style="list-style-type: none"> " National Irrigation Project Plan Formulation (in terms of Agricultural Management) " Establishment of Water Users' Associations for National Projects " Establishment of Other Farmers' Organizations for National Projects, if necessary " Support for Agricultural Management of Farmers in National Projects " Support for Water Users Associations' Activities in National Projects " Coordination with Related Organizations and Institutions in National Projects " Project Monitoring and Evaluation (in terms of Agricultural Management) for National Projects " Support for State Ministries and Other Organizations/Institutions
MEDIWR Line State Ministry	<ul style="list-style-type: none"> " State Irrigation Development Project Plan Formulation " State Irrigation Project Formulation " Irrigation Facility Construction for State Projects " Irrigation Facility Operation and Maintenance for State Projects " Support for Water Users' Associations for State Projects " Project Monitoring and Evaluation (in terms of Facilities Utilization) for State Projects " Support for Counties and Other Organizations/Institutions
MAFCRD Line State Ministry	<ul style="list-style-type: none"> " State Irrigation Development Project Plan Formulation (in terms Agricultural Management) " State Irrigation Project Plan Formulation (in terms of Agricultural Management) " Establishment of Water Users' Associations for State Projects " Establishment of Other Farmers' Organizations for State Projects, if necessary " Support for Agricultural Management of Farmers in State Projects " Support for Water Users Associations' Activities in State Projects " Coordination with Related Organizations and Institutions in State Projects " Project Monitoring and Evaluation (Approach by Agriculture Management) for State Projects " Support for Counties and Other Organizations/Institutions
County	<ul style="list-style-type: none"> " County Irrigation Project Plan Formulation " Irrigation Facility Construction for County Projects " Establishment of Water Users' Associations for County Projects " Establishment of Other Farmers' Organizations for County Projects, if necessary " Support for Agricultural Management of Farmers in County Projects " Support for Water Users Associations' Activities in County Projects " Irrigation Facility Operation and Maintenance for County Projects " Coordination with Related Organizations and Institutions in County Projects " Project Monitoring and Evaluation (in terms of Facilities Utilization) for County Projects " Support for Communities and Other Organizations/Institutions
Farmers	<ul style="list-style-type: none"> " Stabilized and Continuous Production " Establishment and Management of Water User's Associations " Attendance to WUA's Activities
Water User's Associations (Farmers Organizations)	<ul style="list-style-type: none"> " Provision of opportunities to get Agricultural Supporting Services for association members " Operation and Management of Irrigation Facilities " Collection of Water User Fees from Farmers who are Members of the Association

2) Area of Competencies for Irrigation Development

There are several areas of competencies to carry out major roles and necessary activities for irrigation development. The table below shows the areas of competencies which are required to implement irrigation development in all the development phases. Each stakeholder should have some of these specific and/or general areas of competencies based on its roles expected in the field of irrigation development.

Table 2.2.66 Area of Required Competency

ID No.	Area of Competency	Brief Description
1	General Knowledge of Irrigation	Benefits of irrigation project, types of irrigation facilities, necessary activities of actors in irrigation projects, cases of the projects in other countries and others
2	Specific and Technical Knowledge of Hydrology and Meteorology for Irrigation	General rules on hydrology and Metrology, hydrologic and metrological statistics analysis, runoff & water balance analysis, PC software operation and others
3	Specific and Technical Knowledge of design for facilities	General rules on irrigation facility design, structure calculation, design standard, PC software operation and others
4	Specific and Technical Knowledge of Topographical and Geological Survey	Identification of topographical/geological survey methods and necessary survey areas/routes, and Development of technical specification for surveyors
5	Specific and Technical Knowledge of Construction Supervision	Performance Control in terms of budget, qualities control and time management
6	General Knowledge of Establishment and Enhancement of Farmers' Organizations	Objectives and roles famers' organizations (esp. Water Users Associations), methods of establishment and enhancement famers organizations, supporting methods of activities of famers' organizations
7	Specific and Technical Knowledge of Operation and Maintenance of the Facilities	Structures and mechanisms of the facilities, methods of operation and maintenance of the facilities.
8	Specific and Technical Knowledge of Innovative Agriculture	Agricultural extension services, innovative agricultural practices and agricultural practices under irrigation
9	Specific and Technical Knowledge of Project Monitoring and Evaluation for Irrigation development	Monitoring and evaluation standards of the Ministries/Development Partners (including monitoring indicators)

3) Necessary Competencies of Each Stakeholder

Considering the roles which each stakeholder has to perform in implementation of the programmes of the Master Plan, the required competencies for each stakeholder groups are identified in table below (The ID numbers shown in the table below correspond to the ones in Table 2.2.67.).

Table 2.2.67 Required Competency Areas of Each Stakeholders

Stakeholders	ID No. of Required Competency Areas
MEDIWR	1, 2, 3, 4, 5, 7, 9
MAFCRD	1, 6, 7, 8
State Government (Line Ministry. of MEDIWR)	1, 2, 3, 4, 5, 7, 9
State Government (Line Ministry of MAFCRD)	1, 6, 7, 8, 9
County	1, 2, 3, 4, 5, 6, 7, 8, 9
Famers	1, 6, 7, 8
Water User's Associations (FarmersqOrganizations)	1, 6, 7

4) Gaps Analysis of Human Resources

a) MEDIWR General Knowledge of Irrigation

MEDIWR is the Ministry for realizing national welfare through effective, efficient and equitable utilization of water resource at the national level. Irrigation development is one of the pillars of the ministry's activities. MEDIWR consist of several directorates: "Hydrology and Survey"; "Irrigation and Drainage"; "Water Resource Management"; "Planning and Program" and the other three directorates. Since they are operating according to their own specialized fields, the directorates except "Directorate of Irrigation and Drainage" are indirectly conducting irrigation development or playing only a limited role. Therefore, it can be said that some officers employed in the directorates other than "the Irrigation and Drainage" have limited general knowledge of irrigation development.

On the other hand, Governmental irrigation development activities require a wide range of technical processes and administrative procedures. More MEDIWR officers need to be equipped with general knowledge of irrigation development, even though IDMP RSS-TT members, directors, deputy

directors, acting directors and senior inspectors have obtained knowledge of the procedures and process of the irrigation development through the Master Plan formulation. The capacity gaps between the current and required competencies are shown below.

Table 2.2.68 Capacity Gap of General Knowledge of Irrigation Development

Required Competency	Gap
Knowledge of Irrigation development procedures: <ul style="list-style-type: none"> • Understanding of all the procedures for irrigation development • Understanding of the main stakeholders' roles and responsibilities 	IDMP RSS-TT members have been equipped with knowledge of the outline of the procedures through the Master Plan formulation. However, they have not completely understood the detail procedures as well as the activities of each stakeholder. Thus, it can be said that other MEDIWR officers may have limited knowledge of irrigation development procedures.
Knowledge of Irrigation project in other countries: <ul style="list-style-type: none"> • Adaptation of cases of irrigation projects in other countries to RSS 	The majority of the officers have limited knowledge

b) Specific and Technical Knowledge of Hydrology and Meteorology for Irrigation

The roles related to hydrology and meteorology for Irrigation are mainly conducted by the directorate of "Hydrology and Survey" in MEDIWR. Results of hydrological analysis of irrigation water resources are one of the basic criteria for project planning. In addition, hydrological data need to be collected on a daily basis; and water resource availability and disaster risks should be continuously analysed.

According to the CNA survey results, only one respondent has obtained general knowledge of hydrologic analysis; and the rest of the respondents do not have any knowledge, whereas some IDMP RSS-TT members have general knowledge of hydrologic analysis and others have some specific knowledge. Furthermore, the survey results show that three (3) officers have knowledge of creation and operation of database. They are operating well/ground water database and GIS for domestic water supply development. Capacity gaps between the required and current competencies are show below.

Table 2.2.69 Capacity Gap of Hydro-met Knowledge

Required Competency	Gap
Observation of hydro-met: <ul style="list-style-type: none"> • Understandings of measuring methods of the hydro-met observation equipment • Understandings of recording methods of the measured data • Understandings of record-keeping methods of the recordings 	The majority of the officers are equipped with the knowledge. However, hydro-met recording data are scattered and some data have not been computerized.
Statistical analysis of hydro-met data: <ul style="list-style-type: none"> • Understandings of hydro-met data analysis methods (e.g. regression analysis, multivariate statistics) • Understandings of how to use static analysis computer software 	The knowledge of the officers is limited. A few officers(more than Grade 5) are equipped with the basic knowledge
Hydrological simulation for river water discharge: <ul style="list-style-type: none"> • Understandings of analysis method of high and low river water discharge • Understandings of how to use hydrological analysis computer software 	The knowledge of the officers is limited. A few officers(more than Grade 5) are equipped with the basic knowledge

c) Specific and Technical Knowledge of Design for Facilities

Knowledge of facility design is one of essential competencies for facility planning and construction supervision. According to the survey results, two (2) officers have obtained general knowledge of facility design.

Table 2.2.70 Capacity Gap of Knowledge of Irrigation Facilities Design

Required Competency	Gap
Knowledge of the design drawing: <ul style="list-style-type: none"> ▪ Understandings of functions and configurations of major equipment (e.g. pump, electric supply, gate) ▪ Understandings of functions and configurations of major facilities (e.g. intake falsities, canals, diversion facilities, box culverts) ▪ Understandings of major design standards ▪ Understandings of structure calculation and hydrological analysis ▪ Understandings of how to use CAD computer software 	The majority of the officers do not have enough knowledge of facility design at this moment (as of the end of April, 2015). *IDMP RSS-TT members will be conducting facility design of priority projects in cooperation with IDMP JICA-TT members.
Knowledge of construction cost estimate: <ul style="list-style-type: none"> ▪ Understandings of types of engineering services and their unit prices ▪ Understandings of types of construction services and their units price ▪ Understandings of necessary equipment and procurement costs of each equipment ▪ Understandings of indirect costs 	The majority of the officers do not have enough knowledge of cost estimate at this moment (as of the end of April, 2015). *IDMP RSS-TT members will be conducting cost estimates for priority projects in cooperation with IDMP JICA-TT members.
Knowledge of developing technical specifications of design works: <ul style="list-style-type: none"> ▪ Understandings of technical specifications of design works ▪ Understandings of procedures of designing 	The majority of the officers do not have enough knowledge

d) Specific and Technical Knowledge of Topographical and Geological Survey

Topographical and geological survey results are one of the essential information for irrigation facility planning, design and construction. There are five (5) officers that have obtained certain levels of knowledge of topographical surveys. Besides, IDMP RSS-TT members have been equipped with basic know-how by developing technical specifications of topographical and geological surveys for the pre-feasibility studies on the priority project areas.

Table 2.2.71 Capacity Gap of Topographical and Geological Survey

Required Competency	Gap
Knowledge of developing technical specifications of Topographical surveys: <ul style="list-style-type: none"> ▪ Understandings of types of Topographical surveys ▪ Understandings how to identify Topographical survey areas and/or routes based on facility allocation images ▪ Understandings how to develop technical specifications 	IDMP RSS-TT members are equipped with knowledge of how to develop technical specifications of Topographical surveys through IDMP formulation activities. However, they need to conduct more survey activities to enhance their competencies for future irrigation development.
Knowledge of developing technical specifications of geological surveys: <ul style="list-style-type: none"> ▪ Understandings of how to identify geological survey points based on facility allocation images ▪ Understandings of how to develop technical specifications 	IDMP RSS-TT members are equipped with knowledge of how to develop technical specifications of Topographical surveys through IDMP formulation activities. However, they need to conduct more survey activities to enhance their competencies for future irrigation development.

e) Specific and Technical Knowledge of Operation and Maintenance of the Facilities

Suitable and sustainable operation and maintenance of the facilities is essential for sustainability of irrigation schemes. There are various kinds of facilities to be managed, such as intake facilities, water distribution facilities, water storages facilities and others. Operation and maintenance (O&M) for each facility requires acquisition of specific knowledge not only through lectures but also actual management of the facilities. MEDIWR officers at the Renk branch office have been conducting O&M of the intake pump facilities of the Northern Upper Nile Irrigation Schemes (NUNIS). However,

the majority of the MEDIWR staffs do not have broad knowledge of O&M of other facilities, such as reservoir dams, head works among others.

Table 2.2.72 Capacity Gap of Operation and Maintenance for Irrigation Schemes

Required Competency	Gap
Knowledge of facility maintenance: <ul style="list-style-type: none"> • Understanding of structures of major irrigation facilities • Understanding of how to operate water distribution control facilities • Understanding of how to maintain major irrigation facilities • Understanding of roles and responsibilities of the stakeholders for facility operation and maintenance 	The majority of the officers do not have enough knowledge; however, some officers who have been allocated to Renk office have some knowledge. IDMP RSS-TT members are equipped with some knowledge of roles and responsibilities of the stakeholders for facility operation and maintenance through IDMP formulation activities.
Knowledge of equipment maintenance: <ul style="list-style-type: none"> • Understanding of operation and maintenance manuals provided by equipment manufacturers • Understanding of roles and responsibilities of the stakeholders for equipment operation and maintenance 	The majority of the officers do not have enough knowledge; however, some officers who have been allocated to Renk office have some knowledge of pumps and electricity supply equipment for intake facilities

f) Specific and Technical Knowledge of Construction Supervision

There are four (4) respondents who have experiences of construction supervision for civil works. In fact, flood-protection dikes and domestic water supply facilities have been constructed under MEDIWR supervision. On the other hand, MEDIWR does not have any first-hand experience of construction supervision of irrigation facilities at this moment, since the existing two national irrigation schemes, namely the Aweil Irrigation Rice Scheme (AIRS) and the NUNIS, had been constructed before the independence. Therefore, whereas MEDIWR have some knowledge and experiences of construction supervision for civil works, they do not have sufficient knowledge and first-hand experiences of construction supervision of irrigation facilities.

Table 2.2.73 Capacity Gap of Construction Supervision of Irrigation Facilities

Required Competency	Gap
Knowledge of construction supervision: <ul style="list-style-type: none"> • Understanding of construction supervision in terms of qualities, volume and time management (construction performance control) 	Some officers have experiences of construction supervision of Civil works; however, no officers have supervised irrigation facility construction.

g) Specific and Technical Knowledge of Project Monitoring and Evaluation for Irrigation Development

There are three (3) respondents that have knowledge and experiences of monitoring and evaluation (M&E) for domestic water supply projects. In addition, MEDIWR has prepared an M&E method for domestic water supply projects. Thus, MEDIWR officers who are assigned for M&E have general knowledge and some hands-on experiences. On the other hand, M&E knowledge related to irrigation projects needs to be acquired, since irrigation projects requires specific items and timing for conducting M&E.

Table 2.2.74 Capacity Gap of Project Monitoring and Evaluation for Irrigation Projects

Required Competency	Gap
Specific Knowledge of M&E: <ul style="list-style-type: none"> • Understanding of M&E methods and periods • Understanding of monitoring items for irrigation development projects • Understanding of feedback systems 	Some officers who are allocated to the monitoring department have experiences of M&E activities for domestic water supply projects. However, the majority of the officers do not have enough knowledge of irrigation project specific monitoring activities.

5) Department of Mechanization under MAFCRD

a) General Knowledge of Irrigation

MAFCRD is the Ministry for realizing national food security, economic growth, poverty alleviation and social welfare through promotion of innovative agriculture, forestry and community development. Promotion of irrigated agriculture is one of the alternatives to increase the agricultural production. The Department of Mechanization has roles of promoting irrigation agriculture nationwide. Their major current activities are promotion of agricultural mechanization. There are four (4) officers that have experience of engagement in irrigation development projects. The majority of the respondents have experiences of actual agricultural development projects, community development projects and agricultural mechanization projects, which are essential components of irrigation development. Thus, it can be said that the majority of the officers have fundamental knowledge for irrigation development.

Table 2.2.75 Capacity Gap of General Knowledge of Irrigation Development

Required Competency	Gap
Knowledge of Irrigation development procedures: <ul style="list-style-type: none"> ▪ Understanding of all the procedures for irrigation development ▪ Understanding of the main stakeholders' roles and responsibilities 	IDMP RSS-TT members have been equipped with knowledge of the outline of the procedures through the Master Plan formulation. However, they have not completely understood the detail procedures as well as the activities of each stakeholder. Thus, it can be said that other MAFCRD officers may have limited knowledge of irrigation development procedures.
Knowledge of Irrigation projects in other countries: <ul style="list-style-type: none"> ▪ Adaptation of cases of irrigation projects in other countries to RSS 	The majority of the officers have limited knowledge

b) General Knowledge of Establishment and Enhancement of Farmers' Organizations

The officers as respondents of CNA questionnaire survey have had experience to attend training of trainers (TOT) that establishment and enhancement of Water Users Associations for irrigation scheme management and operation.

Table 2.2.76 Capacity Gap of General Knowledge of Farmers' Organization

Required Competency	Gap
General Knowledge of famers' organizations: <ul style="list-style-type: none"> ▪ Understanding of cases of WUAs in other countries ▪ Understanding of roles and responsibilities of WUAs in irrigation schemes 	The majority of the officers have limited knowledge
Knowledge of how to support for WUAs: <ul style="list-style-type: none"> ▪ Understanding of roles and activities of WUAs ▪ Understanding of methods for strengthening WUAs ▪ Understanding of management methods for WUAs ▪ Understanding of training and supporting methods 	The majority of the officers do not have any first-hand experiences

c) Specific and Technical Knowledge of Innovative Agriculture

Agricultural mechanization specialists have been allocated in the department. Some officers are engaged in agricultural improvement project. Basically, officers in the department have enough knowledge of utilization of mechanization for agricultural development. However, innovative agricultural practices other than agricultural mechanization, soil improvement, irrigation development (e.g. agricultural input improvement and pest control) are not included in the main roles of the department.

Table 2.2.77 Capacity Gap of Knowledge of Innovative Irrigated Agriculture

Required Competency	Gap
Knowledge of agricultural mechanization: <ul style="list-style-type: none"> • Understandings of mechanized agriculture • Understandings of promotion of mechanized agriculture for farmers 	Some officers have enough knowledge.
Knowledge of innovative agricultural practices other than the mechanization	This is not included in the main roles of the department. Human resource development regarding this competency has been proposed in the CAMP project profiles. Therefore, this competency is not mentioned in this Master Plan.

6) State Line Ministry of MEDIWR

a) General Knowledge of Irrigation

State line ministries of MEDIWR are designated for realizing effective, efficient and equitable utilization of water resource at the state level. However, Irrigation development projects have not been conducted by the state line ministries. Moreover, some states have not yet retained officers who engaged irrigation development. Thus, it can be said that the majority of the state governmental officers do not have enough knowledge for irrigation development.

Table 2.2.78 Capacity Gap of General Knowledge of Irrigation Development

Required Competency	Gap
Knowledge of Irrigation development procedures: <ul style="list-style-type: none"> • Understandings of all procedures for irrigation development • Understandings of the main stakeholders' roles and responsibilities 	The majority of the officers have limited knowledge
Knowledge of Irrigation project in other countries: <ul style="list-style-type: none"> • Adaptation of case of irrigation project in other countries to RSS 	The majority of the officers have limited knowledge

b) Specific and Technical Knowledge of Hydrology and Meteorology for Irrigation

This is essential for planning of state-level irrigation development projects. For promoting irrigation development, state officers need to conduct hydro-met analysis in collaboration with MDEIWR. However, engineers who have specific knowledge of hydrology and meteorology are not allocated at the state level; and the majority of the currently allocated officers do not have the knowledge.

Table 2.2.79 Capacity Gap of Hydro-met Knowledge

Required Competency	Gap
Statistical analysis of hydro-met data: <ul style="list-style-type: none"> • Understandings of hydro-met data analysis methods (e.g. regression analysis, multivariate statistics) • Understandings of how to use static analysis computer software 	The majority of the officers do not have the knowledge.
Hydrological simulation for river water discharge: <ul style="list-style-type: none"> • Understandings of analysis methods of high and low river water discharge • Understandings of how to use hydrological analysis computer software 	The majority of the officers do not have the knowledge.

c) Specific and Technical Knowledge of design for facilities

Some officers have knowledge of domestic water supply facility design. However, the majority of the officers have not had any knowledge of design for irrigation facility.

Table 2.2.80 Capacity Gap of Knowledge of Irrigation Facility Design

Required Competency	Gap
Knowledge of design drawing: <ul style="list-style-type: none"> ▪ Understandings of functions and configurations of major equipment (e.g. pump, electric supply, gate) ▪ Understandings of functions and configurations of major facilities (e.g. intake falsities, canals, diversion facilities, box culverts) ▪ Understandings of major design standards ▪ Understandings of structure calculation and hydrologic analysis ▪ Understandings of how to use CAD computer software 	The majority of the officers do not have enough knowledge of facility design
Knowledge of construction cost estimation: <ul style="list-style-type: none"> ▪ Understandings of types of engineering services and unit prices ▪ Understandings of types of construction services and unit prices ▪ Understandings of procurement of equipment and unit prices ▪ Understandings of indirect costs 	The majority of the officers do not have enough knowledge of cost estimate.
Knowledge of how to develop technical specifications of design works: <ul style="list-style-type: none"> ▪ Understandings of technical specifications of design works ▪ Understandings of procedures of designing 	The majority of the officers do not have enough knowledge.

d) Specific and Technical Knowledge of Topographical and Geological Survey

Some officers have experiences of conducting topographical and geological Surveys for domestic water supply projects. However, the majority of the officers do not have any knowledge of those for irrigation development.

Table 2.2.81 Capacity Gap of Topographical and Geological Survey

Required Competency	Gap
Knowledge of developing technical specifications of topographical surveys: <ul style="list-style-type: none"> ▪ Understanding of types of topographical surveys ▪ Understanding of how to identify topographical survey areas and/or routes based on facility allocation images/maps ▪ Understanding of how to develop technical specifications 	The majority of the officers do not have enough knowledge.
Knowledge of developing technical specifications of geological surveys: <ul style="list-style-type: none"> ▪ Understanding how to identify geological survey areas and/or routes based on facility allocation images/maps ▪ Understanding of how to develop technical specifications 	The majority of the officers do not have enough knowledge.

e) Specific and Technical Knowledge of Operation and Maintenance of the Facilities

The majority of the officers do not have any knowledge and experience of operation and maintenance (O&M) of irrigation facilities.

Table 2.2.82 Capacity Gap of Operation and Maintenance for Irrigation Scheme

Required Competency	Gap
Knowledge of O&M of major irrigation facilities: <ul style="list-style-type: none"> ▪ Understanding of structures of major irrigation facilities ▪ Understanding of how to operate water distribution control facilities ▪ Understanding of how to maintain major irrigation facilities ▪ Understanding of roles and responsibilities of stakeholders for O&M of irrigation facilities 	The majority of the officers do not have enough knowledge.
Knowledge of O&M of major equipment: <ul style="list-style-type: none"> ▪ Understandings O&M manual provided by equipment manufacturers ▪ Understanding of roles and responsibilities of stakeholders for O&M of equipment 	The majority of the officers do not have enough knowledge.

f) Specific and Technical Knowledge of Construction Supervision

Some officers have experiences of Construction Supervision for domestic water supply projects. However, the majority of the officers do not have any knowledge of construction supervision for irrigation projects.

Table 2.2.83 Capacity Gap of Construction Supervision of Irrigation Facilities

Required Competency	Gap
Knowledge of construction supervision: <ul style="list-style-type: none"> Understanding of construction supervision in terms of qualities, volume and time management (construction performance control) 	Some officers have experiences of construction supervision for domestic water supply projects; however, no one have knowledge and experiences of supervision for irrigation facility construction

g) Specific and Technical Knowledge of Project Monitoring for Irrigation Development

The majority of the officers do not have any knowledge of monitoring activities for irrigation project.

Table 2.2.84 Capacity Gap of Project Monitoring and Evaluation for Irrigation Projects

Required Competency	Gap
Specific Knowledge of monitoring and evaluation (M&E): <ul style="list-style-type: none"> Understanding of M&E methods and periods Understanding of monitoring items for irrigation development projects Understanding of feedback systems 	The majority of the officers do not have enough knowledge of project monitoring.

7) State Line Ministry of MAFCRD

a) General Knowledge of Irrigation

The majority of the officers do not have any knowledge of irrigation. However, some officers have knowledge thorough engagement in Aweil Irrigation rice Scheme (AIRS).

Table 2.2.85 Capacity Gap of General Knowledge of Irrigation Development

Required Competency	Gap
Knowledge of Irrigation development procedures: <ul style="list-style-type: none"> Understanding of all the procedures Understanding of the main stakeholders' roles and responsibilities 	Some Northern Bahr el ghazal state government officers have experiences through operation of AIRS. However, almost the officers have limited knowledge.
Knowledge of Irrigation project in other countries: <ul style="list-style-type: none"> Adaptation of cases of irrigation projects in other countries to RSS 	The majority of the officers have limited knowledge

b) General Knowledge of Establishment and Enhancement of Farmers' Organizations

The majority of the officers do not have any knowledge of establishment and enhancement of farmers' organizations/water users' associations (WUAs) for irrigation schemes; this is because the country had never established such organization before.

Table 2.2.86 Capacity Gap of General Knowledge of WUAs

Required Competency	Gap
General Knowledge of famers' organizations: <ul style="list-style-type: none"> Understanding of WUAs in other countries Understanding of roles and responsibilities of WUAs in irrigation scheme 	The majority of the officers have limited knowledge.
Knowledge of how to support WUAs <ul style="list-style-type: none"> Understanding of roles and activities of WUA Understanding of how to establish WUAs Understanding of how to manage WUAs Understanding of training and supporting methods for WUAs 	Some Northern Bahr El Ghazal state government officers have experiences through operation of AIRS. However, the majority of the officers have limited knowledge

c) Specific and Technical Knowledge of Innovative Agriculture

More than half of officers are engaged in promotion of semi agricultural mechanization practices and provision of extension service at the state level. The majority of the officers have basic knowledge of innovative agricultural practices; however, they have limited knowledge of innovative irrigated agriculture.

Table 2.2.87 Capacity Gap of Knowledge of Innovative Irrigated Agriculture

Required Competency	Gap
Knowledge of agricultural mechanization <ul style="list-style-type: none"> · Understanding of mechanized agriculture · Understanding of promotion of mechanized agriculture for famers 	The majority of the officers have limited knowledge.
Knowledge of innovative agricultural practices other than mechanization	

d) Specific and Technical Knowledge Project Monitoring for Irrigation development

Approximately 40% of the officers have job experiences of monitoring and evaluation (M&E) for Agricultural development projects. They have experiences of M&E form preparation and M&E training. It can be said that almost a half of the officers have basic knowledge of project M&E.

Table 2.2.88 Capacity Gap of Project Monitoring and Evaluation for Irrigation Projects

Main Contents of Required Competency	Gap
General Knowledge of M&E <ul style="list-style-type: none"> · Understandings of monitoring methods and periods · Understandings of monitoring items for irrigation development projects · Understandings of feedback systems 	Some officers have experiences of monitoring activities for agricultural development projects; and they have received some project monitoring training. However the majority of the officers do not have enough knowledge of project monitoring. No one have knowledge of irrigation project monitoring.

8) Counties

CNA surveys have clarified that counties do not have any current activities. Therefore, county officers do not have any knowledge and experiences of irrigation development. Besides, they have limited knowledge of other public infrastructure development, which can be applicable for irrigation development. On the other hand, agricultural officers have been allocated at county offices. They are engaged in extension service provision for famers.

2.2.11 Challenges for Human Resource Development

Irrigation development required specific/technical and general/administrative Human Resource (HR) competencies. Some competencies are cultivated through formal higher education and other off-the-job training opportunities. However, others are cultivated through actual project implementation activities and other on-the-job training opportunities. Therefore, HR development would be realized in combination of off-the-job and on-the-job trainings. The challenges for HR development for future irrigation development that have been identified through CNA surveys are as follows:

- 1) There have not been any new irrigation development projects implemented, since the independence. Therefore, only limited information and data that are related to irrigation development have been accumulated. Moreover, these limited information and data have been owned by individual engineers and have become implicit knowledge, without any sharing systems being installed in governmental institutions. In this account, MEDIWR and MAFCRD need to establish information/data accumulation and sharing systems. Additionally, since raw information and data of foreign countries cannot be always applied for irrigation development in RSS, some necessary information/data analysis functions are to be fulfilled by MEDIWR and MAFCRD for verifying the applicability.
- 2) MEDIWR and MAFCRD need to provide some opportunities of formal advanced education for HR enhancement related to meteorology, hydrology and other specific technical fields. This is because analysis of these specific technical fields is considered as a required advanced

- competency of statistics, mathematics and computer abilities. In addition, MEDIWR and MAFCRD need to consider recruiting competent human resource of these fields.
- 3) Competencies of civil engineering would be cultivated through actual project implementation activities. Therefore, implementation of the priority projects need to be also designed as on-the-job training opportunities, which should be clearly mentioned in the agreements and/or the technical specifications of the engineering services by consulting/engineering firms, construction firms, equipment providers and manufacturers.
 - 4) State government officials have limited knowledge of irrigation development. Although they have irrigation units, in some cases, they do not retain officers designated for irrigation development. Therefore, technical capacity development for the state government staff needs to be considered as a medium-term challenge; and in the short term, it will be indirectly tackled through involvement in national irrigation projects that will be implemented in their states. Training for the officers needs to be conducted in a systematic manner, starting from fundamental knowledge of irrigation development, because the majority of the officers do not have enough knowledge of irrigation development.
 - 5) Considering the current competencies of county officers, they cannot perform roles of main implementers for irrigation development in the short term. In case, county-level irrigation development will be implemented in short/medium terms, MEDIWR and MAFCRD need to provide complete assistance for all the county officers' activities.
 - 6) The training recording system that was established by MEDIWR in 2014 need to be applied for related governmental institutions that will be assigned for the future irrigation development.
 - 7) Localization/Adaptation research of engineering fields (e.g. construction materials, facility design) and extension services of innovative agriculture under irrigation for farmers need to be conducted for future irrigation development project implementation. Besides, achievements of researches and tests need to be stored in sharable database to utilize for capacity enhancement of all stakeholders.
 - 8) General capacities of agricultural extension workers will be enhanced in the CAMP projects. On the other hand, MEDIWR and MAFCRD need to provide the extension workers training opportunities related to innovative agricultural practices under irrigation and establishment/enhancement of water user's associations through the IDMP project. The training opportunities should be planned and provided through the CAMP and IDMP implementation coordination committee.
 - 9) Generally, RSS farmers are not familiar with innovative irrigated agriculture; and thus, they do not have enough knowledge of profits (e.g. increasing production yield, stabilization of production, income generation), in addition they do not keep farm records to help calculate their profit. In this account, MEDIWR and MAFCRD need to disseminate general information on innovative irrigated agriculture nationwide through strengthening research system that generates innovative agricultural technological packages. Besides, both ministries need to provide opportunities of inspections of irrigated demonstration farms for farmers nationwide, especially those who will participate in new irrigation schemes.
 - 10) MEDIWR and MAFCRD need to provide training opportunities to enhance farmers' competencies for innovative agricultural practices as well as operation and maintenance of

irrigation facilities and equipment that will be autonomously managed by famers.

- 11) MEDIWR and MAFCRD need to coordinate and work together in identifying and providing appropriate training to their staff and employ competent new graduates in the field of irrigation and agriculture to improve the performance of the current workforce in the states.
- 12) The current working environment of MEDIWR has seriously affected effectiveness of their service delivery. Moreover, trained governmental engineers cannot make the maximum use of their enhanced capacities without the productive working environment including adequate working/storage space and functional unified information transfer/communication systems through the utilization of information and communications technology (ICT). Therefore, for the success of national irrigation development, the Government of South Sudan including MEDWIR needs to improve the ministry's buildings together with installation of necessary equipment and functional unified information transfer/communication systems, in addition to implementation of human resource capacity development.

3. HUMAN RESOURCE AND INSTITUTIONAL DEVELOPMENT FOR IRRIGATION PROGRAMME (HRIDIP)

3.1 Concept of Human Resource Development (HRD)

Qualified engineers and extension workers will be one of the essential factors for the success of future irrigation development. MEDIWR, MAFCRD and most of the other key stakeholders related to irrigation development have already allocated officers required for irrigation development. However, based on the CNA survey conducted by the IDMP Task Team, it can be clarified that the majority of officers need to enhance their technical competencies in the fields of engineering and innovative agriculture for irrigation development, because they have got a limited opportunity of enhancement of their competencies.

Human resource development needs to be implemented in accordance with the IDMP irrigation development programmes: namely, the NISDP, the SISDP, the CISDP and the CIFDP. In other words, qualified engineers, extension workers and the other essential actors in the irrigation development sector need to be fostered depending on the demands of human resources required for the irrigation development. Qualified officers of the governmental institutions will be the essential actors to realize the IDMP's short term objective: "Promotion of irrigated agriculture". In the medium term of the IDMP's implementation stage, many irrigation scheme development activities are expected to be implemented by the state governments and counties. Therefore, the state and county officers should be fostered as main actor for the irrigation development in the medium and afterward. Moreover, since the medium term, the private sector will also become one of the main implementers, and the demands of qualified human resources will be increased in a greater deal. Therefore, qualified human resources need to be supplied from the higher educational institutions (e.g. universities and other higher educational institutions).

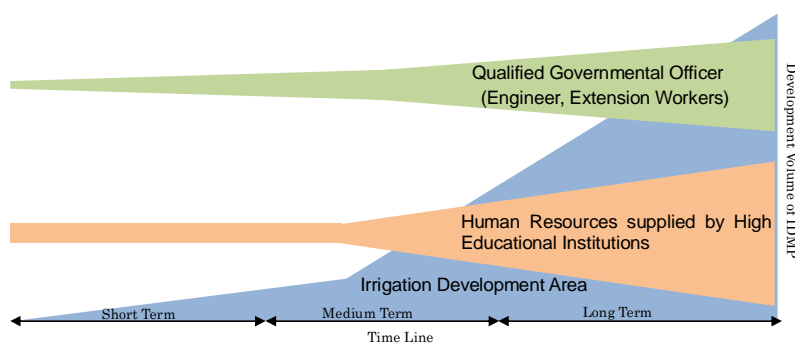


Figure 3.1.1 Relation between Human Resource Development and IDMP Time Line

The human resource development in the short term is important to implement the short term irrigation programmes/projects, but also the competencies fostered through the implementation of the irrigation development activities during the short term will become the foundation to perform the roles required for the irrigation development in the medium and long terms. Moreover, the mobilization of the fostered human resources between the public sector and the private sector will be one of the essential factors for human resource development in a long-term prospective. Therefore, HRIDIP will focus on the short-term human resource development for the stakeholders of the irrigation development.

The life of the HRIDIP is no longer than ten (10) years. Reviews and renewals of the HRIDIP need to be conducted every five (5) years. After ten (10) years of the implementation of the HRIDIP and the IDMP (at the time of the completion of short and medium terms of the IDMP), the capacities of MEDIWR, MAFCRD and other core stakeholders will be fostered enough for them to autonomously develop a new HRIDIP.

The HRD Concept of the IDMP would describe directions and methods for enhancing the capacities of the stakeholders engaged in future irrigation development in RSS. Basically, HRD will be conducted by targeting engineers/administrators as trainees and their superiors as supervisors/trainers. The target trainees of the HRIDIP will be engineers/administrators allocated from Grade 4 (deputy director) to Grade 9 (assistant inspector); and supervisors/trainers are expected to be the ones from Grade 3 (director) to 5 (assistant director). The job titles of each grades are shown in table 2.1.1

Table 3.1.1 The Job Titles of Each Grades of Governmental Institutions

Grade	Job Titles
1	Minister, Deputy Minister, Undersecretary and Advisor
2	Director General
3	Director
4	Deputy Director
5	Assistant Director
6	Senior Inspector
7	Senior Inspector
8	Inspector
9	Assistant Inspector
10	Technician
11	Driver, and other
12	Technician
13	Driver, and other
14-17	Worker, Office Keeper

3.1.1 Expected Competencies for the Main Actors

The HRIDIP has been formulated in a short-term vision. On the other hand, the required competencies of the stakeholders differ in each stage of the IDMP Time Line. Moreover, the national, state and county governmental officers need to be equipped with deferent competencies in each stage of the development time lines. Table 3.1.1 shows the outline of the required competencies of the governmental officers in each stage. The required competencies are shown in details in Appendix 1.

Table 3.1.2 Major Required Competencies

Actor	Major Required Competency		
	Short Term	Medium Term	Long Term
MEDIWR and MAFCRD Engineer	<ul style="list-style-type: none"> • General Knowledge of Irrigation development • Special knowledge of Hydro-Met • Special knowledge Irrigation Facilities Design • Special knowledge of Topographical 	Same as on the left, and as follows: Knowledge and skill of technical traing for engineers of state governments, counties and other	Same as on the left

ANNEX-4: Human Resources and Institutions

Actor	Major Required Competency		
	Short Term	Medium Term	Long Term
	<ul style="list-style-type: none"> and Geological Survey • Special knowledge of Operation and Maintenance for Irrigation Schemes • Special knowledge of Construction Supervision of Irrigation Facilities • Special knowledge of Project Monitoring and Evaluation for Irrigation Projects 	<ul style="list-style-type: none"> stakeholders Knowledge of contract and technical specification for engineering firms and contractors 	
MAFCRD Agronomist	<ul style="list-style-type: none"> • General Knowledge of Irrigation development • Special knowledge of Farmers' Organization • Special knowledge of Innovative Irrigated Agriculture • Special knowledge of Knowledge of on-farm water management 	<ul style="list-style-type: none"> Same as on the left, and as follows: Knowledge and skill of technical training for extension workers of state governments, counties and other stakeholders 	<ul style="list-style-type: none"> Same as on the left, and as follows: Knowledge of contract and technical specification for service company for WUAs, if necessary
MAFCRD Community Development Specialist	<ul style="list-style-type: none"> • General Knowledge of Irrigation development • Special knowledge of Farmers' Organization • Special knowledge of Operation and Maintenance for Irrigation Schemes 	<ul style="list-style-type: none"> Same as on the left, and as follows: Knowledge and skill of technical training for extension workers of state governments, counties and other stakeholders. 	<ul style="list-style-type: none"> Same as on the left, and as follows: Knowledge of contract and technical specification for service company for WUAs, if necessary.
State Line Ministry of MEDIWR Engineer	<ul style="list-style-type: none"> • General Knowledge of Irrigation development 	<ul style="list-style-type: none"> • General Knowledge of Irrigation development • General Knowledge of Hydro-Met • Special knowledge of Irrigation Facilities Design • Special knowledge of Topographical and Geological Survey • Special knowledge of Operation and Maintenance for Irrigation Schemes • Special knowledge of Construction Supervision of Irrigation Facilities • Special knowledge of Project Monitoring and Evaluation for Irrigation Projects 	<ul style="list-style-type: none"> Same as on the left, and as follows: Knowledge and skill of technical training for engineers of counties and other stakeholders. Knowledge of contract and technical specification for engineering firms and contractors.
State Line Ministry of MAFCRD Extension workers	<ul style="list-style-type: none"> • General Knowledge of Irrigation development • Special knowledge of Farmers' Organization • Special knowledge of Innovative Irrigated Agriculture 	<ul style="list-style-type: none"> Same as on the left, and as follows: Knowledge and skill of technical training for extension workers of counties and other stakeholders. 	<ul style="list-style-type: none"> Same as on the left, and as follows: Knowledge of agreement and technical specification for extension service company, if necessary.
State Line Ministry of MAFCRD Community Development Officers	<ul style="list-style-type: none"> • General Knowledge of Irrigation development • Special knowledge of Farmers' Organization • Special knowledge of Operation and Maintenance for Irrigation Schemes 	<ul style="list-style-type: none"> Same as on the left, and as follows: Knowledge and skill of technical training for extension workers of counties and other stakeholders. 	<ul style="list-style-type: none"> Same as on the left, and as follows: Knowledge of contract and technical specification for service company for WUAs, if necessary.
County Engineers	<ul style="list-style-type: none"> • General Knowledge of Irrigation development 	<ul style="list-style-type: none"> • General Knowledge of Irrigation development • General Knowledge of Irrigation Facilities Design • General Knowledge of Topographical and Geological 	<ul style="list-style-type: none"> Same as on the left, and as follows: Knowledge of contract and technical specification for engineering firms and

Actor	Major Required Competency		
	Short Term	Medium Term	Long Term
		Survey • Special knowledge of Operation and Maintenance for Irrigation Schemes • Special knowledge of Construction Supervision of Irrigation Facilities • Special knowledge of Project Monitoring and Evaluation for Irrigation Projects	contractors.
County Extension Workers	• General Knowledge of Irrigation development	• General Knowledge of Irrigation development • Farmers' Organization • Innovative Irrigated Agriculture • Operation and Maintenance for Irrigation Schemes	Same as on the left, and as follows: Knowledge of contract and technical specification for extension service company, if necessary. Knowledge of contract and technical specification for service company for WUAs, if necessary.

3.1.2 Main Implementation Bodies of HRIDIP

MEDIWR and MAFCRD will be the main HRIDIP implementation bodies in the short-term, considering the limited implementation capacities of state and county governmental institutions. On the other hand, the HRIDIP covers the contents of human resource development measures that the government need to take in the medium and long terms. In the medium and long terms, the authority regarding decision-making and budget will be transferred in the contexts of decentralization from the national government to the state and county governments. Hence, the state and county governments is also expected to perform more diverse roles in the HRIDIP. For the state and county governments fulfilling the roles, the human resources fostered through the short-term measures of the HRIDIP need to become the main driving force for promoting the future human resource development at the state and county levels.

3.1.3 Framework of the HRIDIP

The framework of the HRIDIP consists of 1) provision of training opportunities and 2) establishment of a HRD monitoring and feedback system. The training can be divided mainly into two categories: on-the-job and off-the-job training. The main objective of on-the-job training is to enhance technical competencies that cannot be strengthened without accumulation of experiences through the implementation of project activities



Figure 3.1.2 Framework of the HRIDIP

and/or through the duties of the institutions related to irrigation development. On the other hand, off-the-job training will aim at improvement of technical knowledge that can be learnt through the

combination of lectures and practices at training facilities within a limited period. Moreover, opportunities of advanced formal education need to be provided for specified technical officers. Regarding a HRD monitoring and feedback system, it will be established for ensuring the HRIDIP to be accomplished as expected and improving the effectiveness and efficiency.

3.1.4 Provision of Training Opportunities

(1) Overview

As explained in Section 3.4: "Framework of the HRIDIP", the training are classified into three different types. Detail explanations on each type of training are given in Table 3.1.3.

Table 3.1.3 Explanation of Each Type of Training

Training	Description/Expected achievements	Remarks
On-the-job Training	<ul style="list-style-type: none"> On-the-job training will be conducted through daily project activities and/or daily work in each concerned institution. Continuous technical support, monitoring and supervision for trainees by supervisors/trainers are required to make on-the-job training successful. On-the-job training will strengthen practical skills for implementation of daily activities in projects and/or concerned institutions. 	<ul style="list-style-type: none"> On-the-job training opportunities need to be provided in long-term visions and based on trainees' job descriptions.
Off-the-job Training	<ul style="list-style-type: none"> Off-the-job training will be conducted by trainers at concerned training centres, using training curriculums. Off-the-job training will provide basic knowledge of irrigation development, which is necessary to be acquired before project implementation. 	<ul style="list-style-type: none"> Off-the-job training in each time does not take a long duration. However, systematic and continuous training provision is necessary to cultivate trainees' competencies more widely and deeply.
Advanced formal education	<ul style="list-style-type: none"> Advanced formal education will be conducted in universities and research institutions. Advanced formal education will cultivate academic and specialized knowledge. 	<ul style="list-style-type: none"> Advanced formal education takes several years for completion. Therefore, trainees need to take a leave from their work.

*Note: Proposed off-the-job training curriculums were shown below in this chapter.

The CNA survey has identified the actors who are expected to be engaged in future implementation of irrigation development. Allocation of training for each target trainee and locations are shown in table 3.1.4. On-the-job training will be conducted at project sites/trainees' workplaces; and off-the-job training will be mainly conducted at training centres/institutions. For provision of on-the-job training opportunities as well as practices which are included in each off-the-job training curriculum, irrigation development projects that are implemented under National, State and County Irrigation Development Programs need to be equipped with training functions for engineers and specialists. In addition, new irrigated agricultural training centres need to be established and/or existing ones need to be improved, for systematic and continuous implementation of off-the-job training.

Table 3.1.4 Main Allocation of Training for Target Trainees

Target Trainee	Training	Location of training
MEDIWR Engineers	On-the-job Training	• Projects
	Off-the-job Training	• Training Centres • Provision by donors
	Advanced Education	• Universities or Research Institutions
MAFCRD Engineers	On-the-job Training	• Project
	Off-the-job Training	• Training Centres • Provision by donors
	Advanced Education	• Universities or Research Institutions
Teachers for extension workers	Off-the-job Training	• Training Institutions • Provision by donors
Line Min. of MEDIWR Irrigation engineers	On-the-job Training	• Project
	Off-the-job Training	• Training Institutions • Provision by donors
Line Min. of MAFCRD Extension workers	On-the-job Training	• Project
	Off-the-job Training	• Training Institutions • Provision by donors
Counties Irrigation engineers	Off-the-job Training	• Training Institutions
Counties Extension workers	Off-the-job Training	• Training Institutions
Farmers participating in irrigation schemes	Off-the-job Training	• Training Institutions
	Field-level training	• Project
Famer's Organizations/WUAs	Off-the-job Training	• Training Institutions
	Field-level training	• Project

(2) On-the-Job Training

Engineering Competencies would be cultivated through actual project implementation activities. Therefore, implementation of the priority projects need to be designed as on-the-job training opportunities, which should be clearly mentioned in the agreements and/or the technical specifications of the engineering services by consulting/engineering firms, construction firms, equipment providers and manufacturers.

There is a large gap of equipped competencies for irrigation development between officers of national, state and county level institutions. The assignments for irrigation development projects need to be considered based on the current competencies and the number of technical staff of each institution. Therefore, officers of MEDIWR and MAFCRD as national level institutions will participate in all the assignments. The following table shows expected major project assignments for on-the-job training to each candidate officer.

Table 3.1.5 Expected Assignments and Job Descriptions of Projects

Envisaged Major Project Assignments	Job Description	Candidate Officers
Project Leader/Manager	Project management, responsibilities for quality control, coordination with other organization/institutions	Up to Assistant Directors of MEDIWR and MAFCRD
Irrigation Engineer	Planning and design irrigation facilities	Civil and/or Agricultural Engineers of MEDIWR and MAFCRD
Structure Engineer	Structure design of facilities	Civil Engineers of MEDIWR
Hydrologist	Hydrologic analysis, water resource availability analysis for irrigation	Hydrologists of MEDIWR
Geologist	Geological analysis for heavy structure	Geologists of MEDIWR
Agronomist	Planning cropping pattern and cultivation methods	Agronomists of MAFCRD
Extension Specialist	Planning supporting system for farmers	Extension Specialists of MAFCRD
WUA Specialist	Planning supporting system for WUAs	Farmers Organization Specialists of MAFCRD
Environmental Specialist	Environmental evaluation of the project. Planning mitigation measures	Environmental specialists of MEDIWR and MAFCRD

Whereas state governmental institutions related to infrastructure have allocated some engineers for irrigation development, they have limited basic knowledge of irrigation development. Therefore, for accumulating general knowledge of irrigation development and know-how of project implementation, state engineers need to start participation in short-term IDMP projects without being engaged in any specific assignments. However, some skilful engineers are allocated in state institutions; and they should be assigned for irrigation development projects even in a short term.

All the counties have not allocated irrigation engineers. Thus, they cannot currently send specialists to irrigation development assignments; however, they need to obtain basic knowledge of irrigation development, by supporting field level surveys conducted by MEDIWR and MAFCRD, such as topographic surveys and socio-economic surveys.

(3) Off-the-job Training

1) Target Actors and Required Training Items

For enabling the actors to perform their required roles effectively and efficiently when they are actually engaged in irrigation development, off-the-job training curriculums are to be designed to give necessary technical knowledge to each target actor and training curriculums provided for each actor need to be carefully considered. The following table shows target actors and required training items, based on the required roles and competencies identified through the CNA. Necessary training curriculums and their contents will be proposed below in (3) Off-the-job Training Curriculums.

Table 3.1.6 Training Items Required for Each Target Actor

Target Actors		Required Training Items
Institutions/Groups	Individual	
MEDIWR & Mechanization Department of MAFCRD	Engineers	<ul style="list-style-type: none"> • General Knowledge of Irrigation Development • Irrigation Methods and Water Management • Storage Facilities • Irrigation Pumps • Preventive Measures against Water Logging • Soil and Water Conservation Structures • Operation and Maintenance of Major Irrigation Facilities and Equipment • Innovative Agriculture under Irrigation
	Monitoring Officers	<ul style="list-style-type: none"> • Knowledge of Project Monitoring and Evaluation for Irrigation development
	Management and	<ul style="list-style-type: none"> • Community Orientation on Irrigation Development

	Administrative Officers	<ul style="list-style-type: none"> Contract Management and Procurement
MAFCRD	Agronomists	<ul style="list-style-type: none"> General Knowledge of Irrigation Development Irrigation Methods and Water Management Preventive Measures against Water Logging Community Orientation on Irrigation Development Establishment and Enhancement of Farmers' Organizations Operation and Maintenance of Major Irrigation Facilities and Equipment Innovative Agriculture under Irrigation
	Community Development Officer/ Cooperative Officers	<ul style="list-style-type: none"> General Knowledge of Irrigation Development Community Orientation on Irrigation Development Establishment and Enhancement of Farmers' Organizations Innovative Agriculture under Irrigation
	Monitoring Officers	<ul style="list-style-type: none"> Knowledge of Project Monitoring and Evaluation for Irrigation development
State Institutions related to Irrigation facility Development	Engineers	<ul style="list-style-type: none"> General Knowledge of Irrigation Development Irrigation Methods and Water Management Storage Facilities Irrigation Pumps Preventive Measures against Water Logging Soil and Water Conservation Structures Operation and Maintenance of Major Irrigation Facilities and Equipment
	Monitoring Officers	<ul style="list-style-type: none"> Knowledge of Project Monitoring and Evaluation for Irrigation development
	Management and Administrative Officers	<ul style="list-style-type: none"> Community Orientation on Irrigation Development Contract Management and Procurement
State Institutions related to Agriculture	Extension Officers	<ul style="list-style-type: none"> General Knowledge of Irrigation Development Irrigation Methods and Water Management Preventive Measures against Water Logging Community Orientation on Irrigation Development Establishment and Enhancement of Farmers' Organizations Operation and Maintenance of Major Irrigation Facilities and Equipment Innovative Agriculture under Irrigation
	Community Development Officer/ Cooperative Officers	<ul style="list-style-type: none"> General Knowledge of Irrigation Development Community Orientation on Irrigation Development Establishment and Enhancement of Farmers' Organizations Innovative Agriculture under Irrigation
	Monitoring Officers	<ul style="list-style-type: none"> Knowledge of Project Monitoring and Evaluation for Irrigation development
Counties	Irrigation Engineers	<ul style="list-style-type: none"> General Knowledge of Irrigation Development Irrigation Methods and Water Management Storage Facilities Irrigation Pumps Preventive Measures against Water Logging Soil and Water Conservation Structures Operation and Maintenance of Major Irrigation Facilities and Equipment
	Extension Officers	<ul style="list-style-type: none"> General Knowledge of Irrigation Development Irrigation Methods and Water Management Preventive Measures against Water Logging Community Orientation on Irrigation Development Establishment and Enhancement of Farmers' Organizations Operation and Maintenance of Major Irrigation Facilities and Equipment Innovative Agriculture under Irrigation
	Monitoring Officers	<ul style="list-style-type: none"> Knowledge of Project Monitoring and Evaluation for Irrigation development
	Management and Administrative Officers	<ul style="list-style-type: none"> Community Orientation on Irrigation Development Contract Management and Procurement
Beneficiaries	Farmers	<ul style="list-style-type: none"> Innovative Agriculture under Irrigation
	WUA Members	<ul style="list-style-type: none"> Innovative Agriculture under Irrigation Establishment and Enhancement of Farmers' Organizations

2) Method of Training Provision

The training related to irrigation development will be conducted by Irrigation Training Centres as well as Agricultural Training Centres, such as Yei Crop Training Centre and Amadi Rural Development Institute. The details of irrigation training centres are mentioned below in Section 4.1, Irrigation Training Centre Project. These training centres jointly take full responsibilities of planning,

conducting and managing the training.

Basically, training will be designed and implemented in combination of lectures at the training centres and practices/site inspection in an actual irrigation scheme or in a demonstration farm (Proposed training curriculums are shown below in Table 3.1.7). Especially, regarding on-farm management training for farmers in irrigation schemes, the farmers need to be trained in actual irrigation scheme as well as through lectures at training centres so that both their practical skills and technical knowledge can be cultivated through the training.

The lectures will be given by experienced engineers/agronomists belonging to MEDIWR and MAFCRD. However, most of such resource persons may not have any experience of conducting training. Therefore, in a short term, the training centres will hire a training expert as a master trainer to foster the resource persons as trainers so that their knowledge of irrigation development can be handed down to trainees smoothly. Moreover, university lecturers/professors should be invited to give lectures on irrigation development related topics.

Training based on each curriculum is to be provided on a regular basis, and every concerned individual actor should receive necessary training. However, each training centre has certain physical capacity of accommodating trainees in each time. Therefore, the training centres need to carefully select trainees in each time through discussion with the target institutions/groups, by considering the following points:

- a) MEDIWR and MAFCRD: the majority of the officers have a certain amount of knowledge related to irrigation development. Thus, careful selection of candidates who learn each training curriculum is required.
- b) State Institutions: All the concerned officers need to learn required training items. However, considering the capacity of the training centres, the number of the trainees from the state institutions per time needs to be limited. The criteria for prioritization of the candidate trainees are states which is planning and conducting irrigation development and state officers who are assigned in the implementation of irrigation development.
- c) County institutions: All the county officers will receive necessary training in a long run. In a short term, training will be provided only for the concerned staff working in counties where irrigation development projects are going to be conducted.
- d) Beneficiaries: They are subject to training for the purposes of preparing project implementation.

3) Off-the-job Training Curriculums

Off-the-job training curriculums have been considered based on the required training items stated in Table 3.1.6, "Training Items Required for Each Target Actor". For developing the contents of each off-the-job training curriculums, the series of "NBI training manuals" should be utilized. The proposed contents and target trainees of off-the-job training curriculums are mentioned in Table 3.1.7. The details are shown in Appendix 2, "IDMP Training Programmes". As mentioned in (2) Method of Training Provision, these training curriculums will be basically conducted by the concerned training centres. However, Training Curriculum 2-2, "Establishment and Enhancement of Farmers' Organizations", will be provided in irrigation schemes for farmers by extension officers, community development officers, and/or cooperative officers, who receive Training Curriculum 1-9.

The training curriculums should be revised annually by reflecting training implementation results of each fiscal year. The revision need to be jointly conducted by all the concerned training centres, considering the accumulated data of training implementation and the situations of irrigation development at the time of revision.

Table 3.1.7 Proposed Contents and Target Trainees of Off-the-job Training Curriculums

No.	Training Curriculums	Contents	Target Trainees
1. Training for Officers of MEDIWR, MAFCRD, State Institutions and Counties			
1-1	General Training on Irrigation Development	<ol style="list-style-type: none"> 1) Objectives of Irrigation Development 2) Benefits of irrigation projects (including deference between rain-fed and irrigated agriculture) 3) Procedures of Irrigation Development 4) Cases of irrigation projects in other countries and others 5) Facts considered in irrigation planning 6) Types of Irrigation methods 7) Types of irrigation facilities and equipment 8) Site inspection to existing schemes 9) Lessons learnt (including negative impact mitigation) 	Engineers, Agronomist, Extension officers, Community Development Officers and Cooperative Officers (MEDIWR, MAFCRD, State Institutions and Counties)
1-2	Irrigation Methods and Water Management	<ol style="list-style-type: none"> 1) Surface irrigation 2) Sprinkler irrigation 3) Drip irrigation 4) Sub-surface irrigation 5) Spate irrigation 6) Practice/site inspection in training farms 	Engineers, Agronomist and Extension Officers (MEDIWR, MAFCRD, State Institutions and Counties)
1-3	Storage Facilities	<ol style="list-style-type: none"> 1) Small earth dams 2) Weirs 3) Subsurface dams 4) Sand dams 5) Other reservoirs 6) Case Study 	Engineers (MEDIWR, Mechanization Department, State Institutions and Counties)
1-4	Irrigation Pumps	<ol style="list-style-type: none"> 1) The basic knowledge about irrigation pumps 2) Terminology used in pump operating heads 3) Common types of irrigation pumps 4) Pump selection and installation 5) Operation and maintenance of pumping units 6) Site inspection to existing pump facilities 7) Case study 	Engineers (MEDIWR, Mechanization Department, State Institutions and Counties)
1-5	Preventive Measures against Water Logging	<ol style="list-style-type: none"> 1) What is water logging? 2) In-field water management 3) Control of inflow from other water bodies 4) Control of ground-water inflows 5) Control of water from higher ground to lower grounds 6) Types of drainage systems 7) Methods of operation and maintenance of the facilities 8) Operation and Maintenance of Drainage Systems 9) Good practices in other countries 	Engineers, Agronomists and Extension Officers (MEDIWR, MAFCRD, State Institutions and Counties)
1-6	Soil and Water Conservation Structures	<ol style="list-style-type: none"> 1) Significance of soil and water conservation 2) Types of conservation structures 3) Function of each structure 4) Design of each structure 5) Layout and construction of each structure 6) Operation and maintenance of each structure 	Engineers (MEDIWR, Mechanization Department, State Institutions and Counties)
1-7	Community Orientation on Irrigation Development	<ol style="list-style-type: none"> 1) Benefits of irrigation projects for farmers 2) Deference between rain-fed and irrigated agriculture 3) Significance of Community Engagement in irrigation development and its methods 	Agronomists, Extension officers, Community Development Officers, Cooperative Officers and Management and Administrative Officers (MEDIWR, MAFCRD, State Institutions and Counties)
1-8	Contract Management and Procurement	<ol style="list-style-type: none"> 1) Bid packaging 2) Detailed procedures for procurement methods 3) Preparation of bidding documents 4) Bid opening 5) Bid evaluation 6) Award of contracts 	Management and Administrative Officers (National Government, State Institutions and Counties)
1-9	Establishment and	<ol style="list-style-type: none"> 1) Objectives and roles famers' organizations (esp. 	Agronomists, Extension

No.	Training Curriculums	Contents	Target Trainees
	Enhancement of Farmers' Organizations	2) Water Users Associations Establishment and Management of Water Users Associations (WUAs), including organizational management and accounting 3) Supporting methods of activities of famers' organization	Officers, Community Development Officers and Cooperative Officers (MAFCRD, State Institutions and Counties)
1-10	Operation and Maintenance of Major Irrigation Facilities and Equipment	1) Structures and mechanisms of major facilities 2) Methods of operation and maintenance of major facilities and equipment (including control of canal seepage) 3) Operation and maintenance (O&M) activities (actor by actor) 4) Introduction of successful of Operation and Maintenance of Irrigation Systems in other countries	Engineers, Agronomists and Extension Officers (MEDIWR, MAFCRD, State institutions and Counties)
1-11	Promotion of Innovative Agriculture under Irrigation	1) Knowledge of mechanized agriculture 2) Soil management techniques for sustainable use of farmland 3) Methods to cultivate newly introduced and developed varieties with high adaptability of heavy manuring, achievability of high yield and quality 4) Other common issues, such as pest/disease control	Engineers, Agronomists, Extension Officers and Community Development Officer/ Cooperative Officers (MAFCRD, State Institutions and Counties)
1-12	Project Monitoring and Evaluation for Irrigation development	1) Monitoring and Evaluation methods 2) Monitoring items/indicators for irrigation development projects 3) Feedback systems	Monitoring Officers (MEDIWR, MAFCRD, State institutions and Counties)
2. Training for Farmers and Water Users Association Members			
2-1	Innovative Agriculture under Irrigation	1) Innovative irrigated agricultural practices 2) On-farm irrigation management 3) Basic Knowledge of agricultural machinery 4) Good practice in other countries 5) Site inspection to demonstration farms/existing irrigation schemes 6) Practice in training farms	Farmers in irrigation schemes and WUA members
2-2	Establishment and Enhancement of Farmers' Organizations	1) Objectives and roles famers' organizations (esp. Water Users Associations) 2) Establishment and Management of Water Users Associations (WUAs), including organizational management and accounting	WUA members

Note: Training and Capacity Development related to advanced technical knowledge of meteorology and hydrology have been covered by Nail Basin Initiative (Design Report, May 2015). Thus, training on the topic is not included in IDMP training curriculum.

3.1.5 HRD Monitoring and Feedback System

A HRD Monitoring and Feedback System will ensure accomplishments of the HRIDIP through periodical confirmation of personal HRD activities of each engineer and administrator. The system will consist of two (2) phases: "Monitoring for Working and Training" and "Evaluation and Feedback". In the Monitoring Phase, achievements of the on-job and off-job training are recorded; and in the Evaluation and Feedback Phase, through self-evaluation and discussion with supervisors, HRD target officers will recognize their enhanced capacities and become aware of how to enhance their capacities for the future. The cycle of the two phases is called HRD cycle below. The system will be developed to incorporate the existing training record system that has been operated by training unit of MEDIWR since 2014, targeting the directorates of MEDWIR that belonged to the previous MWRI structure.

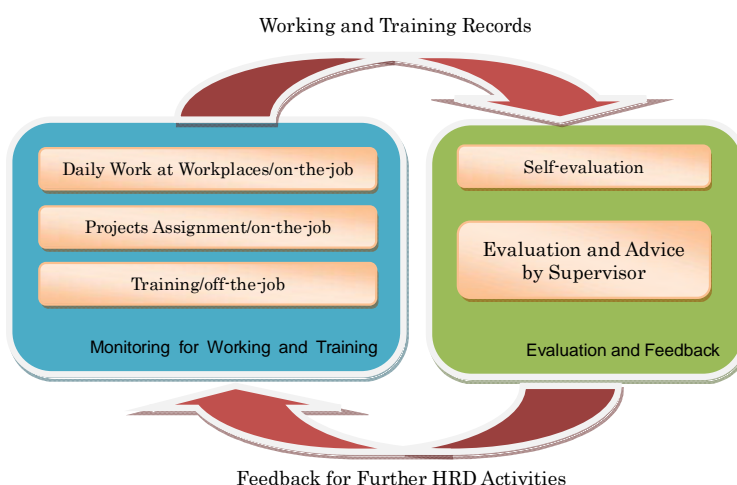


Figure 3.1.3 HRD Cycle

Table 3.1.8 Activities of the HRD Cycle

Phase	Contents of Activities	Responsibility
Monitoring for Working/Training	Working in the Institutions	Each Target Officer & Supervisor
	Projects assignment	Supervisor & Director
	Off-the-job Training	Tanning Centres
	Taking Working Record	Each Target Officer
	Taking Training Record	Each Target Officer & Training Unit
Evaluation & Feedback	Self-evaluation of Activities	Each Target Officer
	Consultation with Supervisor	Supervisor
	Feedback for Further HRD Activities	Each Target Officer & Supervisor

A personal working and training record is one of the essential tools for the system, which is used in monitoring phase. The record contains monthly and annual activities, self-evaluation of competencies, supervisor evaluation and personal training records. The records will be prepared by each officer monthly and annually, and managed by directorates and the training unit of MEDWIR. This personal working and training record will be utilized together with the existing training record-keeping system of MEDIWR for continuous enhancement of competencies of the target officers.

Sample: Format of Personal Working and Trainings Record

Name:		Grade:
Directorate, Units:		
Monthly Working Record		
Month	Fill-in by Personal	Fill-in by Supervisor
January	<i>Record of monthly activities, personal issue that find out through the monthly activities, self-evaluation of the personal competencies through the monthly activities.</i>	<i>Simple evaluation or confirmation of performance by supervisor</i>
February		
.		
.		
.		
December		
Evaluation of Annual Activities	<i>Personal review of last year's activities.</i>	<i>Simple evaluation of performance by supervisor</i>
Evaluation of competency	<i>Competencies need to be strengthen will be pointed out.</i>	Expectation about competencies by Supervisor:
Attended training	<i>Training name : Period of Training: Curriculum: Evaluation of the training:</i>	<i>Requested technical and/or management competencies to be strengthen</i>
	<i>* Soft copies of the texts and other training materials should be submitted for Training Unit</i>	
Training needs	<i>Contents of training requested for participation</i>	

3.1.6 Human Resource Development Projects/Components under the HRIDIP

The framework of the HRIDIP has been introduced in Section 3.1.3. Since Human Resource Development (HRD) is a crosscutting issue of IDMP, some components under the HRIDIP will be covered by other IDMP programmes; and other components are incorporated in the formulated HRD projects (See the table 3.1.9). The HRIDIP mainly consists of Irrigation and Drainage Training project and HRD Monitoring and Feedback Establishment System Project.

Table 3.1.9 HRD Components and Related Programmes

HRD Components	Related Programmes/Projects	Remarks
On-the-job training through the engagement in irrigation development project	National, State, County, Community Irrigation Development Programmes	-
Off-the-job training provision	HRIDIP	The contents of the project are described in Section 2.1.
Field-level training for farmers and WUAs	National, State, County, Community Irrigation Development Programmes; Irrigated Agriculture Extension Programme	-
HRD monitoring and feedback system establishment project	HRIDIP	The contents of the project are described in Section 2.2.

3.1.7 Irrigation and Drainage Training Project (IDTP)

(1) Target Actors and Required Training Items (Rationales)

The Republic of South Sudan (RSS) is planning to promote nationwide irrigation development to stabilize and utilize the water resources for agriculture to meet the national needs, since flood and drought occurs occasionally threatening national food security and fluctuation in annual food production is significant due to the unstable climate.

In the current situation of irrigation development in RSS, there are only two existing irrigation schemes in South Sudan, namely Aweil Irrigation Rice Scheme (AIRS) and Northern Upper Nile Irrigation Schemes (NUNIS), and thus most of the South Sudanese people are not familiar with innovative irrigated agriculture. Therefore, a large number of farmers and farmer organizations do not have clear images of irrigation development as well as its benefits. Besides, as identified through the Capacity Needs Assessment survey conducted by the IDMP Task Team, many government officers including extension workers, who will become the key actors in the future irrigation development, do not have desirable technical capacities for implementing irrigation development.

For successful implementation of IDMP, the development of human resource targeting farmers and government officials is one of the key elements. The human resource development will be achieved through actual engagement/on-the-job training in irrigation schemes as well as provision of required training opportunities. Besides, useful information for practicing innovative agriculture under irrigation needs to be disseminated nationwide to sensitize the farmers and government officials.

To tackle what has been mentioned above, an irrigation and drainage training project (IDTP) need to be established as a provider for training services on innovative irrigated agriculture and/or existing agricultural training centres need to be strengthened for irrigation training provision. In addition, the IDTP are to be equipped with research functions to disseminate information on an innovative irrigated agriculture nationwide. In this account, a project for installing and functionalizing the IDTP should be formulated and implemented. The proposed contents of the project are stated below.

(2) Proposed Contents of the Project

1) The Expected Project Objective, Outputs and Main Activities

The expected objective for the irrigation and drainage training project (IDTP) is "Promotion of innovative agriculture under irrigation through nation-wide human resource capacity development". This objective consists of the following five outputs:

- a) Promotion of innovative irrigated agriculture for RSS
- b) Strengthening engineering capacities for governmental engineers/technicians (at the national, state and local levels);
- c) Strengthening technical capacities for extension workers (at the national, state and local levels);
- d) Strengthening organization capacities of Water Users Associations; and
- e) Strengthening farmers' capacities (Supporting for irrigation scheme).

For fulfilling these outputs, an IDTP's research function for training improvement need to be especially strengthened, starting from information and data collection including lessons learnt. The following table shows the expected project objective, outputs and main activities. Project logical framework is shown Appendix 3.

Table 3.1.10 Expected Objective, Outputs and Main Activities

Objective	Outputs	Main Activities
Promotion of innovative irrigated agriculture under irrigation through nation-wide human resource capacity development	1.Promotion of innovative irrigated agriculture for RSS	1-1. Irrigated demonstration farm managed and operated
		1-2. Information transmitted nationwide
	2.Strengthening engineering capacities for governmental engineers/technicians (at the national, state and local levels)	2-1. Information on irrigation facilities in RSS collected and managed
		2-2. Training needs identified for the engineer who are assigned for irrigation development at the National, State and Local levels
		2-3. Training opportunities provided for the engineers/technicians as per the training needs
		2-4. The ITC equipped with applicability research function regarding engineering aspects of irrigation
		2-5. Information shared with stakeholder on irrigation development
	3.Strengthening technical capacities for extension workers (at the national, state and local levels)	3-1. Technical information collected and managed for practicing innovative agriculture under irrigation
		3-2. Training needs identified for the workers who are assigned for agricultural extension for irrigated agriculture
		3-3. Training opportunities provided for the workers as per the training needs
		3-4. The ITC capacitated for applicability research regarding agricultural practice under irrigation
		3-5. Information shared with stakeholder on agricultural practice under irrigation
		3-6. Extension guidelines and tolls for farmers developed
	4.Strengthening organization capacities of Water Users Associations (WUAs)	4-1. Information on WUAs in other countries collected and managed
		4-2. Training needs identified for the officers who are assigned for organizational strengthening and establishment of the associations
		4-3. Training opportunities provided for the officers as per the training needs
		4-4. Information shared with stakeholder
		4-5. Extension guidelines and tolls for WUAs developed
	5.Strengthening farmers' capacities (Supporting for irrigation scheme)	5-1. Training needs identified for the farmers who manage agriculture in irrigation schemes
		5-2. Training opportunities provided as per training needs

Note: Please refer to IDMP Training Programmes in Attachment 2 as an example of curriculum development.

2) Detail Activities

The detail activities of the project for installing and functionalizing the irrigation and drainage training (IDTP) are implemented to achieve the outputs stated in Table 3.1.10 above. The table below shows all the project activities.

Table 3.1.11 Detailed Activities

Main Activities	Detailed Activities
1-1.Irrigated demonstration farm managed and operated	<ol style="list-style-type: none"> 1) Development of demonstration farm improvement plan that consists of facilities and equipment 2) Constriction of the demonstration farm: Field preparation, Irrigation facility constriction and others 3) Procurement of the equipment to operate demonstration farm 4) Development of annual operation and management plan of demonstration farm 5) Operating demonstration farm within the scope of the plan
1-2.Information transmitted nationwide	<ol style="list-style-type: none"> 1) Making newsletter that consists of plan, activities, achievements and other important Information of irrigated agriculture 2) Sending newsletters to the state and local governments 3) Information transmission thought mass medium
2-0.Preparation for operation of training for the national, states and local governmental irrigation engineers	<ol style="list-style-type: none"> 1) Construction of necessary facilities for training 2) Procurement of the equipment to operate training 3) Development of annual training plan for the engineers
2-1.Information on irrigation facilities collected and managed	<ol style="list-style-type: none"> 1) Development of regulation of administration and abolishment of collected information 2) Currently collected information and data arrangement in accordance with the regulation 3) Information and data collection 4) Management of information and data based on the regulation
2-2.Training needs identified for the engineer who are assigned for irrigation development at the National, State and Local levels	<ol style="list-style-type: none"> 1) Conducting periodic questionnaires and/or interview surveys to identify training needs for the engineers 2) Feedback to contents of the training plan based on the result of the survey
2-3.Training opportunities provided for the engineers/technicians as per the training needs	<ol style="list-style-type: none"> 1) Creation of Training Curriculums for the governmental engineers/technicians 2) Recruiting the candidate national, state and local governmental irrigation engineers/technicians for training 3) Conducting training 4) Development of a training record keeping system and making training records
2-4.The ITC equipped with applicability research function regarding engineering aspects of irrigation	<ol style="list-style-type: none"> 1) Selection of topics of applicability research from collected information and development needs 2) Development of annual research plan 3) Conducting applicability research on irrigation facilities 4) Feedback on the results of the research to development plan and excising schemes
2-5.Information shared with stakeholder on irrigation development	<ol style="list-style-type: none"> 1) Selection of desirable topics that are shared with stakeholders (National Gov., State Gov., Local Gov, related Central Gov. NGO, private company and others) 2) Making and distributing periodic activity reports for the stakeholders 3) Collection of requested research topics from the stakeholders and feedback to the next annual research plan
3-0.Preparation for the operation of training for extension officers	<ol style="list-style-type: none"> 1) Construction of necessary facilities for training 2) Procurement of the equipment to operate training 3) Development of annual training plan for extension officers
3-1.Technical information collected and managed for practicing innovative agriculture under irrigation	<ol style="list-style-type: none"> 1) Development of regulations on administration and abolishment of collected information 2) Information and data collection 3) Management of information and data based on the regulation
3-2.Training needs identified for the extension officers who are assigned for agricultural extension under irrigation	<ol style="list-style-type: none"> 1) Conducting periodical questionnaires and/or interview surveys to identify training needs for the extension officers and the farmers 2) Feedback to contents of the training plan based on the result of the surveys
3-3.Training opportunities provided for the extension officers as per the training needs	<ol style="list-style-type: none"> 3) Creation of Training Curriculums for the extension officers 4) Recruiting the candidate extension officers for training 5) Conducting training 6) Development of a training record keeping system and making training records
3-4.The ITC capacitated for applicability research	<ol style="list-style-type: none"> 1) Selection of topics of applicability research from collected information and development needs

Main Activities	Detailed Activities
regarding agricultural practice under irrigation	<ol style="list-style-type: none"> 2) Development of annual research plan 3) Conducting applicability research on agricultural practice under irrigation 4) Feedback on the results of the research to development plan and excising schemes
3-5.Information shared with stakeholder on agricultural practice under irrigation	<ol style="list-style-type: none"> 1) Selection of desirable topics that are shared with stakeholders (State Gov., Local Gov, related Central Gov. NGO, private company and others) 2) Making and distributing periodic activity reports for the stakeholders 3) Collection of requested research topics from the stakeholders and feedback to the next annual research plan
3-6.Extension guidelines and tolls for farmers developed	<ol style="list-style-type: none"> 1) Study on the existing extension materials for farmers 2) Development of draft extension guidelines and tools on irrigated agriculture 3) Experimental operation of extension services based on the draft extension guidelines and tools 4) Revision and finalization of the extension guidelines and tools
4-0.Preparation for operation of information collection and management of water users associations	<ol style="list-style-type: none"> 1) Construction of necessary facilities for training 2) Procurement of the equipment to operate training 3) Development of an annual training plan for trainer of Water Users Associations 4) Development of annual training plans for the associations
4-1.Information on WUAs in other countries collected and managed	<ol style="list-style-type: none"> 1) Development of regulations on administration and abolishment of collected information 2) Information and data collection 3) Arrangement of collected information and data in accordance with the regulation 4) Management of information and data based on the regulation
4-2.Training needs identified for the officers who are assigned for organizational strengthening and establishment of the associations	<ol style="list-style-type: none"> 1) Conducting periodic questionnaires and/or interview surveys to identify training needs for the associations 2) Feedback on the result of the survey to the contents of the training plan
4-3. Training opportunities provided for the officers as per the training needs	<ol style="list-style-type: none"> 1) Creation of Training Curriculums for the officers 2) Recruiting the trainers and associations 3) Conducting training 4) Making training records
4-4.Information shared with stakeholder	<ol style="list-style-type: none"> 1) Selection of desirable topics that are shared with stakeholders (National Gov., State Gov., Local Gov, related Central Gov. NGO, private company and others) 2) Making and distributing periodic activity reports for the stakeholders 3) Collection of requested training topics from the stakeholders and feedback to the next annual training plan
4-5.Extension guidelines and tolls for WUAs developed	<ol style="list-style-type: none"> 1) Analysis of the collected information and data on WUAs in other countries 2) Study on the existing extension materials for establishment and strengthening of farmer organizations 3) Development of draft extension guidelines and tools 4) Experimental operation of extension services based on the draft extension guidelines and tools 5) Revision and finalization of the extension guidelines and tools
5-1.Training needs identified for the famers who manage agriculture in irrigation schemes	<ol style="list-style-type: none"> 1) Identification of necessity of study tours to demonstration farms (e.g. initial period of irrigation scheme) 2) Identification of necessity of specified training for famers (e.g. initial period of irrigation schemes) 3) Development of annual study tour and/or training plans, if necessary
5-2.Training opportunities provided as per training needs	<ol style="list-style-type: none"> 1) Creation of training curriculums for farmers 2) Conducting the tour if necessary accordance with the annual plan 3) Conducting the training accordance with the annual plan 4) Making annual training records

Note: Please refer to IDMP Training Programmes in Attachment 2 as an example of curriculum development.

3) Necessary Facilities, Equipment and Other Inputs for the Project Implementation

The project costs for conducting the aforementioned activities have been considered in terms of necessary facilities, equipment and human resource for the newly established ITC, as well as other costs related to management and operation of the project. The cost items and their estimate amounts are shown in Table 3.1.12. The expected duration of the project is 5 years.

Table3.1.12 Project Cost Estimate

Items		2016/17			2017/18			2018/19			2019/20			2020/21			2021/22			
		Quantity	Unit	Total Price (US\$)	Quantity	Unit	Total Price (US\$)	Quantity	Unit	Total Price (US\$)	Quantity	Unit	Total Price (US\$)	Quantity	Unit	Total Price (US\$)	Quantity	Unit	Total Price (US\$)	
1 ITC Construction	Specialist/consultants	Project Manager	2	M/M	25,000	1	M/M	25,000												
		Irrigation Engineer	3	M/M	20,000	1	M/M	20,000												
		Facility Design Specialist	3	M/M	20,000	1	M/M	20,000												
	Construction of ITC Buildings	Architecture	3	M/M	20,000	1	M/M	20,000												
		Procurement Specialist	1	M/M	20,000	2	M/M	40,000												
		Construction Supervision	5	M/M	20,000	5	M/M	100,000												
		ITC Main Building (Office, Lecture hall, Research Centre, Library and Store)	1,000	m2	400	1,000	m2	300												
		Accommodation Facility and Canteen	200	m2	500	200	m2	100,000												
	Construction of Farms	Garage and Workshop for the Machineries				100	set	200												
		Training Farm	10	ha	10,000	10	ha	5,000												
		Demonstration Farm	15	ha	10,000	15	ha	5,000												
		Research Farm	5	ha	10,000	5	ha	5,000												
		Irrigation Facility for Farms	1	set	500,000	1	set	500,000												
	Equipment	Agricultural Machines (including attachment)				1	set	100,000												
		Irrigation Equipment (Sprinklers, Drips and others)				1	set	50,000												
ITCs and other ICT Equipment					1	set	200,000													
Research Equipment					1	set	1,100,000													
Other Office Equipment					1	set	100,000													
Vehicles 1*4WD, 2*Pickup					3	car	70,000													
	Sub-Total			1,650,000			3,075,000													
2 Operation/Training for Engineer	MEDIWR Staff	Director	12	M/M	-	12	M/M	-	12	M/M	-	12	M/M	-	12	M/M	-	12	M/M	-
		Sub-Director/Irrigation Engineer1	12	M/M	-	12	M/M	-	12	M/M	-	12	M/M	-	12	M/M	-	12	M/M	-
		Trainer1: Irrigation Engneer2	M/M			3	M/M		12	M/M		12	M/M		12	M/M		12	M/M	
		Trainer2: Structure Engineer	M/M			3	M/M		12	M/M		12	M/M		12	M/M		12	M/M	
		Trainer3: hydrologist	M/M			3	M/M		12	M/M		12	M/M		12	M/M		12	M/M	
3 Operation/Training for Extension Workers	MAFCRD Staff	Trainer4: geologist	M/M			3	M/M		12	M/M		12	M/M		12	M/M		12	M/M	
		Assistants	12	M/M	-	12	M/M	-	36	M/M	-	36	M/M	-	36	M/M	-	36	M/M	-
		Sub-Director/Master Trainer1 Agriculture	12	M/M	-	12	M/M	-	12	M/M	-	12	M/M	-	12	M/M	-	12	M/M	-
4 O&M Staff		Master Trainer2 Agriculture	M/M			3	M/M		12	M/M		12	M/M		12	M/M		12	M/M	
		Master Trainer3 WUA	M/M			12	M/M		24	M/M		24	M/M		24	M/M		24	M/M	
5 Supporting Specialist	Specialist/Consultants	Irrigation Facility Specialist			1	M/M	20,000	6	M/M	20,000	6	M/M	20,000	3	M/M	20,000				
		Civil Structural Specialist				4	M/M	20,000	2	M/M	20,000	2	M/M	20,000						
		Hydrologist				4	M/M	20,000	2	M/M	20,000	2	M/M	20,000						
		Agonomist				6	M/M	20,000	6	M/M	20,000	6	M/M	20,000	3	M/M	20,000			
		Extension Specialist				4	M/M	20,000	2	M/M	20,000	2	M/M	20,000						
6 Operation Cost	Operation Cost	Training Specialist			1	M/M	20,000	4	M/M	20,000	2	M/M	20,000	3	M/M	20,000				
		Fuel	1	set	36,000	1	set	36,000	1	set	36,000	1	set	36,000	1	set	36,000			
		Agricultural Inputs	1	set	5,000	1	set	5,000	1	set	5,000	1	set	5,000	1	set	5,000			
		Maintenance Costs for ITC Building	1	set	1,000	1	set	1,000	1	set	1,000	1	set	1,000	1	set	1,000			
		Maintenance Costs for Irrigation Facilities	1	set	1,000	1	set	1,000	1	set	1,000	1	set	1,000	1	set	1,000			
		Maintenance Costs for Equipment	1	set	1,000	1	set	1,000	1	set	1,000	1	set	1,000	1	set	1,000			
		ICT supplies	1	set	2,400	1	set	2,400	1	set	2,400	1	set	2,400	1	set	2,400			
		Research Equipment Supplies	1	set	3,600	1	set	3,600	1	set	3,600	1	set	3,600	1	set	3,600			
		Farm Equipments Supplies	1	set	2,400	1	set	2,400	1	set	2,400	1	set	2,400	1	set	2,400			
		Internet	1	set	12,000	1	set	12,000	1	set	12,000	1	set	12,000	1	set	12,000			
		Other operation cost (Paper, stationery, etc)	1	set	12,000	1	set	12,000	1	set	12,000	1	set	12,000	1	set	12,000			
	Total (US\$)			1,650,000			3,135,000	1	set	647,200	1	set	487,200	1	set	267,200			87,200	

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4) Implementation Plan

a) Implementation Structure

The figure below shows the project implementation structure. The project implementation unit (PIU), which is the main actor of this project, consists of specialists dispatched by MEDIWR and MAFCRD. The CAMP-IDMP Implementation Coordination Committee will support the coordination between the PIU, other training centres and relevant CAMP projects. Moreover, a specialist team will be hired to help the PIU implement the project.

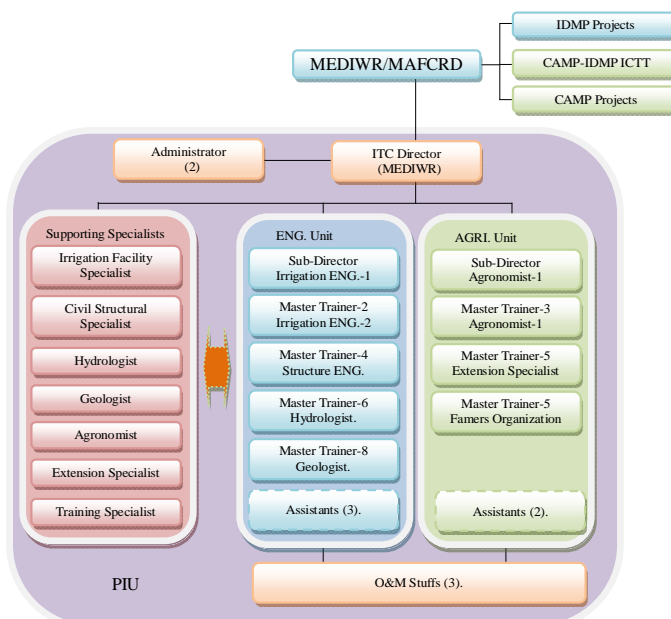


Figure 3.1.4 Project Implementation Structure

b) Implementation Schedule

The project is divided into two (2) phases:

“Construction Phase” and “Operation Phase”. In the construction phase, the IDTP buildings, facilities and equipment will be installed. In the operation phase, the IDTP operation will be started. Time schedule of the project activities are shown in Table 3.1.13.

Table 3.1.13 Time Schedule of the Project Activities

Phase	Activities	1st Year	2nd Year	3rd Year	4th Year	After 4th Year
1. Construction	1-1 Design	█				
	1-2 Installation of Farms & Facilities		█			
	1-3 Construction of ITC Buildings		█			
	1-4 Installation of Equipment			█		
2. Operation	2-1 Research			█	█	█
	2-2 Training			█	█	█
	2-3 Publication			█	█	█

3.2 Concept of Institutional Development (ID)

3.2.1 Coordination with the Existing Training, Research and Educational Institutions

(1) Amadi Rural Development Institute (ARDI)

ARDI provides training courses on cooperative development; and thus, they have had knowledge and experiences for establishment and enhancement of farmers’ organizations. The IDTP needs to utilize the knowledge and experiences for training provision on establishment of water users’ associations, in coordination with Amadi RDI under the CAMP/IDMP implementation coordination mechanism.

In fact, with the support of The Netherlands, MEDIWR in collaboration with ARDI through MAFCRD is implementing a project pertaining to knowledge and skills in water, sanitation and hygiene (WASH). That project is at advance stage in establishing WASH training and research activities at ARDI. The curriculum is being finalised for qualifying technicians and community mobilisers/workers on water (including irrigation) development and management; sanitation; and community entry (including hygiene promotion). It is worth mentioning that additional buildings were built at ARDI through MDTF water supply and Sanitation Project for this purpose. IDTP implementation will be coordinated with the WASH project for knowledge and skills at ARDI.

(2) Linkages with CAMP

The IDMP programme installs and functionalizes the IDTP. The IDTP provide training opportunities regarding operation and maintenance of irrigation schemes/farms and other irrigation schemes/farms management related fields for farmers, extension workers and agriculture and irrigation engineers.

On the other hand, the CAMP project enforces training functions of Yei CTC and establishes new agricultural training centres (ATCs). These ATCs including Yei CTC provide training on crop productions and agricultural extension.

Considering the promotion of modernistic irrigated agriculture, training opportunities regarding irrigation schemes/farms management, crop productions and agriculture extension need to be provided.

Therefore, the IDTP and the ATCs can supplement each other for providing all the required training opportunities related to modernistic irrigated agriculture.

Besides, if CAMP and IDMP jointly establish an irrigation training centre in a priority irrigation project site, such as Jebel Lado, it will enable service users to receive knowledge of both irrigation engineering and innovative agriculture from one training centre.

3.2.2 Current Capacity of the Existing Governmental Training Centres

(1) Existing Agricultural Training Centres run by the Government

There are mainly three existing governmental agriculture training centres related to farming agriculture: namely, Yei Crop Training Centre (Yei CTC) in Central Equatoria State, Kapuri Agricultural and Technology Transfer Centre (KATTC) in Central Equatoria State and Nzara Agriculture Technology Training Centre (NATTC) in Western Equatoria State. However, because of budget limitation, KATTC has not conducted any training for the last three years. In addition, since 2007, NATTC has not conducted any training due to the withdrawal of USAID from the Southern Sudan Agriculture Revitalization Program (SSARP) (In the past, it provided some courses such as food processing and post-harvest handling.). Therefore, among the aforementioned training centres, only Yei CTC is currently in operation.

(2) Current Conditions and Characteristics of Yei CTC

1) Human Resource

Based on the questionnaire survey conducted by the IDMP Study Team as well as the information provided by CAMP Task Team, the number of the staff is 56: 11 classified staff (1 principal and 10 management/administration staff) and 45 unclassified staff, such as cooks, cleaners, farm workers, drivers and security guards. Moreover, 9 instructors is currently working at Yei CTC (Yei CTC relies on part-time instructors, instead of hiring permanent trainers.).

Regarding the certificates of the classified staff, only 1 staff has a university degree, 6 staff have diplomas and the rest of them have some certificates. No training is provided for the CTC staff by the government, whereas they demand constant training including refresher courses to improve and update their technical knowledge.

Regarding the years of their working experience, all the classified staff have more than 5-year working experiences (5 classified staff have been working over 20 years). Regarding the instructors, 6

instructors joined Yei CTC only a couple of years ago.

2) Equipment and Facilities

Yei CTC has 3 tractors, 2 plagues, 1 narrower, 1 planter and 1 sprayer as its own equipment (2 tractors are operational, but they lack spare parts and need maintenance.).

Regarding the facilities, they have 71-feddan demonstration farm (half of the area is currently occupied by the returnees), one conference hall with the capacity of 400 people, three lecture halls which have 1,620 m² in total, ten office rooms, one library, one cafeteria and four dormitories with 90 beds for trainees. The conference hall and one of the lecture halls are in a good condition, while the remaining two lecture halls and the dormitories need some renovation.

3) Training Course Provided by Yei CTC

The main course currently provided by Yei CTC is a three-month agriculture/agribusiness extension course, targeting agriculture extension workers employed by the government, secondary school graduates, NGOs and farmers, but it is conducted only once a year (29 people were trained in 2010.). Remaining courses are tailored based on demand, targeting farmers.

According to the questionnaire survey conducted by the IDMP Study Team, Yei CTC requires the training/teaching materials to enable farmers to learn practical knowledge, through good demonstration farms and up-to-date technology demonstration. Moreover, Yei CTC is aware of the necessity of providing short courses that address farmers' day-by-day problems and those related to management of high value crops (eg. Reusing management for vegetable, vegetable field management, post-harvest management and etc.), as well as the necessity of conducting training for farmers in their communities and on their farms.

4) Recent Support by Development Partners

The Dutch government is supporting Yei CTC to establish a 9-12 months certificate accredited course. The new curriculum will include not only crop production components but also livestock production and scientific knowledge of agriculture. The Dutch government also provides technical support to improve teaching skills. Moreover, through support by JICA, a training component about rice was added to the training courses. Besides, GIZ provided training for two CTC staff, regarding value chain.

5) Coordination with the relevant ministries/organizations

Yei CTC Staff salaries are provided by the Ministry of Agriculture, Forestry, Cooperatives and Rural Development (MAFCRD), whereas all other running costs are generated through its own efforts. Moreover, Yei CTC has no formal partnership with extension officers, except through provision of tractor services to farmers.

Table 3.2.1 Summary of the current resources of Yei CTC

S/N	Item	Highlight	Note
1	Human Resources	1) 56 staff: 11 Classified Staff and 45 Unclassified Staff	➤ Besides the 56 staff, 9 part-time instructors have been hired.
2	Equipment and Facilities	1) Equipment: 3 tractors, 2 plagues, 1 narrower, 1 planter and 1 sprayer 2) Facilities: a 71-feddan demonstration farm, 1 conference hall, 3 lecture halls, 10 office rooms, 1 library, 1 cafeteria and 4 dormitories	➤ 2 tractors are operational, but they lack spare parts and need maintenance. ➤ Half of the area of the demonstration farm is currently occupied by the returnees. ➤ 2 lecture halls and the dormitories need some renovation.
3	Training Course	1) Regular Training Course: three-month agriculture/agribusiness extension course 2) Other Course: Tailored Course based on demand, targeting farmers	➤ The regular course is conducted only once a year (only 29 people were trained in 2010.).
4	Budget	1) Annual Budget: US\$ 700,000 (2011)	

(3) Comparison between Establishment of a New Irrigation and Drainage Training Centre (IDTC) and Improvement of Yei CTC

For the comparison between the establishment of a new irrigation training centre and improvement of Yei CTC, strengths, weaknesses, opportunities and threats (SWOT) involved in the two cases has been considered by adopting the SWOT analysis, as shown in the following table.

Table 3.2.2 Results of the Comparison

Newly Established Irrigation Training Centre	Improved Yei CTC
Strengthens	
<ul style="list-style-type: none"> • ITC (irrigation training centre) can be allocated in the best location (e.g. command areas in the priority project sites such as Jebel Lado, which has easy access from the capital city (30 mins by car)). • The new ITC can easily demonstrate to farmers in the scheme how to do irrigation farming in the scheme. • The coordination between the new ITC and extension workers in the scheme is easily established. • Field training on irrigation farming is easily conducted. • The new ITC can organize study tours on irrigation farming. • The new ITC can be installed together with the irrigation scheme. • Easy to develop business model/plan of the ITC (e.g. agricultural machines rental, research contract(soil stricture, construction materials, etc)) 	<ul style="list-style-type: none"> • The cost is lower than that of establishing a new ITC. • Yei CTC has accumulated a certain amount of knowledge on agriculture related training. • Yei CTC is equipped with accommodation facilities, agricultural machineries. • Yei CTC has one regular curriculum on agricultural extension. • Yei CTC has obtained some support from Development Partners (DPs) for improvement of training curriculum. • 9 part-time tutors are working for the CTC.
Weakness	
<ul style="list-style-type: none"> • Improvement of ITC depends on implementation of the Priority Project. • Construction and equipment fee will be higher than that of Yei CTC Improvement plan. • Training and demonstration farms of New ITC will reduce the beneficial area of the scheme • New organization must be established • All the staff must be allocated. 	<ul style="list-style-type: none"> • Yei CTC does not have sufficient irrigation facilities and equipment. • Water resource for irrigation is limited in this area. • It takes more than 6 hours to travel by car from Juba even in dry seasons (Remote from Juba. So it is not so easy for service users to access this CTC.). • The CTC is not located in priority areas identified by IDMP. • The weak coordination between the CTC and extension workers.
Opportunities	
<ul style="list-style-type: none"> • The priority projects facilities can be utilized by the ITC. • MEDIWR and MAFCRD are aware of the importance of human resource development related to irrigation. 	<ul style="list-style-type: none"> • CAMP targets the straightening of this CTC as a very important centre of agricultural training. • Institutional Capacity Development for this CTC can be done in collaboration with a CAMP project. • Yei CTC has relationship with DPs. • MEDIWR and MAFCRD are aware of the importance of human resource development related to irrigation.
Threats	
<ul style="list-style-type: none"> • This Irrigation Training Centre project cannot be done without implementation of irrigation development project. 	<ul style="list-style-type: none"> • This Training Centre Improvement project cannot be done without implementation of irrigation development project.

The following table is the highlights of the SWOT analysis, showing the key strengths, the critical weakness, the key opportunities and the critical threats.

Table 3.2.3 Highlights of the SWOT Analysis Results

Newly Established Irrigation Training Centre	Improved Yei CTC
Key Strengths	
<ul style="list-style-type: none"> • This will be done together with development of irrigation schemes. • Easy access from MEDIWR and MAFCRD HQs • Easy access for people all over the country • Information can be easily disseminated nationwide 	<ul style="list-style-type: none"> • The cost is lower than that of establishing a new ITC. • Some accumulated knowledge and experience including training curriculums.
Critical Weakness	
<ul style="list-style-type: none"> • The cost is a lot more expensive than that of improvement of Yei CTC. 	<ul style="list-style-type: none"> • The CTC is located more than 6-hours driving distance from Juba even in the dry season. • Irrigation facilities are not easily installed in the compound of the CTC, because water resource for irrigation is limited in this area. • The CTC is not located in priority areas identified by IDMP.
Key Opportunities	
<ul style="list-style-type: none"> • MEDIWR and MAFCRD are aware of the importance of human resource development related to irrigation. 	<ul style="list-style-type: none"> • CAMP targets the straightening of this CTC as a very important centre of agricultural training. • MEDIWR and MAFCRD are aware of the importance of human resource development related to irrigation.
Critical Threats	
<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • None

By considering the results of the SWOT Analysis, the establishment of a new irrigation training centre will be proposed, because of the following points:

- a) The new IDTC will be installed right next to an irrigation scheme;
- b) The new IDTC will have easy access for famers and other service users all over the country than Yei CTC;
- c) The information on irrigated farming is easily disseminated from the new IDTC;
- d) The new IDTC can be installed as a part of the irrigation scheme development package;
- e) Yei CTC has the difficulty of irrigation facilities being installed in its compound, due to surface water resource; and
- f) MEDIWR and MAFCRD have been aware of necessity of irrigation specific training.

(4) Comparison between Establishment of a New IDTC and ARDI

Amadi RDI is a governmental training institution which mainly provides training courses concerning rural development, cooperative development and so on. Approximately 30 community development officers and 30 cooperative officers are trained every year. Amadi RDI receives not only staff salaries but also some operational funds from MAFCRD.

Based on situation analysis conducted by the CAMP TT in 2013 and interview surveys conducted by the IDMP TT in 2015, they are newly preparing one-year certificate courses on the WASH sector as well as irrigation, with the support of the Dutch government. The one-year certificate courses are targeting 1) water technicians, 2) irrigation technicians, 3) sanitation technicians, 4) community mobilizers and 5) water analysts. The courses consist of 6 compulsory modules and 3-month technical modules based on the specialities of each target technician. The detail contents of the training courses, especially the ones on irrigation, are not very clear at this moment (they are going to be developed from December, 2015.).

However, according to the MEDIWR staff that IDMP TT interviewed, he assumed that the target government technicians would be the ones whose grade is lower than 10 and that the module on irrigation would focus on smallholder irrigation technics (e.g. bucket irrigation), which can be autonomously practiced by farmers. The IDMP TT has got the impression that the new courses would be useful to foster human resource including NGOs and non-governmental entities, who can promote community development in terms of water.

At the moment, new buildings are being constructed for the new training courses; and the existing buildings are being renovated (building construction and renovation will be completed by July, 2015). Besides, staff training for the new training courses has been conducted.

3.3 HRD Monitoring and Feedback System Establishment Project

(1) Rationales

Qualified engineers and extension workers will be one of the essential factors for the success of future irrigation development. MEDIWR, MAFCRD and most of the other key stakeholders related to irrigation development have allocated required officers for irrigation development. However, based on the CNA survey results, it can be clarified that the majority of the officers need to enhance their technical competencies of engineering and innovated agricultural fields for irrigation development, because they have not got opportunities of enhancement of their own competencies. In this account, IDMP HRIDIP has been formulated to indicate directions and methods of HRD on future irrigation development in RSS.

As mentioned above, IDMP HRD is realized mainly through provision of on-the-job and off-the-job training. Furthermore, achievements of the training need to be ensured, and the personal competences need to be enhanced continuously. Therefore, the HRD monitoring and feedback system needs to be established to make IDMP HRD possible together with training provision.

(2) Target

MEDIWR has a training unit for enhancement of competencies of officers to improve their service deliveries. The HRD Monitoring and Feedback System will be established and operated by the unit; and the officers working in the directorates of MEDWIR that belonged to the previous MWRI structure will be set as the target of the system.

(3) The Expected Objective and Functions for Monitoring and Feedback System

The expected objective of the system is "Ensuring human resource capacity development through establishment of the HRD monitoring and feedback system". To achieve this objective, the following four (4) outputs should be produced for the establishment of the system.

- i.) The HRD monitoring and feedback system designed
- ii.) Improvement of ICT facilities
- iii.) Installation of ICT equipment
- iv.) System operation

(4) Project Activities

The activities related to each output are shown in Table 3.3.1. The main activities will be conducted by MEDIWR officers and each activity will be supported by a specialist for three (3) years after the mobilization of the project. The project logical frame work are shown attachment 4.

Table 3.3.1 Project Activities

Outputs	Activities
1. The HRD monitoring and feedback system designed	1) Designing the HRD monitoring and feedback system in terms of both structural and non-structural components, and obtaining the approval from the system establishment/operation board 2) Clarification of the roles and responsibilities for each target officer regarding irrigation development 3) Development of formats (e.g. a personal working and training record format) to be applied in the system
2. Improvement of ICT facilities	1) Designing facilities based on %activity1-1)+ 2) Construction of necessary facilities for the system
3. Installation of ICT equipment	1) Planning for procurement of necessary equipment based on %activity1-1)+ 2) Procurement and installation of the equipment
4. System operation	1) Conducting workshops for trainees and supervisors 2) Distribution of formats to target officers 3) Monthly guidance and support for officers on how to fill the formats 4) Supporting supervisors for evaluating submitted personal working and training records and giving feedback to each target officer 5) Management of the personal working and training records

(5) Necessary Inputs and Cost Estimate

Estimated project cost is shown in the table below. MEDIWR Officers' salaries and allowances and other costs related to daily operation of the ministry are not included in the cost estimate. The duration of the project is three (3) years. After that, the HRD monitoring and feedback system will be operated with the budget of the ministry.

Table 3.3.2 Project Cost Estimate

Input Items	1st Year			2nd Year			3rd Year			Total Cost(US\$)
	Volume	Unit-cost	Cost(US\$)	Volume	Unit-cost	Cost(US\$)	Volume	Unit-cost	Cost(US\$)	
1. Specialist										
HRD Specialist1	7	25,000	175,000	3	25,000	75,000	4	25,000	100,000	350,000
HRD Specialist2	8	20,000	160,000	4	20,000	80,000	5	20,000	100,000	340,000
Architecture	4	20,000	80,000	-	20,000		-	20,000		80,000
ICT Specialist	3	20,000	60,000	-	20,000		-	20,000		60,000
Irrigation Engineer	1.5	20,000	30,000	1	20,000	20,000	1	20,000	20,000	70,000
River Engineer	1.5	20,000	30,000	1	20,000	20,000	1	20,000	20,000	70,000
Water Supply Engineer	1.5	20,000	30,000	1	20,000	20,000	1	20,000	20,000	70,000
Project Monitoring Specialist	1.5	20,000	30,000	1	20,000	20,000	1	20,000	20,000	70,000
2. facilities Constriction	set		140,000							
3. Equipment Procurement	set		85,000							
4. Other Operation Cost	set		12,000			12,000			12,000	36,000
Tota Cost (US\$)			832,000			247,000			292,000	1,146,000

(6) Project Implementation Plan

1) Project Implementation Structure

The figure below shows the project implementation structure. The project implementation unit (PIU), which is the main actor of this project, consists of the staff of Training Unit, a HRD specialist and an IT specialist. The DGs from each target directorate will provide overall supervision and approval. Moreover, a specialist team will be hired to help the PIU implement the project.

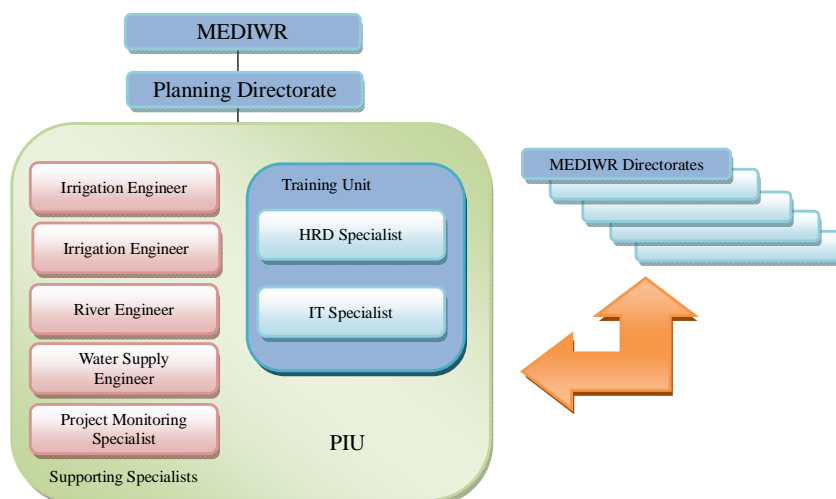


Figure 3.3.1 Project Implementation Structure

2) Time Schedule of the Project

The project is divided into two (2) phases: ‘Preparation Phase’ and ‘System Operation Phase’. In the preparation phase, the system will be designed in terms of both structural and non-structural components, and facilities and equipment for establishing the system will be installed. In the system operation phase, the system operation will be started, monitored and improved. Time schedule of the project activities are shown in Table 3.3.3.

Table 3.3.3 Time Schedule of the Project Activities

Phase	Activities	1st Year	2nd Year	3rd Year	4th Year	After 4th Year
1.Preparation	1-1.System Design and Establishment	██████████				
	1-2.Orientation for Trainees and Supervisor		▲	▲	▲	
	1-3.Construction of facilities	██████████				
	1-4.Installation of Equipment	██████████				
2.Operation	2-1.Priodical Monitoring by Target Officers		██████████	██████████	██████████	██████████
	2-2.Evaluation of Annual Achievements		▲	▲	▲	▲
	2-3.Feedback for Activities of Next Year		▲	▲	▲	▲

3.4 Governance and Regulatory Aspects of the Institutional Development (ID)

For establishment and capacity building of such types of institutions, please refer to: (1) ANNEX 5, Guideline 1: Institutional Arrangements for Irrigation Development & Management; and (2) ANNEX 5, Guideline 9: Irrigation Scheme Management Establishment.

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APPENDIX - 1

EXPECTED MAJOR COMPETENCIES FOR MAIN ACTORS

APPENDIX - 1: EXPECTED MAJOR COMPETENCIES FOR MAIN ACTORS

Actor	Major Required Competency		
	Short Term	Medium Term	Long Term
MEDIWR and MAFCRD Engineer	<p>General Knowledge of Irrigation development</p> <ul style="list-style-type: none"> • Understanding of all the procedures for irrigation development • Understanding of the main stakeholders' roles and responsibilities • Adaptation of cases of irrigation projects in other countries to RSS <p>Hydro-Met</p> <ul style="list-style-type: none"> • Understandings of measuring methods of the hydro-met observation equipment • Understandings of recording methods of the measured data • Understandings of record-keeping methods of the recordings • Understandings of hydro-met data analysis methods (e.g. regression analysis, multivariate statistics) • Understandings of how to use static analysis computer software • Understandings of analysis method of high and low river water discharge • Understandings of how to use hydrological analysis computer software <p>Irrigation Facilities Design</p> <ul style="list-style-type: none"> • Understandings of functions and configurations of major equipment (e.g. pump, electric supply, gate) • Understandings of functions and configurations of major facilities (e.g. intake falsities, canals, diversion facilities, box culverts) • Understandings of major design standards • Understandings of structure calculation and hydrological analysis • Understandings of how to use CAD computer software • Understandings of types of engineering services and their unit prices • Understandings of types of construction services and their units price • Understandings of necessary equipment and procurement costs of each equipment • Understandings of indirect costs • Understandings of technical specifications of design works • Understandings of procedures of designing <p>Topographical and Geological Survey</p> <ul style="list-style-type: none"> • Understandings of types of Topographical surveys 	<p>Same as on the left, and as follows:</p> <p>Knowlegde and skill of techical traing for engineers of state governments, counties and other stakeholders.</p> <p>Knowlegde of contracts and techical specification for engineering fairms and contractors.</p>	<p>Same as on the left</p>

Actor	Major Required Competency		
	Short Term	Medium Term	Long Term
MEDIWR and MAFCRD Engineer	<ul style="list-style-type: none"> • Understandings how to identify Topographical survey areas and/or routes based on facility allocation images • Understandings how to develop technical specifications • Understandings of how to identify Geologic survey points and/or routes based on facility allocation images • Understandings of how to develop technical specifications Operation and Maintenance for Irrigation Schemes • Understanding of structures of major irrigation facilities • Understanding of how to operate water distribution control facilities • Understanding of how to maintain major irrigation facilities • Understanding of roles and responsibilities of the stakeholders for facility operation and maintenance • Understanding of operation and maintenance manuals provided by equipment manufacturers • Understanding of roles and responsibilities of the stakeholders for equipment operation and maintenance Construction Supervision of Irrigation Facilities • Understanding of construction supervision in terms of qualities, volume and time management (construction performance control) Project Monitoring and Evaluation for Irrigation Projects • Understanding of M&E methods and periods • Understanding of monitoring items for irrigation development projects • Understanding of feedback systems 		
MAFCRD Agronomist	<p>General Knowledge of Irrigation development</p> <ul style="list-style-type: none"> • Understanding of all the procedures for irrigation development • Understanding of the main stakeholders' roles and responsibilities • Adaptation of cases of irrigation projects in other countries to RSS <p>Farmers' Organization</p> <ul style="list-style-type: none"> • Understanding of cases of WUAs in other countries • Understanding of roles and responsibilities of WUAs in irrigation schemes • Understanding of roles and activities of WUAs • Understanding of methods for strengthening WUAs • Understanding of management methods for WUAs • Understanding of training and supporting methods for WUA <p>Innovative Irrigated Agriculture</p> <ul style="list-style-type: none"> • Knowledge of agricultural mechanization: 	<p>Same as on the left, and as follows:</p> <p>Knowlegde and skill of techical traing for extencion workers of state governments, counties and other stakeholders.</p>	<p>Same as on the left, and as follows:</p> <p>Knowlegde of contracts and techical specification for extencion survice counpany, if nessesaly.</p>
MAFCRD	<ul style="list-style-type: none"> • Knowledge of innovative agricultural practices other than 		

Actor	Major Required Competency		
	Short Term	Medium Term	Long Term
Agronomist	<ul style="list-style-type: none"> the mechanization Knowledge of on-farm water management 		
MAFCRD Community Development Specialist	<ul style="list-style-type: none"> General Knowledge of Irrigation development Understanding of all the procedures for irrigation development Understanding of the main stakeholders' roles and responsibilities Adaptation of cases of irrigation projects in other countries to RSS Farmers' Organization Understanding of cases of WUAs in other countries Understanding of roles and responsibilities of WUAs in irrigation schemes Understanding of roles and activities of WUAs Understanding of methods for strengthening WUAs Understanding of management methods for WUAs Understanding of training and supporting methods for WUA Operation and Maintenance for Irrigation Schemes Understanding of structures of major irrigation facilities Understanding of how to operate water distribution control facilities Understanding of how to maintain major irrigation facilities Understanding of roles and responsibilities of the stakeholders for facility operation and maintenance Understanding of operation and maintenance manuals provided by equipment manufacturers Understanding of roles and responsibilities of the stakeholders for equipment operation and maintenance 	<p>Same as on the left, and as follows:</p> <p>Knowledge and skill of technical training for extension workers of state governments, counties and other stakeholders.</p>	<p>Same as on the left, and as follows:</p> <p>Knowledge of contracts and technical specification for service company for WUAs, if necessary.</p>
State Line Ministry of MEDIWR Engineer	<ul style="list-style-type: none"> General Knowledge of Irrigation development Understanding of all the procedures for irrigation development Understanding of the main stakeholders' roles and responsibilities Adaptation of cases of irrigation projects in other countries to RSS 	<ul style="list-style-type: none"> General Knowledge of Irrigation development Understanding of all the procedures for irrigation development Understanding of the main stakeholders' roles and responsibilities Adaptation of cases of irrigation projects in other countries to RSS General Knowledge of Hydro-Met Irrigation Facilities Design Understandings of functions and configurations of major equipment (e.g. pump, electric supply, gate) Understandings of functions and configurations of major facilities (e.g. intake facilities, canals, diversion facilities, box culverts) Understandings of major design standards Understandings of structure calculation and hydrological 	<p>Same as on the left, and as follows:</p> <p>Knowledge and skill of technical training for engineers of counties and other stakeholders.</p> <p>Knowledge of contracts and technical specification for engineering firms and contractors.</p>
State Line			

Actor	Major Required Competency		
	Short Term	Medium Term	Long Term
Ministry of MEDIWR Engineer		<ul style="list-style-type: none"> analysis • Understandings of how to use CAD computer software • Understandings of types of engineering services and their unit prices • Understandings of types of construction services and their units price • Understandings of necessary equipment and procurement costs of each equipment • Understandings of indirect costs • Understandings of technical specifications of design works • Understandings of procedures of designing Topographical and Geological Survey • Understandings of types of Topographical surveys • Understandings how to identify Topographical survey areas and/or routes based on facility allocation images • Understandings how to develop technical specifications • Understandings of how to identify Geologic survey points and/or routes based on facility allocation images • Understandings of how to develop technical specifications Operation and Maintenance for Irrigation Schemes • Understanding of structures of major irrigation facilities • Understanding of how to operate water distribution control facilities • Understanding of how to maintain major irrigation facilities • Understanding of roles and responsibilities of the stakeholders for facility operation and maintenance • Understanding of operation and maintenance manuals provided by equipment manufacturers • Understanding of roles and responsibilities of the stakeholders for equipment operation and maintenance Construction Supervision of Irrigation Facilities • Understanding of construction supervision in terms of qualities, volume and time management (construction performance control) Project Monitoring and Evaluation for Irrigation Projects • Understanding of M&E methods and periods • Understanding of monitoring items for irrigation development projects • Understanding of feedback systems 	
State Line	General Knowledge of Irrigation development	Same as on the left, and as follows:	Same as on the left, and as follows:

Actor	Major Required Competency		
	Short Term	Medium Term	Long Term
Ministry of MAFCRD Extencion wokers	<ul style="list-style-type: none"> · Understanding of all the procedures for irrigation development · Understanding of the main stakeholders' roles and responsibilities · Adaptation of cases of irrigation projects in other countries to RSS Farmers' Organization · Understanding of cases of WUAs in other countries · Understanding of roles and responsibilities of WUAs in irrigation schemes · Understanding of roles and activities of WUAs · Understanding of methods for strengthening WUAs · Understanding of management methods for WUAs · Understanding of training and supporting methods for WUA Innovative Irrigated Agriculture · Knowledge of agricultural mechanization: · Knowledge of innovative agricultural practices other than the mechanization · Knowledge of on-farm water management 	<p>Knowlegde and skill of techical traing for extencion workers of counties and other stakeholders.</p>	<p>Knowlegde of contracts and techical specification for extencion survice counpany, if nessesaly.</p>
State Line Ministry of MAFCRD Comunity Development Officers	<p>General Knowledge of Irrigation development</p> <ul style="list-style-type: none"> · Understanding of all the procedures for irrigation development · Understanding of the main stakeholders' roles and responsibilities · Adaptation of cases of irrigation projects in other countries to RSS Farmers' Organization · Understanding of cases of WUAs in other countries · Understanding of roles and responsibilities of WUAs in irrigation schemes · Understanding of roles and activities of WUAs · Understanding of methods for strengthening WUAs · Understanding of management methods for WUAs · Understanding of training and supporting methods for WUA Innovative Irrigated Agriculture · Knowledge of agricultural mechanization: · Knowledge of innovative agricultural practices other than the mechanization Operation and Maintenance for Irrigation Schemes · Understanding of structures of major irrigation facilities · Understanding of how to operate water distribution control facilities · Understanding of how to maintain major irrigation facilities 	<p>Same as on the left, and as follows:</p> <p>Knowlegde and skill of techical traing for extencion workers of counties and other stakeholders.</p>	<p>Same as on the left, and as follows:</p> <p>Knowlegde of contracts and techical specification for survice counpany for WUAs, if nessesaly.</p>
State Line	<ul style="list-style-type: none"> · Understanding of roles and responsibilities of the 		

Actor	Major Required Competency		
	Short Term	Medium Term	Long Term
Ministry of MAFCRD Comunity Development Officers	<ul style="list-style-type: none"> stakeholders for facility operation and maintenance Understanding of operation and maintenance manuals provided by equipment manufacturers Understanding of roles and responsibilities of the stakeholders for equipment operation and maintenance 		
County Engineers	<ul style="list-style-type: none"> General Knowledge of Irrigation development Understanding of all the procedures for irrigation development Understanding of the main stakeholders' roles and responsibilities Adaptation of cases of irrigation projects in other countries to RSS 	<ul style="list-style-type: none"> General Knowledge of Irrigation development Understanding of all the procedures for irrigation development Understanding of the main stakeholders' roles and responsibilities Irrigation Facilities Design <ul style="list-style-type: none"> Understandings of functions and configurations of major equipment (e.g. pomp, electric supply, gate) Understandings of functions and configurations of major facilities (e.g. intake falsities, canals, diversion facilities, box culverts) Topographical and Geological Survey <ul style="list-style-type: none"> Understandings of types of Topographical surveys Understandings how to identify Topographical survey areas and/or routes based on facility allocation images Understandings how to develop technical specifications Understandings of how to identify Geologic survey points and/or routes based on facility allocation images Understandings of how to develop technical specifications Operation and Maintenance for Irrigation Schemes <ul style="list-style-type: none"> Understanding of structures of major irrigation facilities Understanding of how to operate water distribution control facilities Understanding of how to maintain major irrigation facilities Understanding of roles and responsibilities of the stakeholders for facility operation and maintenance Understanding of operation and maintenance manuals provided by equipment manufacturers Understanding of roles and responsibilities of the stakeholders for equipment operation and maintenance Construction Supervision of Irrigation Facilities <ul style="list-style-type: none"> Understanding of constriction supervision in terms of qualities, volume and time management (construction performance control) Project Monitoring and Evaluation for Irrigation Projects <ul style="list-style-type: none"> Understanding of M&E methods and periods Understanding of monitoring items for irrigation development projects Understanding of feedback systems 	<p>Same as on the left, and as follows:</p> <p>Knowlegde of contracts and techical specification for engineering fairms and contractors.</p>
County	General Knowledge of Irrigation development	General Knowledge of Irrigation development	Same as on the left, and as follows:

Actor	Major Required Competency		
	Short Term	Medium Term	Long Term
Extencion Workers	<ul style="list-style-type: none"> • Understanding of all the procedures for irrigation development • Understanding of the main stakeholders' roles and responsibilities • Adaptation of cases of irrigation projects in other countries to RSS 	<ul style="list-style-type: none"> • Understanding of all the procedures for irrigation development • Understanding of the main stakeholders' roles and responsibilities • Adaptation of cases of irrigation projects in other countries to RSS Farmers' Organization <ul style="list-style-type: none"> • Understanding of cases of WUAs in other countries • Understanding of roles and responsibilities of WUAs in irrigation schemes • Understanding of roles and activities of WUAs • Understanding of methods for strengthening WUAs • Understanding of management methods for WUAs • Understanding of training and supporting methods for WUA Innovative Irrigated Agriculture <ul style="list-style-type: none"> • Knowledge of agricultural mechanization: • Knowledge of innovative agricultural practices other than the mechanization • Knowledge of on-farm water management Operation and Maintenance for Irrigation Schemes <ul style="list-style-type: none"> • Understanding of structures of major irrigation facilities • Understanding of how to operate water distribution control facilities • Understanding of how to maintain major irrigation facilities • Understanding of roles and responsibilities of the stakeholders for facility operation and maintenance • Understanding of operation and maintenance manuals provided by equipment manufacturers • Understanding of roles and responsibilities of the stakeholders for equipment operation and maintenance 	<p>Knowlegde of contracts and techical specification for extencion survice counpany, if nessesaly.</p> <p>Knowlegde of contracts and techical specification for survice counpany for WUAs, if nessesaly.</p>

APPENDIX - 2

IDMP TRAINING PROGRAMMES

APPENDIX -2: IDMP TRAINING PROGRAMMES

(0) The List of Training for Irrigation Development

Category		Code	Name of Training
Off-the-job Training	Regular Based Training	1-1	General Training on Irrigation Development
		1-2	Irrigation Methods and Water Management
		1-3	Storage Facilities
		1-4	Irrigation Pumps
		1-5	Preventive Measures against Water Logging
		1-6	Soil and Water Conservation Structures
	Before Conducting Projects	2-1	Community Orientation on Irrigation Development
		2-2	Contract Management and Procurement
		2-3	Establishment and Enhancement of Farmers' Organizations
		2-4	Operation and Maintenance of Major Irrigation Facilities and Equipment
2-5		Innovative Agriculture under Irrigation	
On-the-job Training	OJT 1	Socio-economic Survey for Irrigation Development	
	OJT 2	Environmental and Social Consideration	
	OJT 3	Hydrology and Meteorology for Irrigation	
	OJT 4	Topographical and Geological Survey	
	OJT 5	Irrigation Facility Design	
	OJT 6	Economic and Financial Analysis	
	OJT 7	Construction Supervision	

(1) Off-the-job Training

1) Regular Based Training

Programme 1-1: General Training on Irrigation Development	
Description:	This training is designed for irrigation engineers to obtain general knowledge that is necessary to realize irrigation development.
Training Topics:	<ol style="list-style-type: none"> 1) Objectives of Irrigation Development 2) Benefits of irrigation projects (including deference between rain-fed and irrigated agriculture) 3) Procedures of Irrigation Development 4) Cases of irrigation projects in other countries and others 5) Facts considered in irrigation planning <ul style="list-style-type: none"> • Physical attributes of the land • Engineering design, planning and construction • Crop selection and agronomy • Cost-benefit analysis • Socio-economic issues • Environmental impacts • Necessary activities of each actor in irrigation projects • Implementation and management coordination structure 6) Types of Irrigation methods <ul style="list-style-type: none"> • Surface irrigation • Sprinkler irrigation • Drip irrigation • Sub-surface irrigation • Spate irrigation • Use of ground water for irrigation 7) Types of irrigation facilities and equipment <ul style="list-style-type: none"> • Small earth dams • Weirs • Subsurface dams • Sand dams • Other reservoirs

	<ul style="list-style-type: none"> • Dykes and other river bank protections • Cannels • Gates • Drainage facilities • Shallow well • Boreholes • Motorized Irrigation Pumps • Renewable energy and manual pumps <p>8) Site inspection to existing schemes 9) Lessons learnt (including negative impact mitigation)</p>
Target Trainees:	State engineers, county engineers, national government engineers (especially, freshman in concerned ministries), Agronomists, Extension workers, Community development officers, Cooperative officers
Responsible Training Providers:	Irrigation Training Centre (ITC), MEDIWR, MAFCRD
Duration of Training	<p>1) 10 days for State engineers, county engineers, national government engineers: 8-day lecture and 2-day site inspection/practice</p> <p>2) 2 days for Extension workers, Community development officers, Cooperative officers: 1-day lecture and 1-day site inspection/practice (simplified version of training)</p>

Programme 1-2: Irrigation Methods and Water Management

Description:	Government officials, especially extension workers, need to acquire knowledge concerning on-farm irrigation methods and water management. This training is to be conducted on a regular basis, mainly targeting extension workers and engineers employed by concerned state institutions.
Training Topics:	<p>1) Surface irrigation</p> <ul style="list-style-type: none"> • Overview of surface irrigation methods • Types of surface irrigation methods • Design and installation • Advantage and disadvantage • Operation and maintenance <p>2) Sprinkler irrigation</p> <ul style="list-style-type: none"> • Overview of sprinkler irrigation methods • Types of sprinkler irrigation methods • Design and installation • Advantage and disadvantage • Operation and maintenance <p>3) Drip irrigation</p> <ul style="list-style-type: none"> • Overview of drip irrigation methods • Types of drip irrigation methods • Design and installation • Advantage and disadvantage • Operation and maintenance <p>4) Sub-surface irrigation</p> <ul style="list-style-type: none"> • Overview of sub-surface irrigation methods • Types of sub-surface irrigation methods • Design and installation • Advantage and disadvantage • Operation and maintenance <p>5) Spate irrigation</p> <ul style="list-style-type: none"> • Overview of spate irrigation methods • Types of spate irrigation methods • Design and installation • Advantage and disadvantage • Operation and maintenance <p>6) Practice/site inspection in training farms</p>

Target Trainees:	Agronomists, Extension workers, State engineers, County engineers, National Government Engineers
Responsible Training Providers:	ITC
Duration of Training	10 days

Programme 1-3: Storage Facilities

Description:	In South Sudan, except for the Nile, the majority of revivers are seasonal ones; and thus, installation of storage facilities needs to be considered for utilization of water resource. This training is designed for engineers to acquire technical knowledge for installation of storage facilities for irrigation.
Training Topics:	<ol style="list-style-type: none"> 1) Small earth dams <ul style="list-style-type: none"> • Types of small earth dams • Design and installation • Operation and management 2) Weirs <ul style="list-style-type: none"> • Types of small earth dams • Design and installation • Operation and management 3) Subsurface dams <ul style="list-style-type: none"> • Types of small earth dams • Design and installation • Operation and management 4) Sand dams <ul style="list-style-type: none"> • Types of small earth dams • Design and installation • Operation and management 5) Other reservoirs 6) Case Study
Target Trainees:	State engineers, County engineers, National Government Engineers
Responsible Training Providers:	ITC
Duration of Training	5 days

Programme 1-4: Irrigation Pumps

Description:	Considering the topography of South Sudan, irrigation development cannot be done without pump equipment in quite a few areas. This training is designed for engineers to acquire technical knowledge for installation of irrigation pumps.
Training Topics:	<ol style="list-style-type: none"> 1) The basic knowledge about irrigation pumps 2) Terminology used in pump operating heads 3) Common types of irrigation pumps 4) Pump selection and installation 5) Operation and maintenance of pumping units 6) Site inspection to existing pump facilities 7) Case study
Target Trainees:	State engineers, County engineers, National Government Engineers
Responsible Training Providers:	ITC
Duration of Training	5 days

Programme 1-5: Preventive Measures against Water Logging

Description:	In South Sudan, especially during the rainy season, agricultural land is often affected by flooding. This training provides necessary knowledge for engineers to deal with water logging in agricultural land.
Training Topics:	<ol style="list-style-type: none"> 1) What is water logging? 2) In-field water management 3) Control of inflow from other water bodies

	<ol style="list-style-type: none"> 4) Control of ground-water inflows 5) Control of water from higher ground to lower grounds 6) Types of drainage systems 7) Methods of operation and maintenance of the facilities 8) Operation and Maintenance of Drainage Systems 9) Good practices in other countries
Target Trainees:	State engineers, County engineers, National Government Engineers
Responsible Training Providers:	ITC
Duration of Training	5 days

Programme 1-6: Soil and Water Conservation Structures	
Description:	In South Sudan, soil erosion or other environmental negative impacts cannot be often seen at this moment. However, considering the future irrigation development, mitigation to environment negative impacts is very important. This training provides necessary technical knowledge for installing soil and water conservation structures for minimizing soil erosion or other environmental impacts.
Training Topics:	<ol style="list-style-type: none"> 1) Significance of soil and water conservation 2) Types of conservation structures <ul style="list-style-type: none"> • Diversion ditches • Terraces • Artificial waterways • Gullies 3) Function of each structure 4) Design of each structure 5) Layout and construction of each structure 6) Operation and maintenance of each structure
Target Trainees:	State engineers, County engineers, National Government Engineers
Responsible Training Providers:	ITC
Duration of Training	5 days

2) Training to Be Conducted Before Project Implementation

Programme 2-1: Community Orientation on Irrigation Development	
Description:	Irrigation development should be done considering how to involve communities so that community's rights toward land or other assets can be protected. This training is designed to foster human resource that can implement irrigation development by communicating/coordinating with communities.
Training Topics:	<ol style="list-style-type: none"> 1) Benefits of irrigation projects for farmers 2) Deference between rain-fed and irrigated agriculture 3) Significance of Community Engagement in irrigation development and its methods, based on "Handbook on Community Engagement (David K. Deng, 2012)"
Target Trainees:	Concerned government officials (national, State, county), NGOs, Private companies
Responsible Training Providers:	ITC
Duration of Training	3 days

Programme 2-2: Contract Management and Procurement	
Description:	Government officials are expected to procure consulting/survey firms as well as construction companies to conduct preparatory surveys, design work and construction for irrigation development. This training provides necessary knowledge regarding contract management and procurement, targeting concerned government administrative officials.
Training Topics:	<ol style="list-style-type: none"> 1) Bid packaging 2) Detailed procedures for procurement methods 3) Preparation of bidding documents

	4) Bid opening 5) Bid evaluation 6) Award of contracts
Target Trainees:	Project Directors/Managers of Project Implementation Units under concerned governmental institutions, Administrators of concerned governmental institutions
Responsible Training Providers:	ITC, MEDIWR
Duration of Training	3 days

Programme 2-3: Establishment and Enhancement of Farmers' Organizations

Description:	Establishment of functional farmerø organizations (esp. Water Userø Associations (WUAs)) is the engine for operation and maintenance of irrigation scheme. This training is designed to foster human resource that can support farmers for establishment of functional WUAs.
Training Topics:	1) Objectives and roles famers' organizations (esp. Water Userø Associations) 2) Establishment and Management of Water Userø Associations (WUAs), including organizational management and accounting <ul style="list-style-type: none"> • Procedures of establishment of WUAs • Benefits of WUAs • Organizational Structures of WUAs • Roles and Responsibilities of WUAs in O&M of irrigation facilities and equipment • Provision of Support for WUAs 3) Supporting methods of activities of famers' organization
Target Trainees:	Agronomists, Extension workers of state institutions, Community Development Officers, Cooperative Officers, NGOs
Responsible Training Providers:	ITC, Amadi RDI
Duration of Training	5 days

Programme 2-4: Operation and Maintenance of Major Irrigation Facilities and Equipment

Description:	This training provides necessary technical/engineering knowledge of operation and maintenance of major irrigation facilities and equipment, which is the key for the sustainability of irrigation schemes.
Training Topics:	1) Structures and mechanisms of major facilities 2) Methods of operation and maintenance of major facilities and equipment (including control of canal seepage) 3) Operation and maintenance (O&M) activities (actor by actor) 4) Introduction of successful of Operation and Maintenance of Irrigation Systems in other countries
Target Trainees:	State Engineers, County Engineers, National Government Engineers
Responsible Training Providers:	ITC
Duration of Training	3 days

Programme 2-5: Innovative Agriculture under Irrigation

Description:	Innovative agriculture under irrigation is new to the majority of farmers in South Sudan. This training provides farmers in irrigation schemes necessary knowledge for managing innovative irrigated farming.
Training Topics:	1) Innovative irrigated agricultural practices 2) On-farm irrigation management 3) Basic Knowledge of agricultural machinery 4) Good practice in other countries 5) Site inspection to demonstration farms/existing irrigation schemes 6) Practice in training farms
Target Trainees:	Farmers in irrigation schemes
Responsible Training Providers:	ITC, Yei CTC and/or other agricultural training centres

Providers:	
Duration of Training	5 days

Programme 2-6: Promotion of Innovative Agriculture under Irrigation	
Description:	Innovative agriculture under irrigation is new to the majority of farmers in South Sudan. This training provides the concerned government officers necessary knowledge for promoting innovative agriculture under irrigation.
Training Topics:	<ol style="list-style-type: none"> 1) Knowledge of mechanized agriculture 2) Soil management techniques for sustainable use of farmland 3) Methods to cultivate newly introduced and developed varieties with high adaptability of heavy manuring, achievability of high yield and quality 4) Other common issues, such as pest/disease control
Target Trainees:	National, State and County Officers in charge of Agriculture
Responsible Training Providers:	ITC, Yei CTC and/or other agricultural training centres
Duration of Training	5 days

Programme 2-7: Project Monitoring and Evaluation for Irrigation development	
Description:	It is crucial to conduct project monitoring and evaluation (M&E) for effective and efficient implementation of irrigation development. This training will provide necessary knowledge of M&E for the concerned government officers.
Training Topics:	<ol style="list-style-type: none"> 1) Monitoring and Evaluation methods 2) Monitoring items/indicators for irrigation development projects 3) Feedback systems
Target Trainees:	National, State and County Officers in charge of Project Monitoring
Responsible Training Providers:	ITC
Duration of Training	5 days

(2) On-the-job Training

OJT 1: Socio-economic Survey for Irrigation Development	
Description:	Government officials are expected to procure/supervise consulting/survey farms to conduct socio-economic survey for irrigation development. They need to acquire necessary knowledge through on-the-job training.
OJT Topics:	<ol style="list-style-type: none"> 1) Procedures and methods for socio-economic survey 2) Survey items of socio-economic survey (e.g. community structure, population and demographic features, household number, means of livelihoods, land use and ownership, farming methods, cropping patterns, and so on) 3) Formulation of questionnaire/interview sheets
Target Trainees:	MEDIWR, MAFCRD and state engineers (esp. ones in project implementation units)

OJT 2: Environmental and Social Consideration	
Description:	Government officials are expected to procure/supervise consulting/survey farms to conduct IEAs and/or EIAs for irrigation development. They need to acquire necessary knowledge through on-the-job training.
OJT Topics:	<ol style="list-style-type: none"> 1) Introduction to environmental laws and policies of RSS and International Donor Agencies 2) Procedures and Implementation Methods of IEAs and EIAs based on the guidelines formulated by the IDMP 3) Activities and measures of environmental impact mitigation carried out in Irrigation Development Projects of other countries 4) Formulation of Environmental Management Plan 5) Environmental Monitoring for Irrigation Development
Target Trainees:	MEDIWR and state engineers (esp. ones in project implementation units)

OJT 3: Hydrology and Meteorology for Irrigation	
Description:	Hydrological and meteorological data are one of the basic criteria for irrigation project planning. Government officials are expected to acquire necessary knowledge through on-the-job training.
OJT Topics:	<ol style="list-style-type: none"> 1) Observation of hydro-met: <ul style="list-style-type: none"> ▪ Measuring methods of the hydro-met observation equipment ▪ Recording methods of the measured data ▪ Record-keeping methods of the recordings 2) Statistical analysis of hydro-met data: <ul style="list-style-type: none"> ▪ Hydro-met data analysis methods (e.g. regression analysis, multivariate statistics) ▪ Static analysis computer software 3) Hydrological simulation for river water discharge: <ul style="list-style-type: none"> ▪ Understandings of analysis method of high and low river water discharge ▪ Understandings of how to use hydrological analysis computer software
Target Trainees:	MEDIWR, state and county engineers

OJT 4: Topographical and Geological Survey	
Description:	Topographical and geological survey results are essential information for irrigation facility planning, design and construction. Government officials are expected to procure/supervise consulting/survey farms to conduct topographical and geological surveys. They need to acquire necessary knowledge through on-the-job training.
OJT Topics:	<ol style="list-style-type: none"> 1) Identification of topographical/geological survey methods and necessary survey areas/routes 2) Development of technical specification for surveyors
Target Trainees:	MEDIWR and state engineers (esp. ones in project implementation units)

OJT 5: Irrigation Facility Design	
Description:	Government officials are expected to procure/supervise consulting/survey farms and/or construction/design companies to conduct design work for irrigation development. They need to acquire necessary knowledge through on-the-job training.
OJT Topics:	<ol style="list-style-type: none"> 1) Requirements of an efficient irrigation system 2) Soil-water-plant relationship 3) Irrigation efficiency 4) Identifying an appropriate irrigation method 5) General rules on irrigation facility design 6) Structure calculation, 7) Design standards 8) Cost estimate 9) PC software operation
Target Trainees:	MEDIWR and state engineers (esp. ones in project implementation units)

OJT 6: Economic and Financial Analysis	
Description:	Government officials are expected to procure/supervise consulting/survey farms to conduct economic and financial analysis for irrigation development. They need to acquire necessary knowledge through on-the-job training.
OJT Topics:	<ol style="list-style-type: none"> 1) Identification of Project Costs 2) Identification of Project Benefits 3) "With" and "Without" Comparisons 4) Calculation of B/C and EIRR/FIRR
Target Trainees:	MEDIWR and state engineers (esp. ones in project implementation units)

OJT 7: Construction Supervision	
Description:	Government officials are expected to procure/supervise construction companies to conduct irrigation facility construction. They need to acquire necessary knowledge through on-the-job training.
OJT Topics:	<ol style="list-style-type: none">1) Orientation of Construction Standards in South Sudan2) Introduction of International Standards practiced in other countries3) Legal documents regulating activity of construction works and supervision applied in construction works.4) Performance Control (e.g. budget control, quality control and time management) of construction works5) Labour safety and sanitation in construction works.
Target Trainees:	MEDIWR and state engineers (esp. ones in project implementation units)

APPENDIX - 3

LOGICAL FRAMEWORK FOR IDTC PROJECT

APPENDIX - 3: LOGICAL FRAMEWORK FOR IDTC PROJECT

Logical Framework

Date: 15.07.2015

Ver. No.: 0-0

Project Name: Irrigation Training Centre (ITC) Project

Duration: 5 years

Implementation Agency: Donor Side:

South Sudan Side: MEDIWR in collaboration with MAFCRD

Project Area: Priority Irrigation Project Site in Jebel Lado

Target Group: Concerned Technical Officers of MEDIWR and MAFCRD

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Overall Goal</p>			
<p>To achieve sustainable irrigated agriculture and other productive uses, thereby improve food security and resilience, reduce poverty and contribute to economic growth and development</p>	<ul style="list-style-type: none"> • Agricultural production is stabilized (less affected by the seasonality) • Agricultural production is increased. • Irrigation schemes are developed and irrigated areas are expanded according to the IDMP target indicators. 	<ul style="list-style-type: none"> • FAO stat • Annual Irrigation Scheme Report • NBI Statistics 	
<p>Project Objective</p>			
<p>Promotion of innovative agriculture under irrigation through nation-wide human resource capacity development:</p>	<ul style="list-style-type: none"> • The Capacity of concerned engineers who have received training from the ITC is increased. • The Capacity of concerned extension officers who have received training from the ITC is increased. • The Capacity of concerned cooperative development officers who have received training from the ITC is increased. • Trained officers start provision of technical support in priority project areas • Farmers in priority project areas start practices of irrigated agriculture. • The stakeholders at the state level become familiar with innovative irrigated agriculture. 	<ul style="list-style-type: none"> • Annual Scheme Management Report • Personnel Evaluation Data • Hearing from supervisors • ITC Achievement Report • Hearing survey • Annual Scheme Management Report • Hearing from the state institutions 	<p>Other IDMP programmes will be implemented according to the schedule.</p> <p>Trained Engineers, Agronomists, extension workers and farmers will keep working for irrigation development.</p>
<p>Outputs</p>			
<p>Output 1_Promotion of innovative irrigated agriculture for RSS</p>	<p>(Output 1)</p> <ul style="list-style-type: none"> • Installation of demonstration farm • Monthly newsletter is issued by the ITC and disseminated to the stakeholders. • The media cover the information on innovative irrigated agriculture disseminated by the ITC. 	<ul style="list-style-type: none"> • Project Completion Report • ITC Achievement Report 	<p>Priority projects of IDMP will be implemented.</p>
<p>Output 2 Strengthening engineering capacities for governmental engineers/technicians (at the national, state and local levels)</p>	<p>(Output 2)</p> <ul style="list-style-type: none"> • Training and research facilities and equipment are installed. • Formulation of Training programmes for government officials concerned with irrigation development based on the identified training needs • Database on irrigation facilities is established and managed. • Training manuals and materials are developed based on the identified training needs. • Training for government officials is conducted by the ITCs.. • Applicability researches regarding engineering aspects of irrigation are conducted by the ITCs. 	<ul style="list-style-type: none"> • Project Completion Report • Training Programmes and plans • Training manuals and materials • Training Records • ITC Achievement Report 	

<p>Output 3 Strengthening technical capacities for extension workers (at the national, state and local levels)</p>	<ul style="list-style-type: none"> • Monthly newsletter is issued by the ITC and disseminated to the stakeholders. <p>(Output 3)</p> <ul style="list-style-type: none"> • Research and training farms and equipment are installed. • Formulation of Training programmes for extension officers, based on the identified training needs. • Training for extension officers will be conducted by the ITCs. • Database on innovative agriculture under irrigation is established and managed. • Training manuals and materials are developed based on the identified training needs. • Applicability researches regarding agricultural practice under irrigation will be conducted by the ITCs. • Monthly newsletter is issued by the ITC and disseminated to the stakeholders. • Development of Extension guidelines and tolls for farmers 	<ul style="list-style-type: none"> • Project Completion Report • Training Programmes and plans • Training manuals and materials • Training Records • ITC Achievement Report • Extension guidelines and toll 	
<p>Output 4 Strengthening organization capacities of Water Users Associations (WUAs)</p>	<p>(Output 4)</p> <ul style="list-style-type: none"> • Training facilities and equipment are installed. • Formulation of Training programmes for the officers who are assigned for organizational strengthening and establishment of WUAs, based on the identified training needs. • Training on organizational strengthening and establishment of WUAs is conducted by the ITCs. • Database on WUAs is established and managed. • Training manuals and materials are developed based on the identified training needs. • Monthly newsletter is issued by the ITC and disseminated to the stakeholders. • Development of Extension guidelines and tolls for WUAs 	<ul style="list-style-type: none"> • Project Completion Report • Training Programmes and plans • Training manuals and materials • Training Records • ITC Achievement Report • Extension guidelines and toll 	
<p>Output 5 Strengthening famers capacities (Supporting for irrigation scheme)</p>	<p>(Output 5)</p> <ul style="list-style-type: none"> • Formulation of Training programmes for the o famers who manage agriculture in irrigation schemes based on the identified training needs • Training manuals and materials are developed based on the identified training needs. • Training for farmers will be conducted by the ITCs. 	<ul style="list-style-type: none"> • Training Programmes and plans • Training manuals and materials • Training Records • ITC Achievement Report 	

Activities	Inputs	
<p>Activity 1-1: Irrigated demonstration farm managed and operated</p> <p>1-1-1 Development of demonstration farm improvement plan that consists of facilities and equipment</p> <p>1-1-2 Construction of the demonstration farm: Field preparation, Irrigation facility construction and others</p> <p>1-1-3 Procurement of the equipment to operate demonstration farm</p> <p>1-1-4 Development of annual operation and management plan of demonstration farm</p> <p>1-1-5 Operating demonstration farm within the scope of the plan</p>	<p>1) Government Personnel</p> <p>1-1) MEDIWR</p> <ul style="list-style-type: none"> - Project Director - Sub-Director/Irrigation Engineer1 - Trainer1: Irrigation Engineer2 - Trainer2: Structure Engineer - Trainer3: hydrologist - Trainer4: geologist - Assistants <p>1-2) MAFCRD</p> <ul style="list-style-type: none"> -Sub-Director/Master Trainer1 Agriculture -Master Trainer2 Agriculture - Master Trainer3 WUA -Assistants <p>1-3) O&M Staff</p> <p>2) Expert</p> <p>2-1) Construction Expert</p> <ul style="list-style-type: none"> - Project Manager - Irrigation Engineer - Facility Design Specialist - Architecture - Procurement Specialist <p>2-2) Training and research Expert</p> <ul style="list-style-type: none"> -Irrigation Facility Specialist -Civil Structural Specialist - Hydrologist - Agronomist - Extension Specialist - Training Specialist 	
<p>Activity1-2: Information transmitted nationwide</p> <p>1-2-1 Making newsletter that consists of plan, activities, achievements and other important information of irrigated agriculture</p> <p>1-2-2 Sending newsletters to the state and local governments</p> <p>1-2-3 Information transmission through mass medium</p>	<p>3) Office space and equipment for the project team</p> <ul style="list-style-type: none"> - Office space - Meeting space - Office equipment 	
<p>Activity 2-0: Preparation for operation of training for the national, states and local governmental irrigation engineers</p> <p>2-0-1 Construction of necessary facilities for training</p> <p>2-0-2 Procurement of the equipment to operate training</p> <p>2-0-3 Development of annual training plan for the engineers</p>	<p>4) Equipment and supplies for the ITC</p> <ul style="list-style-type: none"> - Agricultural Machines (including attachment) - Irrigation Equipment (Sprinklers, Drips and others) - PCs and other ICT Equipment - Research Equipment - Farm Equipment - Generator - Other Office Equipment for the ITC - Vehicles 1*4WD, 2*Pickup for the ITC 	
<p>Activity 2-1: Information on irrigation facilities collected and managed</p> <p>2-1-1 Development of regulation of administration and abolishment of collected information</p> <p>2-1-2 Currently collected information and data arrangement in accordance with the regulation</p> <p>2-1-3 Information and data collection</p> <p>2-1-4 Management of information and data based on the regulation</p>	<p>5) Project Operation costs</p>	
<p>Activity 2-2: Training needs identified for the engineer who are assigned for irrigation development at the National, State and Local levels</p> <p>2-2-1 Conducting periodic questionnaires and/or interview surveys to identify training needs for the engineers</p> <p>2-2-2 Feedback to contents of the training plan based on the result of the survey</p>		
<p>Activity 2-3: Training opportunities provided for the engineers/technicians as per the training needs</p> <p>2-3-1 Creation of Training Curriculums for the governmental engineers/technicians</p> <p>2-3-2 Recruiting the candidate national, state and local governmental irrigation engineers/technicians for training</p> <p>2-3-3 Conducting training</p> <p>2-3-4 Development of a training record keeping system and making training records</p>		

ANNEX-4

Activity 2-4: The ITC equipped with applicability research function regarding engineering aspects of irrigation

- 2-4-1 Selection of topics of applicability research from collected information and development needs
- 2-4-2 Development of annual research plan
- 2-4-3 Conducting applicability research on irrigation facilities
- 2-4-4 Feedback on the results of the research to development plan and excising schemes.

Activity 2-5: Information shared with stakeholder on irrigation development

- 2-5-1 Selection of desirable topics that are shared with stakeholders (National Gov., State Gov., Local Gov, related Central Gov, NGO, private company and others)
- 2-5-2 Making and distributing periodic activity reports for the stakeholders
- 2-5-3 Collection of requested research topics from the stakeholders and feedback to the next annual research plan

Activity 3-0: Preparation for the operation of training for extension officers

- 3-0-1 Construction of necessary facilities for training
- 3-0-2 Procurement of the equipment to operate training
- 3-0-3 Development of annual training plan for extension officers

Activity 3-1: Technical information collected and managed for practicing innovative agriculture under irrigation

- 3-1-1 Development of regulations on administration and abolishment of collected information
- 3-1-2 Information and data collection
- 3-1-3 Management of information and data based on the regulation

Activity 3-2: Training needs identified for the extension officers who are assigned for agricultural extension under irrigation

- 3-2-1 Conducting periodical questionnaires and/or interview surveys to identify training needs for the extension officers and the farmers
- 3-2-2 Feedback to contents of the training plan based on the result of the surveys

Activity 3-3: Training opportunities provided for the extension officers as per the training needs

- 3-3-1 Creation of Training Curriculums for the extension officers
- 3-3-2 Recruiting the candidate extension officers for training
- 3-3-3 Conducting training
- 3-3-4 Development of a training record keeping system and making training records

Activity 3-4: The ITC capacitated for applicability research regarding agricultural practice under irrigation

- 3-4-1 Selection of topics of applicability research from collected information and development needs
- 3-4-2 Development of annual research plan
- 3-4-3 Conducting applicability research on agricultural practice under irrigation
- 3-4-4 Feedback on the results of the research to development plan and excising schemes

Activity 3-5: Information shared with stakeholder on agricultural practice under irrigation

- 3-5-1 Selection of desirable topics that are shared with stakeholders (State Gov., Local Gov, related Central Gov, NGO, private company and others)
- 3-5-2 Making and distributing periodic activity reports for the stakeholders
- 3-5-3 Collection of requested research topics from the stakeholders and feedback to the next annual research plan

Activity 3-6: Extension guidelines and tools for farmers developed

- 3-6-1 Study on the existing extension materials for farmers
- 3-6-2 Development of draft extension guidelines and tools on irrigated agriculture
- 3-6-3 Experimental operation of extension services based on the draft extension guidelines and tools
- 3-6-4 Revision and finalization of the extension guidelines and tools

Activity 4-0: Preparation for operation of information collection and management of water users associations

- 4-0-1 Construction of necessary facilities for training
- 4-0-2 Procurement of the equipment to operate training
- 4-0-3 Development of an annual training plan for trainer of Water Users Associations
- 4-0-4 Development of annual training plans for the associations

Activity 4-1: Information on WUAs in other countries collected and managed

- 4-1-1 Development of regulations on administration and abolishment of collected information
- 4-1-2 Information and data collection
- 4-1-3 Arrangement of collected information and data in accordance with the regulation
- 4-1-4 Management of information and data based on the regulation

Activity 4-2: Training needs identified for the officers who are assigned for organizational strengthening and establishment of the associations

- 4-2-1 Conducting periodic questionnaires and/or interview surveys to identify training needs for the associations
- 4-2-2 Feedback on the result of the survey to the contents of the training plan

Activity 4-3: Training opportunities provided for the officers as per the training needs

- 4-3-1 Creation of Training Curriculums for the officers
- 4-3-2 Recruiting the trainers and associations
- 4-3-3 Conducting training
- 4-3-4 Making training records

Activity 4-4: Information shared with stakeholder

- 4-4-1 Selection of desirable topics that are shared with stakeholders (National Gov., State Gov., Local Gov, related Central Gov, NGO, private company and others)
- 4-4-2 Making and distributing periodic activity reports for the stakeholders
- 4-4-3 Collection of requested training topics from the stakeholders and feedback to the next annual training plan

Activity 4-5: Extension guidelines and tools for WUAs developed

- 4-5-1 Analysis of the collected information and data on WUAs in other countries
- 4-5-2 Study on the existing extension materials for establishment and strengthening of farmer's organizations
- 4-5-3 Development of draft extension guidelines and tools
- 4-5-4 Experimental operation of extension services based on the draft extension guidelines and tools
- 4-5-5 Revision and finalization of the extension guidelines and tools

Activity 5-1: Training needs identified for the famers who manage agriculture in irrigation schemes

- 5-1-1 Identification of necessity of study tours to demonstration farms (e.g. initial period of irrigation scheme)
- 5-1-2 Identification of necessity of specified training for famers (e.g. initial period of irrigation schemes)
- 5-1-3 Development of annual study tour and/or training plans, if necessary

Activity 5-2: Training opportunities provided as per training needs

- 5-2-1 Creation of training curriculums for farmers
- 5-2-2 Conducting the tour if necessary accordance with the annual plan
- 5-2-3 Conducting the training accordance with the annual plan
- 5-2-4 Making annual training records

Precondition

One IDMP Priority Project will be implemented either in Rejaf East or in Jebel Lado, together with this project.

Collaboration with other agricultural related training centres (e.g. Yei CTC and Amadi RDI) and CAMP projects

Candidate master trainers are selected and allocated for this project.

APPENDIX - 4

LOGICAL FRAMEWORK FOR MONITORING AND FEEDBACK SYSTEM ESTABLISH PROJECT

APPENDIX - 4: LOGICAL FRAMEWORK FOR MONITORING AND FEEDBACK SYSTEM ESTABLISH PROJECT

Logical Framework

Project Name: HRD Monitoring and Feedback System Establishment Project

Duration: 3 years

Date: 15/07/2015

Ver. No.: 0-0

Implementation Agency: Donor Side: To be decided

South Sudan Side: Planning Directorate, MEDIWR

Project Area: Juba, MEDIWR Office

Target Group: All the officers working in the directorates of MEDWIR that belonged to the previous MWRI structure

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Overall Goal</p> <p>Improvement of MEDIWR's water-sector service delivery for RSS nation*</p> <p>*This also contribute to promotion of capable human resource and institutions for effective and efficient irrigated agriculture and other productive uses development and management.</p>	<ul style="list-style-type: none"> The stakeholders of irrigation development in RSS acquire necessary knowledge of irrigation development and other water sector services. The stakeholders of irrigation development in RSS experience of irrigation development projects and other water sector services 	<ul style="list-style-type: none"> Hearing from MEDIWR, the relevant state institutions and other stakeholders MEDIWR annual reports MEDIWR project monitoring reports 	
<p>Project Objective</p> <p>Ensuring human resource capacity development through establishment of the HRD monitoring and feedback system</p>	<ul style="list-style-type: none"> Target MEDIWR officers receive necessary training on irrigation development, and other water sector services. The capacities of Target officers are enhanced. 	<ul style="list-style-type: none"> Training records Hearing survey Hearing from Directors and Target officers 	<ul style="list-style-type: none"> Irrigation Training Center Project is implemented according to the plan. The priority projects of IDMP are implemented as scheduled. Capacity development related to other water sector services is promoted.
<p>Outputs</p> <p>1. The HRD monitoring and feedback system designed</p>	<p>(Output 1)</p> <ul style="list-style-type: none"> Necessary facilities and equipment are designed. The roles and responsibilities of each target officer are clarified. Formats (e.g. a personal working and training record format) are developed. A HRD monitoring and feedback schedule is made. 	<ul style="list-style-type: none"> Project Completion Report Personal Job Description for the target officers Formats 	<p>MEDIWR keeps operating and managing the system autonomously.</p>

Logical Framework

Project Name: HRD Monitoring and Feedback System Establishment Project

Duration: 3 years

Date: 15/07/2015

Ver. No.: 0-0

Implementation Agency: Donor Side: To be decided

South Sudan Side: Planning Directorate, MEDIWR

Project Area: Juba, MEDIWR Office

Target Group: All the officers working in the directorates of MEDWIR that belonged to the previous MWRI structure

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>2. Improvement of ICT facilities</p> <p>3. Installation of ICT equipment</p> <p>4. System operation</p>	<p>(Output 2)</p> <ul style="list-style-type: none"> • Necessary facilities for the system are constructed. <p>(Output 3)</p> <ul style="list-style-type: none"> • Necessary ICT equipment is installed and functionalized. <p>(Output 4)</p> <ul style="list-style-type: none"> • Supervisors and target officers become capable of operating the system. • The developed formats are used by the target officers. • The Monthly guidance is mandated by MEDIWR. • The personal working and training records are managed properly in MEDIWR. 	<ul style="list-style-type: none"> • Project Completion Report • Hearing from the board • Project Completion Report • Hearing from the board • Hearing from the board and target officers • Workshop Records • Project Completion Report 	
Activities	Inputs		
<p>Output 1</p> <p>1-1 Designing the HRD monitoring and feedback system in terms of both structural and non-structural components, and obtaining the approval from the system establishment/operation board</p> <p>1-2 Clarification of the roles and responsibilities for each target officer regarding irrigation development</p> <p>1-3 Development of formats (e.g. a personal working and training record format) to be applied in the system</p> <p>Output 2</p> <p>2-1 Designing facilities based on "Activity1-1)"</p> <p>2-2 Construction of necessary facilities for the system</p> <p>Output 3</p> <p>3-1 Planning for procurement of necessary equipment based on</p>	<p>1) Government Personnel (MEDIWR)</p> <ul style="list-style-type: none"> - HRD Specialists - IT Specialists - Coordinators <p>2) Experts</p> <p>2-1) ICT Facility and Equipment Installation Experts</p> <ul style="list-style-type: none"> -Architecture - ICT Specialists <p>2-2) Project Implementation Supporting Experts</p> <ul style="list-style-type: none"> - HRD Specialists - Irrigation Engineer - River Engineer -Water Supply Engineer 		Precondition

ANN4: APP4-2

Annex 4 - Appendix 4: Logical Framework for Monitoring and Feedback System Establish Project

Logical Framework

Project Name: HRD Monitoring and Feedback System Establishment Project

Duration: 3 years

Date: 15/07/2015

Ver. No.: 0-0

Implementation Agency: Donor Side: To be decided

South Sudan Side: Planning Directorate, MEDIWR

Project Area: Juba, MEDIWR Office

Target Group: All the officers working in the directorates of MEDWIR that belonged to the previous MWRI structure

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
"activity1-1)" 3-2 Procurement and installation of the equipment	- Project Monitoring Engineer 3) Project Operation Costs		MEDIWR select and allocate necessary personnel for the project implementation unit.
Output 4 4-1 Conducting workshops for trainees and supervisors 4-2 Distribution of formats to target officers 4-3 Monthly guidance and support for officers on how to fill the formats 4-4 Supporting supervisors for evaluating submitted personal working and training records and giving feedback to each target officer 4-5 Management of the personal working and training records			The DGs of MEDIWR take the responsibility of establishment of a HRD monitoring and feedback system.