スーダン共和国 水供給人材育成計画プロジェクト

終了時評価調査報告書

平成22年12月 (2010年)

独立行政法人国際協力機構 地球環境部

環境
JR
15-096

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序 文

日本国政府は、スーダン国政府の要請に基づき、「水供給人材育成計画プロジェクト」を実施することを決定し、2008 年 6 月から 2011 年 3 月までの約 3 年間のプロジェクトを実施しています。

当機構は、プロジェクト開始から約2年半が経過した2010年10月に終了時評価調査団を現地に派遣し、スーダン側のカウンターパートと合同でこれまでの活動実績ならびにその結果について終了時評価を行いました。

評価結果はミニッツに取りまとめられ、日本国とスーダン国双方の合意のもとに署名交換が行われました。本報告書は、今回の調査および協議結果をとりまとめたものであり、今後、本案件を効果的、効率的に実施して行くための参考として、広く活用されることを願うものです。

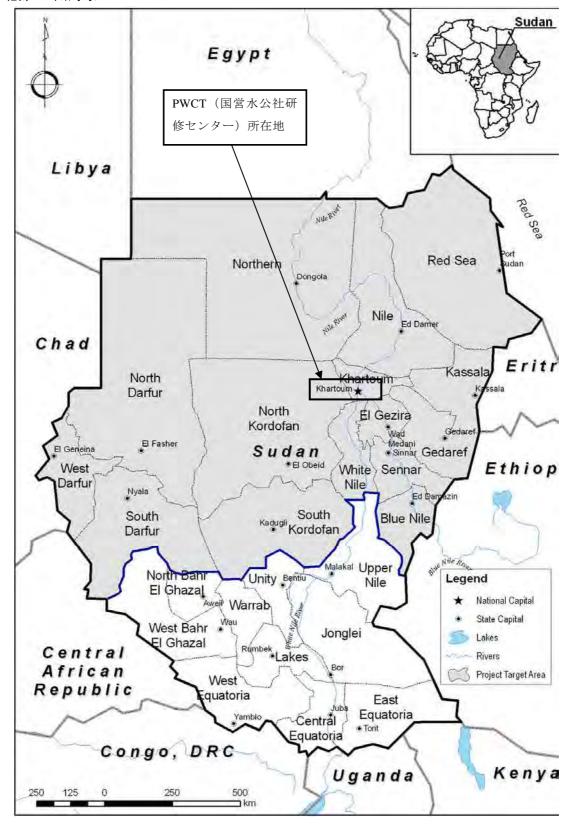
終わりに、調査にご協力とご支援を戴いた関係各位に対し、心より感謝申し上げるとともに、 引き続き一層のご支援をお願いする次第です。

2010年12月

独立行政法人国際協力機構 地球環境部 部長 江島 真也

プロジェクトサイト位置図

北部 15 州対象



写 真 集



ミニッツ署名者の協議

州水公社での協議

略 語 表

略語	正式名称	日本語表記
BSc	Bachelor of Science	学士 (理学)
GIS	Geographic Information System(s)	地理情報システム
GWD	Groundwater Wadis Directorate	地下水ワジ公社
JCC	Joint Coordinating Committee	合同調整委員会
JICA	Japan International Cooperation	国際協力機構
JICS	Japan International Cooperation System	日本国際協力システム
KSWC	Khartoum for Water and Services Company	ハルツーム州水公社
KTC	Kilo Ten Training Centre	キロ・テン研修センター
MIWR	Ministry of Irrigation and Water Resources	灌漑・水資源省
MIC	Ministry of International Cooperation	国際援助省
MIFG	Ministry of Federal Governance	連邦統治省
MSc	Master of Science	修士 (理学)
NCMWE	National Corporation for Manufacturing	国営水機材製作公社
	Water Equipment	
NG	(Sudan) National Government	スーダン政府
O&M	Operation and Maintenance	運営維持管理
PDM	Project Design matrix	プロジェクト・デザイン・マトリックス
PO	Plan and Operation	実施計画
POM	Project Operations Manual	プロジェクト・運営マニュアル
PWC	Public Water Corporation	国営水公社
PWCT	Public Water Corporation Training Center	国営水公社研修センター
SWC	State Water Corporation	州水公社
UNDP	United Nations Development Programme	国連開発計画
UNICEF	United Nations Children's Fund	国連児童基金
WB	World Bank	世界銀行
WES	Water Environment Services	水と環境衛生プロジェクト
WHO	World Health Organization	国連保健機関

終了時評価調查結果要約表

1. 案件の概要	
国名:スーダン共和国	案件名:スーダン水供給人材育成計画プロジェクト
分野:水資源管理	援助形態:技術協力プロジェクト
所轄部署:地球環境部水資源第二課	協力金額(評価時点): 3.3 億円
	先方関係機関:
協力期間:2008年6月~2011年3月	国営水公社研修センター (PWCT)
	日本側協力機関:特になし
	他の関連協力:特になし

1-1 協力の背景と概要

現在、スーダンにおける安全な水へのアクセス率の平均は 59%で、都市部は 70%、農村部は 52%である。一人一日当たり給水量は、現在都市部で 30~50 リットル/日・人、農村部では 6~ 18 リットル/日・人となっている。スーダン国家 25 カ年給水計画 (2003~2027) によれば、2027 年までに、安全な水のアクセス率を 100%に、一人一日当たり給水量は、都市部で 150 リットル/日・人、農村部で 50 リットル/日・人に引き上げることを目指している。

スーダンでは国営水公社(Public Water Corporation: PWC)が給水事業全般の権限を有していたが、地方分権化政策により、給水施設の維持管理については州水公社 (State Water Corporation: SWC) に権限委譲された。これに伴い、PWCの役割は給水政策の策定、大規模給水施設建設、SWCのモニタリング、人材育成に限定されることとなった。

一方、SWC は都市と村落両方の給水施設維持管理の他に小規模給水施設の建設に責任を持つ。各 SWC の給水人口規模は、首都であるハルツーム州 SWC の 450 万人やゲジーラ州 SWC の 305 万人から、紅海州・青ナイル州 SWC の 30 万人程度まで様々であり、また、水源や給水施設の形態も州ごとに異なる。技術者数は、エンジニアクラスは多くても各州 80 人程度(測量、化学等も含む)と少ないことから、各エンジニアが専門分野以外の対応を余儀なくされている。更に、SWC が実施する給水事業は昨今の状況変化により様々な課題を抱えている。

今後、一人あたり給水量の増加に伴い浄水場の新規建設が計画されていることを勘案すると、技術者の増員及び能力強化が必要となるが、現在のスーダンではハルツーム州 SWC が小規模な内部向け研修を行っているのみであり、全 SWC を対象とする研修やそれらを行う施設は存在しない。

この様な状況の下、スーダン政府は、人材育成を主な業務の一つとする PWC に全 SWC に対する研修機能を付加することを決定し、研修センター(Public Water Corporation Training Center: PWCT)を含む PWC 新庁舎をハルツームの南 6km の地に建設した。今後 PWC は PWCT に基本的な機材及び人材を配置する計画であるが、研修内容の計画・実施能力が不十分であることから、2006 年に我が国に対し技術協力を要請した。これを受けて事前調査団が 2007 年 10 月に派遣され、2008 年 4 月 9 日の R/D 署名を経てプロジェクトが開始された。

1-2 協力内容

(1) 上位目標

北部スーダンにおける水供給安定のための組織的能力が向上する。

指標1:各SWCで7人以上の核となる人材が育成される。

指標2: 実施された研修コースから学んだ教訓が州予算に基づき年間給水計画(3-5年

間)に適用される。

(2) プロジェクト目標

PWCT が研修実施体制を確立する。

指標1:研修生による研修コースの評価平均点が90%以上になる。

指標2:研修生による研修管理の評価平均点が90%以上になる。

指標3: 少なくとも90%以上の研修生がコースを満足に修了した証明書を得る。

(3) 成果

成果1:PWCT が研修計画・実施能力を獲得する。

指標 1-1: 研修コース管理と実施の作業の 80%以上がコースコーディネーターによって実施される。

指標 1-2: 3 つの基幹コース、4 つのアドホック研修コースの年間計画、マニュアル、教材、シラバスを確立する。

指標 1-3: 研修サイトが確立される〔キロ・テン研修センター (Kilo Ten Training Centre: KTC)。

指標 1-4: 全研修コースの講師への評価の改善。

成果2:PWCTが研修運営に必要な事務管理能力を獲得する。

指標 2-1: 活動 2(-1) に示されている就業規則と業務分掌が改定される。

指標 2-2: 研修コースの改善された教材やテキストの適切な管理。

指標 2-3: 研修センター予算の適切な管理。

成果3:PWCTの問題解決能力と研修コースにフィードバックする能力が向上する。

指標 3-1: 3 つの基幹コースの 5 回以上の実施とアドホックコースの 3 回以上の実施。

指標 3-2: 活動 3-2 の各観点における問題点と困難の数。

指標 3-3: 活動 3-2 に基づいた研修センターの全活動の改善の数。

(4) 投入(評価時点)

日本側:

専門家派遣9名(65.9 人/月)機 材 供 与約 6400 万円研修員受入8名(3.5 人/月)ローカルコスト負担約 1250 万円合計約 7650 万円

スーダン国側:

カウンターパート配置 18名(2010年11月時点)

ローカルコスト負担 433,155SDG

執務スペース提供

2. 評価調査団の概要

調査者 丸尾 祐二 総括 JICA 国際協力専門員

佐藤 隼人 協力企画 JICA 地球環境部水資源第二課 山内 珠比 評価分析 アイ・シー・ネット株式会社

調査期間 | 2010 年 10 月 12 日 − 2010 年 11 月 4 日 | 評価種類:終了時評価

3. 評価結果の概要

3-1 実績の確認

(1) プロジェクト目標の達成度

終了時評価時点で、プロジェクト目標は概ね達成されつつあると判断できる。スーダン共和国のPWCT立後間もなく本プロジェクトが開始されたため、プロジェクトは研修実施のための組織体制の構築、ワークショップや建物の整備なども支援し、研修実施体制はほぼ確立されつつある。他方、カウンターパートの研修実施能力には課題もあるため、継続的なモニタリングが必要である。

指標1: 受講生による講師及びコースの評価がそれぞれ91点、90点であり、既に達成して

いる。

指標2: 受講生による研修管理、宿舎、食事の評価がそれぞれ85点、82点、72点である。

研修管理については、さらに向上させてプロジェクト終了までに達成されることが

期待される。

指標3: 研修生全員が修了証を受領した。研修生に対する試験結果の平均点は60点で概ね

合格点に達しているため、指標は概ね達成された。

(2) 成果1の達成度

成果1は、ほぼ達成されたと判断できる。その理由は以下のとおり。

- ・ 指標 1-1:2010 年に実施された 7 つの研修コースにおいて、コースコーディネーターにより行われた作業割合は平均 84%である。
- ・ 指標 1-2: 現地調査で把握されたニーズに基づき、研修コース内容が作成された。シラバスと4つの研修評価・管理マニュアルも専門家によって準備された。年間研修計画がプロジェクトの進捗に伴い立案された。教材が各講師によって提供され、全コース実施完了時、教材が1冊に最終化予定。
- 指標 1-3: KTC が 2010 年 1 月に必要な機材を備えて建設された。
- ・ 指標 1-4:2 回以上講師を務めた 12 名のうち 6 名が評価結果を以前より改善したのに対し、 4 名の講師は評価結果が低くなった。ただ、研修生による評価は講師との相性によって評価される場合があり、評価が低い講師でも良い講義をする講師もいる。評価の低くなった 4 名のうち 2 名は他の講師に交代されたが、他の講師については適切な人材が限られていることから交代できずにいる。

(3) 成果2の達成度

成果 2 は、指標をほぼ達成している。専門家は研修コースを管理するための 12 のマニュアルの作成を支援し、その活用方法を教えた。予算の管理にはまだ課題が残る。

- ・指標 2-1: PWCT の就業規則やスタッフの業務指示 (TOR) が変化するニーズや状況に応じて 改訂されている。これらは 2011 年 1 月に完成する予定である。
- ・指標 2-2: テキストや教材は専門家室に保管され、カウンターパートや講師が利用するため に適切に管理されている。著作権に対する意識が低かったので、著作権に関する講義がカウンターパートに対して行われた。機材が設置された後、機材管理専門家が機材リストや維持管理マニュアルを使って、機材の維持管理方法についてワークショップスタッフに説明した。
- ・指標 2-3: 予算管理システムがマニュアルに基づいて構築された。PWCT の予算表が作成された。予算はマニュアルに沿って管理されているが、PWCT の予算は PWC の予算の一部であり、独自の銀行口座を持っていないため、PWCT で適切な予算管理が行われず、突然の支払いが不可能である。

(4) 成果3の達成度

成果 3 は、指標を達成している。ただし、カウンターパートだけで問題点や改善策を見出すには時間がかかる。

- ・指標 3-1:2つの基幹コース(給水施設、データベース/GIS)は5回、もう1つの基幹コース (浄水場運営維持管理)は4回実施される予定である。2つのアドホックコース(水質分析、 管網管理)は2回、その他2つのアドホックコース(井戸管理、組織管理)は3回実施され る予定である。
- ・指標 3-2:問題や課題はあげられた。しかし、専門家によると、カウンターパートは、問題点や課題を見つけることが難しいため、専門家は研修後の反省会でカウンターパートに問題点を教えた。しかし、カウンターパートだけで見つけるには時間がかかる。
- ・指標 3-3: 把握された問題点や課題に基づき、専門家の支援を得てカウンターパートが解決策 や改善方法を見つけようとした。これらの努力を通じて、問題点の大半は改善することがで きた。しかしながら、改善策の大半は専門家によって行われたため、今後カウンターパート だけで考えていくよう努力することが必要である。

3-2 評価結果の要約

(1) 妥当性

プロジェクトの妥当性は高いと判断される。

プロジェクトを取り巻く政策環境は、中間レビュー時から変化はなく、プロジェクトの政策的妥当性は現在も高い。プロジェクトの目的はスーダンの国家開発計画や水政策(ドラフト)、日本の援助方針に合致している。プロジェクトは北部スーダンの持続可能な給水サービスのためのニーズに合致している。北部スーダンでは10年以上も給水に関する研修を行っていなかったため、本プロジェクトの意義は大きい。研修コースのテーマは、現地調査でSWCの緊急ニーズとして確認された。コースの内容は、現地調査や研修コース後の研修生へのインタビューに基づいて開発されたものである。しかし、まだ各SWCの研修ニーズに関する情報収集が十分でないため、今後のPWCの研修計画のために、プロジェクト終了までにそれらを収集することが予定されている。

PWCT の現在の能力を考えると、プロジェクトでは、各 SWC から派遣された各コース 1 名の研修生が受講後、SWC の同僚に研修するという講師研修(Training of Trainers: ToT)システムを採用したことは適切であった。だが、各州の膨大な研修ニーズを考えると、将来 PWCT の能力を向上させ、研修コース、研修生数を増加させることが望まれる。

日本は給水セクターで高い技術があり、優れた研修施設も持っている。日本の高い給水技術はスーダンの現在の給水状況にも適用できる。

(2) 有効性

プロジェクトの有効性は高いと判断される。

プロジェクト目標の達成にはいくつかの課題はあるが、ほぼ達成される見込みである。研修 実施体制はほぼ完成されたが、組織体制や予算管理体制の整備や、カウンターパートだけでの 研修コースの実施にはまだ時間が必要である。研修の適切な実施には、新たな研修センターを 建設することが望ましい。

3つの成果はプロジェクト目標の達成に必要十分である。

関係者の良いコミュニケーションや、PWC 総裁や PWCT 長のリーダーシップによりプロジェクトは円滑に実施された。他の案件への支援を通じて、カウンターパートは予算管理能力やプロジェクト実施能力などを向上させた。カウンターパートの本邦研修は、関係者のモチベーションを向上させ、プロジェクトに対するオーナーシップを高めた。

一方、機材調達の遅れにより、実習を他の場所で行わなければならなかったり、水質分析コースの開始が遅れたりした。当初のカウンターパートが多忙のためすべて交代したことも、有効性の阻害要因となった。

(3) 効率性

プロジェクトの効率性は高いと判断される。

3 つの成果はほぼ達成されている。まだカウンターパートだけで研修を計画、実施するには 課題があるが、実施はほぼできるようになった。プロジェクト・デザイン・マトリックス (Project Design Matrix: PDM) 上の活動も成果を達成するのに適切である。

プロジェクト1年目は組織体制構築や研修コースの準備に集中したため、その後2年間で24の研修コースを実施する予定である。この集中的な研修スケジュールから、プロジェクト活動は効率的に行われたといえる。

専門家はカウンターパートと良い信頼関係を築いていることも、プロジェクトの効率性を向上させた。

供与機材も調達の遅れはあったが、種類、数ともに適切であり、適切に活用されている。PWCT 予算もニーズに応じて増加している。 スーダン側投入もほぼ適切に行われた。

(4) インパクト (見込み)

プロジェクトのインパクトの見込みは高い。

上位目標はいくつかの条件のもとにほぼ達成される見込みである。本プロジェクトで各州 7 名の核となる人材が育成された。組織能力については、PWCT マスタープランが作成され、研

修生による各州での技術移転の成果として、いくつかの州でデータベースが作られ、井戸のリハビリが実施された。しかし、まだほとんどの州で研修に必要な機材・施設が整備されていないため、各 SWC で研修生が教えていくのは難しい。各 SWC の総裁は研修の重要性を認識しているが、研修に関するリーダーシップの差により、各 SWC の研修施設の整備計画の間で差が出てきている。安定的な給水を行うための組織能力を高めるには、PWC や SWC の組織体制構築に必要な事務管理能力のほか、水道料金表の改定、予算管理や情報管理などの能力向上も必要である。

本プロジェクトは援助再開第 1 号案件であり、これが成功裏に実施されることにより、スーダン政府や国民の日本の援助に対する期待が高まった。プロジェクトの広報活動は日本国民に対する説明責任の向上にもつながった。

(5) 持続性(見込み)

プロジェクトの持続性はいくつかの課題があり、中程度から高い見込みである。

政治的、組織的側面においては、国家水政策の現草案には研修の重要性が書かれており、この点についての変更はなく水政策は完成される見込みである。PWCの長期計画であるPWCTマスタープランは、水・灌漑省の高い関心とPWCからの強い支援により採択される予定である。PWCTは自助努力もあり短期間に発展、改善しており、これは持続性の面で高く評価される。新研修センターが2011年1月に竣工される予定であること、研修実施体制は、PWC総裁とPWCT長のリーダーシップのもとに、予算が確保されて維持されていく見込みであることなどは、持続性の貢献要因である。

組織・財政面では、以下の項目が課題としてあげられる。①研修プログラムや研修生の数の増加が予定されており、これに対する予算や人員の増加が必要である。②必要な予算の確保のためには、PWCT は将来 PWC から独立した銀行口座を持つことが望ましい。③効果的な研修コースのためには PWCT と SWC の関係が改善され、SWC における技術移転や研修ニーズについて PWCT によるモニタリングシステムが開発されることが望ましい。

技術的側面では、以下の課題があげられる。①カウンターパートは研修をある程度まで実施できるようになったが、完全にカウンターパートだけで実施することは難しく、継続的なモニタリングが必要である。②カウンターパートによるより高度な研修管理のためには、パソコンスキルや技術的能力の向上が必要である。

3-3 効果発現に貢献した要因

- (1) カウンターパート、専門家、JICA 間の良いコミュニケーションが、プロジェクトの円滑な 実施とプロジェクト目標の達成に貢献した。
- (2) プロジェクトに対する PWC 総裁の強い支援があった。
- (3) カウンターパートの本邦研修により、プロジェクトに対するオーナーシップの醸成と効果的なフィードバックを生み出した。
- (4) 研修コース実施数の増加により、カウンターパートが研修コース管理・実施能力を高め、 専門家との間に信頼関係が築かれた。
- (5) スーダン側、日本側の相互信頼関係が、プロジェクトの短期間の発展を導いた。

3-4 問題点及び問題を惹起した要因

- (1) カウンターパートは以前経験がなかったため、問題の発見や時間管理、コース評価が難しかった。
- (2) PWCT 予算が PWC に帰属しているため、研修センターの適切な予算管理は時に難しく、特に突然の支払いが不可能であった。
- (3) 研修コース受講料や交通費の問題を抱えている SWC は、研修生を送れなかった。
- (4) 大半の SWC は研修用機材・施設を整備しておらず、研修生が実施したくても SWC の同僚 に対する技術移転が不可能であった。

3-5 結論

- (1) プロジェクト目標はプロジェクト終了までに達成される見込みである。
- (2) 上位目標はいくつかの条件のもとに達成される見込みである。
- (3) 評価5項目による本プロジェクトの評価結果はおしなべて高い。
 - プロジェクトの妥当性は高く、有効性と効率性も高い。
 - ▶ 実施プロセスも課題はあるが、おしなべてよい。
 - プロジェクトのインパクトについては条件付きだが、高い見込みである。
 - ▶ 持続的な研修実施にはいくつかの課題があるため、プロジェクトの持続性は中程度から高い見込みである。
- (4) PWC 総裁と PWCT 長の強いオーナーシップとリーダーシップ、JICA スーダン事務所の集中的支援、プロジェクトの効果的な管理により、PWCT は短期間に発展した。
- (5) 研修効果を高めるために、PWCT は SWC における研修ユニットの設立を支援し、それに対して技術的な支援を行うことが期待される。

3-6 提言

(1) PWCT の研修能力の拡大

宿泊能力から一度に約 25 人の研修能力は、SWC の大きな研修需要に比して小さすぎる。 PWCT の施設、予算、人的資源は拡大すべきである 1 。

(2) PWCTの中・長期開発計画の完成と承認

PWCT の中・長期開発計画が完成され、スーダン政府によって承認されることが期待される。

(3) 研修プログラムの多様化

SWC の多様なニーズに応えるために、PWCT は多様な技術テーマで、異なる技術レベルの研修コースや、プロジェクト計画、資金管理、水道料金表などの事務レベルの研修コースなど多様な研修プログラムを開始することが望ましい。

(4) PWCT 予算のための独立銀行口座

効果的効率的予算管理のために、PWCT は独立した銀行口座を持つべきである。

(5) SWC に研修ユニットを設置するための PWCT の支援

¹ PWC の総裁からの情報では、50 人の研修生を擁することができる新研修センターの建設予算が確保され、建設作業が来年 初頭から始まる予定とのことである。PWC は人的資源や PWCT 活動の拡大に応える予算を増やすことも計画している。

PWCT は SWC の多様なレベルの人材に給水サービスの知識や技術を伝達するための研修ユニットを組織するため、SWC に対して継続的な支援を提供することが望ましい。研修ユニットの役割の中には、SWC レベルでの技術移転状況や SWC の研修ニーズを PWCT に効果的にフィードバックすることが含まれる。

(6) PWCT スタッフによるマニュアルの効果的な活用

PWCT スタッフは PWCT の効果的な管理のための管理マニュアルを活用すべきである。これらのマニュアルは必要があれば、適切に改定されるべきである。

3-7 教訓

- (1) PWCT の急速な発展に貢献した要因 プロジェクトの急速な進展に貢献した正の要因はいくつかある。
- PWC の総裁や PWCT センター長の強いオーナーシップとリーダーシップ
- 日本人専門家総括の長期派遣期間
- ・ JICA スーダン事務所からの集中的支援
- ・ 他の関連 JICA プロジェクト (ダルフールプロジェクトなど) への支援により得られた相乗 効果
- (2) 1つの研修コースを複数に分けて行うことによる正の効果 1つの研修コースを複数に分けることにより得られた正の効果は、以下のとおりである。
- ・ 研修期間中に接触する機会を増加させたことにより、研修生、専門家、コースコーディネーター間の互いの理解が高まった。
- ・ 研修コースの管理を増加させることにより、コースコーディネーターの能力向上が高まった。
- ・ 研修コース管理における技術移転の機会を増やしたことにより、コースコーディネーターと 専門家の間の信頼関係が築かれた。
- ・ 各研修コース期間を2週間に制限したことにより、多忙な研修生がコースに出席しやすくなった。

(3) 効果的な本邦研修

カウンターパート本邦研修は主要なカウンターパート全員に対して行われ、また専門家が研修内容を計画したため、適切で効果的な研修となった。彼らの研修業務に対する意欲、プロジェクトに対するオーナーシップの向上につながり、その後の業務によいフィードバックが見られた。

以上

Summary of the Joint Terminal Evaluation

1. Outline of the Project	
Country: Republic of Sudan	Project Title : Project for Human Resources Development for
	Water Supply
Issue/Sector: Water Resources	Cooperation Scheme: Technical Cooperation
Management	
Division in Charge:	Total Cost (at the time of the Terminal Evaluation):
Water Resources Management Division 2	JPY330Million
Global Environment Department	
Period of Cooperation:	Partner Country's Implementing Organizations:
June 2008 - March 2011	Public Water Corporation (PWC) Training Center
	Supporting Organization in Japan:
Related Cooperation:	

1-1 Background of the Project

The provision of adequate and safe water supply services for human is one of the essential issues in the Republic of Sudan. And also the Government of Sudan has conducted the significant efforts to improve the critical water supply situation. According to the Quarter Century Strategy for Water Supply Plan

(2007-2031), the specific objectives of the strategy are to achieve by the end of the strategy period, a consumption rate of 50 liter/capita/day and 150 liter/capita/day for rural and the urban population respectively.

On the other hand, PWC was the responsible and organizational authority for water supply projects in Sudan, the responsibilities on operation and maintenance for the water supply facilities have been transferred from PWC. The present role of PWC is construction of the large-scale water supply facilities, coordination of international assistance, monitoring of SWC and human resources development by this decision of the government water supply policy.

SWC has responsibility for the construction of small water supply facilities other than maintenance of urban and rural water supply facilities. As for the water supply population of each SWC, it is quite different from State of Khartoum (4,500,000), Sate of Gezira (3,050,000), Red Sea and Blue Nile State (about 300,000). In addition, the types of the water source and the water supply facilities in SWC are different. Furthermore, an average of engineer in each SWC is around 80.

Various water related problems occur in each SWC by the drastic change of organizational situation in Sudan. There are problems of pump and generator in the villages of Sudan. Particularly, new generator and electric motor pumps are spreading in Sudan recently. Therefore, the engineers cannot cope with sufficient troubleshooting but only experienced on conventional reciprocating pump. In addition, the operation and maintenance technology of water treatment plant is not sufficient in each state. As a result, water supply in each SWC becomes unstable.

Under this situation, the Government of Sudan has decided to transfer the training function to PWC. And a new building of PWC including a training center was built in Khartoum. Although PWC Training Center has opened in 2006, all of the staff doesn't have sufficient experience on training management and implementation. Therefore the Government of Sudan requested the technical cooperation project to the Government of Japan for training ability improvement of the staff of PWCT.

1-2 Project Overview

- (1) **Overall Goal**: Institutional capacity for stabilizing water supply in the northern Sudan is enhanced.
- (2) **Project Purpose**: PWC Training Center establishes the system for the implementation of Training.

(3) Outputs

- 1) PWC Training Center acquires abilities to implement and plan training courses.
- 2) PWC Training Center acquires administrative abilities necessary for managing training courses.
- 3) PWC Training Center acquires the abilities of problem solution and feedback on training courses.

(4) Inputs (as of the time of the Terminal Evaluation)

Japanese side:

Japanese experts: 9 experts Equipment and materials: JPY 64 million Training in Japan: 8 trainees Local Expenses: JPY 12.5 million

Sudanese side:

Counterparts (C/Ps): 18 persons Local costs: 433,155SDG

Office space in PWC Training Center for the Project Team

2. Evaluation Team

	iese Side> iji MARUO	Team I	Leader	Senior Advisor, JICA
Michigers of	ayato SATO	Evalua Plannii		Water Resources Management Division 2 Global Environment Department, JICA
Evaluation Team Ms. Ta	amahi YAMAUCHI	Evalua Analys		IC Net Limited
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Mr. M	ahmoud Haroun A/el	elgabar Senior Su		uperintendent Water Engineering
Ms. E	atiadal Elrayah Malik	[Director of	of Public Water Corporation Training Center

Evaluation Period: October 12, 2010 – November 4, 2010 **Type of Evaluation:** Terminal Evaluation

3. Evaluation Results

3-1. Achievements of the Project

(1) Achievements of the Outputs

Output 1 (PWC Training Center acquires abilities to implement and plan training courses.)

Output 1 is mostly achieved. For implementing and planning training courses, PWCT needs to grasp the training needs of the trainees (in this Project, from SWCs) to plan the contents of the training courses and their schedule, and to implement the courses according to the schedule. PWCT activities started at the same time as the Project. Hence the Expert team helped to establish the training implementation system. Because of the capacity of PWCT, it was planned that PWCT train the leaders of each SWC who later train other colleagues in their SWCs through the training of trainers (ToT).

Output 2 (PWC Training Center acquires administrative abilities necessary for managing training courses.)

Output 2 is mostly achieved. As mentioned above, the Project is to start training implementation by establishing such items as the training implementation system, organization, regulations, and budget control. Since PWCT was established in 2007 and no PWCT staff members had ever managed training courses, the Experts helped them develop up to 12 manuals for the management of training courses and explained how to use them.

Output 3 (PWC Training Center acquires the abilities of problem solving and feedback on training courses.)

Output 3 is achieved. In the mid-term evaluation, this output added the aspect of feedback to future training courses. According to the trainees, training courses in Sudan have no feedback system, which means that course coordinators are not accustomed to problem solving and feedback. The Experts helped develop the evaluation sheets on training courses, lecturers, and accommodation and food, and conduct interviews with the trainees. Based on the interviews, the counterparts and the Experts conducted after-training meetings and evaluation of the course.

(2) Prospect for the Achievement of the Project Purpose (PWC Training Center establishes the system for the implementation of training.)

As stated in the achievement of the Outputs, with the support of the Experts, PWCT developed its regulations and the TOR of its personnel, the training implementation system, 12 manuals for

management of training courses, the budget management system, four manuals for implementation of training courses, and implemented so far 18 training courses according to the schedule. For management and implementation of the training courses, C/Ps acquired abilities, although limited in a number of ways, to implement, plan, and manage training courses, find solutions to problems, and provide feedback to future training courses, with the technical support of the Experts. It is fair to say that PWCT established almost an entire training implementation system from scratch during the Project period. However, to build the capacities of the C/Ps, it is necessary to keep implementing the training courses with monitoring by the Experts. At the end of the Project, the Experts are to have C/Ps implement the training courses on their own

3-2. Summary of Evaluation Results

(1) Relevance: High

The relevance of the Project is high.

The political surroundings of the Project remain the same as at the time of the mid-term evaluation. The Project is in line with Sudanese government's policy. The final draft of the National Policy for Water Supply and Sanitation of October 2009 refers to human resource development for water supply as one of its priorities. The Quarterly Century Strategic Plan for 2007-2031 stresses the importance of training. The PWC 5-year plan (2007-2012) states that PWC should support SWC at the state level in training.

The Project is also in line with the Japanese ODA policy. The country assistance program for Sudan of the Japanese ODA (2008) stipulates water and sanitation as two of the focal assistance sectors. TICAD IV also addressed effective water resource management and access to safe water and sanitation facilities.

The Project targets the urgent needs for sustainable water supply in Northern Sudan. The training of the water supply sector in Sudan was limited for more than 10 years. The Project meets the training needs in the water sector in Northern Sudan. The themes of the training courses were confirmed as the urgent needs of the states in the field surveys by the Project team. The contents of the courses were developed based on these field surveys and the interviews with the trainees after the training courses. The field surveys also identified other specific needs in some SWCs that PWCT needs to consider in planning courses in the future. However, since not enough information of SWCs has been collected so far, the Project team plans to collect it by the end of the Project.

The Project applied the ToT system by training of one personnel member on each field at each SWC who later trains his or her colleagues. Given the large area and demands of each state, it was not possible for ToT to cover all the demands while equipment and the training system at SWCs were inadequate. It is necessary in the future to train at PWCT more personnel of each state.

The Project matches the needs of PWC and PWCT. In 2007, the PWC 5-Year Plan stated that PWC should support SWCs by training. That is why PWCT was established. The Project helps PWCT establish the training implementation system. UNICEF helped PWC construct hand pumps and maintain them for more than 20 years. The water supply facility course of the Project complements this support with a multiplier effect.

Japan has technical advantage in water supply sector, and also has excellent training facilities. Japan has high-level water supply technologies which can be adapted to the current water supply situation in Sudan.

(2) Effectiveness: High

The effectiveness of the Project is high.

The Project Purpose will mostly be achieved with some challenges. The training implementation system is almost complete and the C/Ps acquired abilities to implement, plan, and administer training courses. Meanwhile, it will take time to finalize organizational arrangements of PWCT such as regulations and budget management and accounting procedures. It also takes time for C/Ps to master all the steps of training implementation and management so that they can control the quality of lectures. For proper implementation of training courses, a new training center must be constructed.

The three Outputs help achieve the Project Purpose. Planning, implementing with feedback for further improvement, and managing the training courses are the necessary and sufficient elements to establish the implementation system of training courses.

The important assumptions to achieve the Project Purpose, i.e. 'Budget for the Center is secured continuously and the structure of the organization is not changed dramatically' have been fulfilled so far. Since the Project started, 90% of the proposed budget by PWCT has been approved on average. The PWCT budget was increased every year, which shows the high concern of the Ministry of Irrigation and Water Resources about the Project and the strong support of PWC.

(3) Efficiency: High

The efficiency of the Project is high.

All the three Outputs were mostly achieved. While the C/Ps and PWCT had no experience in implementing training courses, the technical support of the Experts to C/Ps was efficient enough to enable the C/Ps to plan, implement, and manage training. However, it is necessary to monitor the work of the C/Ps even after the Project period to ensure that they can properly conduct the work by themselves. Meanwhile, the activities mentioned in the PDM were generally adequate to achieve the Outputs.

After the first year, the Project concentrated on arranging the organization of PWCT and preparation of the training courses. 18 training courses were held in a year and half and six more training courses are to be held in the remaining six months. Given the intensive schedule of training courses in two years, it is fair to say that the Project implemented the activities efficiently.

As for the important assumptions to achieve outputs, the first assumption, i.e. 'Trainees in the course for instructions will stay and continue working at the Center as instructors' is not clear on who the trainees are in the course for instructions. The record on the second assumption, i.e. 'Staff members of the Training Center will continue working at the Center without transfer', is mixed. Six C/Ps were replaced in the first period of the Project as they were unable to fulfil their mandates, which hindered the efficient technical transfer of the Project. However, the new, younger C/Ps kept working for the rest of the Project period. Hence this assumption was mostly fulfilled.

The Experts have a good working relationship with C/Ps. As a result, they gained the trust of C/Ps. It also contributed to the efficiency of the Project.

(4) Impact: High

The expected impact of the Project is high.

The Overall Goal is expected to be achieved with several conditions. The capacity building of 7 core personnel at each state has already started. Some trainees already conducted transfer their knowledge and techniques to other colleagues at SWCs. By teaching other colleagues they would ascertain their knowledge and technique, so that their capacity would be developed.

As to the institutional capacity of water sector in general, under the National Water Policy which put importance on training, the development of PWCT Master plan is underway with the support of Experts, which is the positive impact of this Project. The field survey in August 2010 revealed that, as positive by-products of the training, several databases were developed in three states, and seven wells were rehabilitated. However, most of the trainees faced the problems of limited equipment and facilities for training, although most of the DGs of SWCs urge the importance of the training. The difference among the SWCs on conducting technical transfer by the trainees lies in how much importance the DG puts on training-related issues and the availability of the total budget for water supply. In Gedaref state, the training facilities were constructed with necessary equipment, which could be a model for other states. Three states also plan to construct training centers. The DGs are interested in applying the techniques and knowledge from the PWCT training to their water supply plan regardless of the scale. Moreover, for developing institutional capacity for stabilizing water supply in Northern Sudan, it is necessary to address other issues such as organizational structure of PWC and SWCs for effective water administration, effective tariff scales, financial management, and information management.

Hence the achievement of the Overall Goal will depend not only on the availability of the budget for training courses and for water supply in general in Northern Sudan, but also on the above-mentioned issues.

(5) Sustainability: Moderate to High

The expected sustainability of the Project is moderate to high with several challenges.

In the political and institutional aspects, the current draft National Water Policy is expected to be

finalized without change in the importance of human resource development in water supply. The PWCT Master Plan describes the long term plan of the PWCT activities and suggests the principle functions to be realized because of the high interest of the Ministry of Irrigation and Water Resources and the strong support from PWC. Moreover with the support of the Project PWCT enabled quick improvement which is highly evaluated in terms of sustainability.

3-3. Factors enabling the realization of positive effects

Followings are the factors enabling the realization of positive effects.

- (1) Good communication between C/Ps, Experts, and JICA contributed to smooth implementation and achievement of the Project Purpose.
- (2) Strong support of DG of PWC to the Project.
- (3) Ownership development and effective feedback from the good C/Ps trainings in Japan
- (4) By increasing the number of implementation of training courses C/Ps develop their capacity of management and implementation of the training courses and create trust between Experts and C/Ps.
- (5) The mutual trust by both parties creates further development of the Project.

3-4. Factors obstructing the realization of positive effects

Followings are the factors obstructing the realization of positive effects.

- (1) Since they had not have the similar experience, C/Ps have had difficulties in finding problems, time management, and evaluation of the course, etc.
- (2) Since PWCT budget belongs to PWC, the budget management of PWCT is sometimes difficult, such as in sudden payment.
- (3) Some SWCs which have problems of paying fee and transport for the course could not send the trainees.
- (4) Since most of the SWCs don't have equipment and facilities for training, the technical transfer could not be conducted even with the trainees' efforts.

3-5. Conclusions

Conclusion of this Evaluation is as follows.

The Project purpose will be achieved by the termination of the Project.

The Overall goal is expected to be achieved with several conditions.

On the five evaluation criteria the evaluation results of the Project is generally high.

- The relevance of the Project is high and its effectiveness and efficiency are also high.
- The implementation process is mostly good with a few issues to concern.
- Impact of the Project is high with several conditions.
- In order to sustain the training implementation, there are several challenges to overcome. Hence the sustainability of the Project is moderate to high.

PWCT achieved quick progress with strong ownership and leadership of the DG of PWC and Director of PWCT, intensive support from JICA Sudan Office, and effective management of the Project.

In order to enhance the effect of the training PWCT should support to establish the training units in SWCs so that they could conduct their own training, which could be supported by PWCT.

3-6. Recommendations

The Evaluation team recommends that the Sudanese side and JICA consider the following concrete actions to be taken by the termination of the Project, and after the Project, respectively, as follows:

3-6-1. Recommendations by the termination of the Project

(1) Conduction of training courses by C/Ps themselves

C/Ps should conduct the remaining training courses on their own initiatives with the least involvement of Japanese Experts in order to enhance human and institutional capacity for sustainability.

(2) Compilation of Human Resource database of all the SWCs

PWCT should compile Human Resource database of all the SWCs in order to grasp the precise training needs so that they could plan the new training courses to be implemented after the completion of the Project.

3-6-2. Recommendations after completion of the Project

(1) Expansion of the training capacity of PWCT

The current training capacity of about 25 trainees at one time based on the limited accommodation capacity is too small compared to the vast demands of the SWCs. The capacity in terms of facilities, budget and human resources of PWCT should be expanded.

(2) Completion and authorization of mid- to long-term development plan of PWCT

The mid- to long-term development plan, which has been elaborated by PWCT, should be completed and authorized by the Sudanese government.

(3) Diversification of training programmes

To respond to diverse needs of SWCs, PWCT should initiate much more training programmes on various engineering topics, with different technical levels, and on administrative programmes as well, in such topics as project planning, financial management, water tariff structure, etc.

(4) Independent bank account for PWCT budget

For the effective and efficient budget management PWCT should have independent bank account.

(5) PWCT's support to establish training unit in SWCs

PWCT should provide continuous support to SWCs in institutionalizing a training unit for the effective dissemination of knowledge and skills of water supply services to various levels of SWCs personnel. The function of the training unit includes effective feedback of the results of the technical transfer and the training needs of SWCs to PWCT.

(6) Effective utilization of the manuals by PWCT staffs

PWCT staffs should utilize the management manuals for the effective management of PWCT. Those manuals should be revised properly, whenever it is necessary.

3-7. Lessons Learned

(1) Positive elements to achieve the quick progress of PWCT development

There are several positive elements which contributed jointly to enable the quick progress of the Project as follows.

- Strong ownership and leadership of DG of PWC and Director of PWCT
- Long assignment period of the leader of Japanese Experts
- Intensive support from JICA Sudan Office
- Ripple effects provided by supporting to other related JICA project (Darfur project)
- (2) Positive outcomes by dividing one training course into several times

Some positive outcomes were earned by dividing one training course into several times as follows:

- Intensifying mutual understanding between trainees, Experts and course coordinator by increasing occasions of contact during the training period.
- Enhancement of capacity development of course coordinators by increasing the managing opportunities of training courses.
- Trust building between Course coordinators and Experts by increasing occasions of technical transfer in management of training courses.
- Encouragement of busy trainees to attend the courses by limiting the length of each training period into 2 weeks.

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第1章 終了時評価調査の概要

1-1 終了時評価調査団派遣の目的

- (1) 本プロジェクトは 2008 年 6 月に開始され、2011 年 3 月を以って終了する見込みである。 プロジェクトの目標の達成見込みを確認し、必要に応じ、残された期間での活動計画を 見直す。
- (2) 評価 5 項目(妥当性、有効性、効率性、インパクト、持続性)の観点からも検証を行い、プロジェクト終了時までの対応方針等について提言を行うとともに、類似の技術協力案件への教訓を抽出する。
- (3) 本プロジェクトの終了後、想定される協力の展開について協議・検討を行う。

1-2 終了時評価調査団の構成

	担当	氏名	所属
1	団長	丸尾 祐二	JICA 国際協力専門員
2	協力企画	佐藤 隼人	JICA 地球環境部水資源第2課
3	評価分析	山内 珠比	アイ・シー・ネット株式会社

1-3 調査日程

山内団員による調査(関係者への聞取り、リバーナイル州現地視察)
丸尾団長、佐藤団員のスーダン入り
JICA スーダン事務所、国際援助省(Ministry of International Cooperation:
MIC)表敬
国営水公社(Public Water Corporation: PWC)総裁表敬
国営水公社研修センター(Public Water Corporation Training Center:
PWCT)との協議
各種研修施設の視察、JICA 専門家との協議、JICA 事務所での協議
州水公社(State Water Corporation: SWC)訪問
給水施設視察 (ゲジーラ州、センナール州、白ナイル州)
ミニッツ案作成
合同評価委員会開催
合同調整委員会(Joint Coordination Committee: JCC) 開催
ミニッツ署名
UNICEF 訪問
JICA 事務所報告、大使館報告
調査団スーダン発

1-4 評価手法

プロジェクトの評価は、プロジェクトの概要を記しているプロジェクト・デザイン・マトリックス (PDM) に基づいて行われた。評価の基準には、2009 年 11 月の JCC で承認された PDM ヴァージョン 4 を使い、以下の手順で終了時評価調査を実施した。

(1) プロジェクト実績の確認

投入、活動、成果、プロジェクト目標のようなプロジェクト達成度合いは、PDM4 で記載された客観的に証明可能な指標に関して評価された。この評価調査のため、質問票、インタビュー、サイト観察、ワークショップ、プロジェクト関係者との討議など様々な方法が適用された。

(2) プロジェクト実施プロセスの調査 プロジェクト実施プロセスは、様々なポイントから精査された。

(3) 5項目の評価基準による評価

以下の5項目の評価基準がプロジェクト評価に適用される。

- ① 妥当性:プロジェクト目標や上位目標について、スーダン政府の開発政策やプロジェクト受益者のニーズの観点で妥当かどうか考察する。
- ② 有効性:プロジェクトが実際にターゲットグループに便益を与えたか、プロジェクトが有効であるか確認する。プロジェクト目標が期待通りに達成されているか、それがプロジェクトの成果の結果なのかについても精査する。
- ③ 効率性:プロジェクトが資源の活用を効率的に行っているか確認する。投入と成果の関係についても見直す。基本的に、投入コストが成果とプロジェクト目標の達成度合いに適切であるか確認する。
- ④ インパクト:プロジェクトによって延長された長期の直接的効果や、間接的効果を確認する。その分析はプロジェクトが計画されたときに、期待されていなかった正・負のインパクトを含む。
- ⑤ 持続性:組織的、資金的、技術的側面に焦点をあて、プロジェクトの達成がどの程度 持続的に延長されるか確認する。

(4) 提言と教訓

合同評価調査団は、提言と調査結果に基づく教訓を述べた。

第2章 プロジェクトの実績と現状

2-1 投入実績

2-1-1 日本側投入

(1) 専門家

プロジェクトの終了までに9人の専門家が、延べ65.9人月で派遣されることが計画されている。専門家派遣の詳細は別添資料3に示すとおりである。

(2) 機械と機材の供与

日本とスーダンでプロジェクトが購入した機材は、別添資料 4 と 5 に示すとおりである。 日本での購入費は 39,519,000 円であり、スーダンでの購入費は 22,080,124 円である。専門 家が持参した機材の費用は別添資料 6 に示すとおり、2008 年は 1,563,133 円、2009 年は 1,151,400 円であり、2010 年の機材費は計画されていない。日本側の運営費は別添資料 7 に 示すとおり、2008 年は 2,986,237 円、2009 年は 3,876,271 円で、2010 年は 5,616,039 円が計 画されており、これは人件費、図書購入費、レンタカー代、消耗品費などを含む。

(3) 日本での研修

合計 8 人のカウンターパート (C/P) は、日本の研修システムと給水管理について学ぶため本邦研修に参加した。

研修生名 職位 計人月 Ms. Eatidal Elrayah Malik | PWCT センター長 0.46 0.46 Mr. Hashm Abdul Raheem | PWCT 管理部長 Mr. Muzamil Mohammed コースコーディネーター 0.43 コースコーディネーター Mr.Bashary Ibrahim 0.43 コースコーディネーター Mr. Abdela Majed 0.43 Mr.Egbal B.Alamir コースコーディネーター 0.43 アシスタントコースコーディネーター Mr.Osama Wais 0.43 アシスタントコースコーディネーター Mr. Aladin Wais 0.43 合計 3.50

表 2-1 カウンターパートの本邦研修

出典:専門家データ

2-1-2 スーダン側投入

スーダン側は別添資料 8 のとおり、18 人の C/P を配置した。専門家の執務スペース、キロ・テン研修センター(Kilo Ten Training Centre: KTC)、水質分析ラボ、宿泊施設が提供され、別添資料 9 に示すように、建設費用に 396,555SDG、機材維持費に 36,600SDG が投入された。

2-2 成果の達成状況

2-2-1 成果 1

成果1は「PWCTが研修コースを実施し、計画する能力を持つ」である。研修コースの計画、実施のために、PWCTは研修コースの内容とスケジュールを計画し、それに従って実施するために、SWCの研修生のニーズを把握する必要がある。PWCTの活動は、本プロジェクトと同時期に開始したので、専門家チームは研修実施システムの確立を助けている。研修を開始したばかりのPWCTの研修能力を鑑みて、PWCTでは、SWCの同僚を指導するため、各SWCのリーダーへの講師研修(ToT)が計画された。

表 2-2 成果1の達成状況

指標	達成状況
1-1. 研修コース管理と実施の	本指標は達成している。2010年に実施された7つの研修コース
作業の 80%以上がコース	で、コースコーディネーターにより実施された作業の割合は84%
コーディネーターによっ	であった。
て実施される。	
1-2.3 つの基幹コース、4 つの	本指標は概ね達成している。現地調査で把握されたニーズをもと
アドホック研修コースの	に、研修コース内容が作成され、シラバスが専門家により準備さ
年間計画、マニュアル、教	れた。コース評価と管理のための4つのマニュアルが作成された。
材、シラバスを確立する。	プロジェクトの進捗に従い、年間計画が作成された。教材が各講
	師によって提供された。全研修コースの完了後、コース教材は最
	終化される予定。
1-3. 研修サイトが確立される	KTC は 2010 年 1 月に必要な機材を備えて、建設が完了した。
(KTC) _o	
1-4. 全研修コースの講師への	この指標は一部達成している。全研修コースで2回以上講師を担
評価の改善。	当した 12 人の講師のうち 6 人が評価結果を改善した。

指標 1-1 は達成された。研修コースの管理と実施のための 34 の作業において、2010 年に実施された 7 つの研修コースでは、コースコーディネーターにより行われた作業の割合が平均84%であった。7 つの研修コースで、コースコーディネーターにより作業の80%以上が実施された作業の数は、34 作業項目のうち平均25.4 項目であった。これまで実施された17 の研修コースで、コースコーディネーターによる作業の割合は平均73%であった。このように、プロジェクトの進捗とともに、以前研修コースの実施や管理を行ったことがないコースコーディネーターが、その作業割合を増加した。しかしながら、研修スケジュール作成、研修生に対する質問票の作成、試験の準備、研修後の会合や評価については、コースコーディネーターによる作業割合は約50%と比較的低かったため更なる向上が求められる。

以上より、一部改善の余地はあるものの、全体的には、各研修コースを管理するためにチーフコースコーディネーターとアシスタントにより構成されたカウンターパートチームが結成され、実施システムは確立されたと言える。

表 2-3 PWCT スタッフの作業割合

										11回~									
	11 - 216	1回	2回	3回	4回	5回	6回	7回	8回	9回	10回	11回	12回	13回	14回	15回	16回	17回	17回の 平均
No	作業項目	WTP	WSF	GIS	WSF	GIS	WM	WTP	OM	GIS	WSF	WTP	WQA	WM	WM	GIS	OM	PNM	(%)
1	非常用発電機の確保	0	50	50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
2	宿舎の整備	80	90	95	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
3	開校式(オリエンテーション)準備	40	50	50	80	60	60	40	95	50	100	80	70	80	90	50	95	50	74
	研修生データ整備	40	70	80	100	90	80	20	90	100	100	100	100	90	100	100	90	100	97
5	講師データ整備	20	70	80	90	100	80	20	50	100	100	100	100	100	100	100	100	80	97
6	講師との協議と調整	40	90	60	70	40	70	60	80	40	80	100	90	90	90	30	80	50	76
7	研修スケジュール	10	80	50	80	40	50	50	70	40	80	50	10	80	80	30	70	20	49
8	研修場所準備	30	90	30	90	60	50	100	80	90	70	100	50	60	100	90	95	100	85
9	テキスト作成	20	80	20	90	80	50	100	95	70	80	100	80	80	90	80	100	100	90
	テキストの印刷製本	0	100	0	90	100	50	100	70	50	90	100	100	100	100	100	90	100	99
	試験問題と模範解答の作成	50	80	30	70	50	40	50		70	80	50	50	60	80	80		0	53
12	研修用機材の確認	50	80	30	90	50	70	50	50	90	90	80	50	60	100	90	100	100	83
13	研修生への質問表作成	0	0	0	0	0	40	50	70	40	0	100	10	50	70	40	80	0	50
	評価シートの作成	0	0	0	50	30	40	100	50	50	100	100	100	50	100	50	100	80	83
15	研修前ミーティング	0	0	0	0	40	40	20	70	50	50	100	20	50	70	40	80	70	61
16	開校式(オリエンテーション)	50	50	50	80	70	80	10	100	80	100	80	100	80	90	90	100	70	87
17	研修状況写真撮影	10	10	40	70	50	80	50	100	60	100	100	100	60	100	100	100	70	90
18	食事準備	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
19	試験の実施	80	100	100	100	100	60	100		100	100	100	100	100	100	100		80	97
20	講師評価シートの配布回収	90	100	100	100	100	100	100	70	100	100	100	100	100	100	100	100	100	100
21	研修内容評価シートの配布回収	90	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
22	宿舎評価シートの配布回収	90	100	100	100	100	100	100	100	100	100	50	100	100	100	100	100	90	91
23	試験の実施監督と採点	50	90	60	100	70	50	50		90	80	100	100	80	100	90		80	92
24	試験結果の分析	0	0	50	80	50	50	80		50	80	80	0	70	80	50		100	63
25	研修終了証の作成	0	0	60	80	70	70	100	100	100	100	100	100	80	90	100	100	100	96
26	成績優秀者表彰状の作成	0	0	0	80	20	70	20	100	100	100	100	100	80	90	100		100	95
27	研修生へのインタビュー	0	10	10	80	10	50	50	60	50	50	100	50	50	100	100	80	50	76
28	閉校式	50	50	50	50	70	80	80	100	100	100	80	100	80	100	100	100	80	91
29	研修生への日当支払い	100	100	100	100	100	100	100	100	100	60	100	100	100	100	100	100	100	100
30	講師への支払い	100	100	100	100	100	100	100	100	100	100	80	100	100	100	100	100	100	97
31	研修生へのインタビューの分析	0	0	0	0	0	50	50	60	30	0	100	0	50	100	70	100	50	67
32	評価シートの分析	0	0	30	80	30	50	70	100	40	100	70	50	50	100	50	100	100	74
33	研修終了後のミーティングと評価	20	20	20	40	0	40	100	0	30	50	100	20	40	50	40	80	50	54
34	報告書作成	0	0	20	50	20	50	100	0	20	50	100	80	40	100	70	100	80	81
	平均	36	55	49	76	62	68	71	79	73	82	91	74	77	93	81	94	78	84
	80%以上の作業項目数	8	16	10	24	13	13	18	18	18	26	30	22	21	31	23	28	23	25
		WT	浄水場	維持管	理														
		WSF	給水施	設															
		GIS WM	データ 井戸管		18														
		WQA	水質分	析															
	曲,東明安チニ)		組織管管網管																

出典:専門家チーム

指標 1-2 はほぼ達成された。2007 年 11 月に行われた本プロジェクトの事前評価調査団によるニーズ調査に基づいて、3 つの基幹コースと 2 つのアドホックコースの実施が決定された。プロジェクト開始後、8 つの SWC への現地調査が 2008 年 8 月と 11 月に行われ、給水状況と研修ニーズが把握された。調査結果に基づき、5 つの研修コースの詳細な内容が作成され、さら

に2つのアドホックコースが実施されることが決められた。その後専門家によりコースのシラバスが準備された。専門家は研修コースの管理と評価、講師の評価、研修報告書の作成に関するマニュアルを準備した。すべてのマニュアルは実情に即して改定され、プロジェクト終了までに完成される予定である。年間計画が作成され、プロジェクトの進捗に従って毎年更新された。各コースが実施される前に教材は各講師によって作成され、すべてのコースが実施された後、PWCTの現在の7つのコースの一般的教材として最終化される予定である。

		対象者						
No	マニュアル	管理職	担当者	アシスタント	研修生			
1	PWCTの就業規則	0	0	0				
2	会計管理マニュアル	0	0					
3	予算管理マニュアル	0	0					
4	文書管理マニュアル	0	0	0				
5	データ管理マニュアル	0	0	0				
6	機材の管理マニュアル		0	0				
7	PWCTの管理マニュアル	0	0	0				
8	宿舎の管理マニュアル		0	0				
9	宿舎の利用マニュアル		0	0	0			
10	KTCの管理マニュアル		0	0				
11	報告書作成マニュアル		0	0				
	研修コースの管理マニュアル		0	0				
	研修コースの評価マニュアル		0	0	0			
14	研修講師の評価マニュアル		0	0	0			
15	宿舎の評価マニュアル		0	0	0			

表 2-4 PWCTのマニュアルリスト

KTC は、必要な供与機材を備えて 2010 年 1 月に建設されたため、指標 1-3 は達成されている。PDM0 は研修コースに必要な機材が JICA により供与されるとしているが、プロジェクト 開始時にすべてを購入する計画ではなかった。日本からの機材の調達が遅れたため、KTC の建設も遅れた。

指標 1-4 は一部達成された。2 回以上講師を務めた 12 人の研修講師のうち 6 人は、研修生からの評価が改善した。一方、4 人の講師の評価は、前回より低くなり、質の悪い講義を行っている 2 人の講師は交代された。しかしながら、専門家によると、低く評価された幾人かの講師は良い講義をしており、これらの評価結果は研修生との相性等、講義内容以外の要素の影響を受けている可能性がある。以上を勘案すると、指標 1-4 には改善の余地があると考えられる。

2-2-2 成果 2

成果 2 は「PWCT は研修コースを管理するために必要な管理能力を獲得する」である。前項で述べたように、本プロジェクトは、研修実施システム、組織、就業規則、予算管理などを確立することにより、研修の実施を開始した。PWCT は 2007 年に設立され、PWCT スタッフは

誰もそれまでに研修コースを管理したことがなかったので、専門家は研修コース管理のための 12 のマニュアルを作成し、その使い方を説明した。

表 2-5 成果2の達成状況

指標	達成状況
2-1. 活動 2 (-1) に示されて	本指標は達成される見込みである。PWCT の就業規則やスタッフの
いる就業規則と業務分	業務分掌は変化するニーズや状況に従って改定されている。これら
掌が改定される。	は 2011 年 1 月に完成される予定である。
2-2. 研修コースの改善され	本指標は達成されている。テキストや教材は専門家オフィスに保存
た教材やテキストの適	されており、カウンターパートや講師による使用のために適切に管
切な管理。	理されている。著作権に関する講義がカウンターパートに対して行
	われた。機材が設置された後、機材管理の専門家は機材リストと維
	持管理マニュアルを使って機材を維持する方法をワークショップ
	スタッフに説明した。
2-3. 研修センター予算の適	本指標はほぼ達成されている。予算管理システムはそのテーマのマ
切な管理。	ニュアルに基づき開発された。PWCT の予算表が開発された。予算
	はマニュアルに沿って管理されているが、PWCT は PWC から独立
	した銀行口座を持っていないので、適切な予算管理ができず、支払
	いに時折遅れが生じている。

指標 2-1 はプロジェクト終了までに達成される見込みである。PWCT の就業規則や研修管理におけるスタッフの業務分掌は、2008 年 7 月に作成された。PWCT は PWC の一部であるため、すべての管理規則は PWC のそれに従っている。さらに、就業規則は大変複雑で、研修センターのニーズや状況に対応するために改定されなければならない。現在改定中であり、2011 年 1 月に完成予定である。

指標 2-2 は達成されている。プロジェクト開始当初は研修コースの参考書がなく、必要な機材も遅れたため、本指標は PDM4 で開発された。中間レビューの後、スーダンでは手に入らない何冊かの参考書が、カウンターパートの本邦研修期間中に供与されている。教材やテキストは専門家オフィスに保存されており、カウンターパートや講師による使用のために適切に管理されている。機材が設置された後、機材管理の専門家は作成された機材リストや維持管理マニュアルを使って、機材の維持管理方法についてワークショップスタッフに説明した。

指標 2-3 はほぼ達成されている。指標 2-1 で述べたように、予算管理や会計も PWC のそれに従っている。 PWCT の予算管理マニュアルは 2008 年 7 月に作成されたが、現在のニーズに応じるために改定中であり、まだ完成されていない。プロジェクトの 1 年目には PWCT 予算はPWC 予算の一部となっており、研修活動費用が PWC 予算の中で明確に記載されていなかった。そこで専門家は PWCT センター長、管理部長、会計部長と専門家で構成される PWCT の予算管理システムの確立を支援した。2009 年には、2008 年から 2010 年までの PWCT の予算表が作成された。予算表は現在 2011 年まで作成されており、それによると PWCT 予算は継続的に増加している。しかし、PWCT は独立した銀行口座を保有しておらず、会計手続きの際には PWC

の銀行口座を必ず介する必要があるため、突発的な資金ニーズへの対応が難しい。このような 状況を勘案すると、PWCT は今後独立した銀行口座を開設する必要がある。

2-2-3 成果 3

成果 3 は「PWCT は研修コースの問題解決とフィードバックの能力を獲得する」である。中間レビューで、この成果は将来の研修コースにフィードバックする側面が追加された。研修生によると、スーダンにおける研修コースはフィードバックシステムを持っていない。そのため、コースコーディネーターは問題解決やフィードバックに慣れていない。専門家は研修コース、講師、宿泊施設、食事に関する評価シートの作成や、研修生に対するインタビューを支援した。インタビューに基づき、カウンターパートと専門家は研修後の会議やコース評価を行った。

表 2-6 成果3の達成状況

	指標	達成状況
3-1.	3つの基幹コースの5	本指標はほぼ達成している。給水施設とデータベース/GIS に関する 2
	回以上の実施とアド	つの基幹コースは5回実施され、もう1つの基幹コース(浄水場運営
	ホックコースの 3 回	と維持管理)は 4 回実施される予定である。水質分析と管網管理の 2
	以上の実施。	つのアドホックコースは 2 回実施され、プロジェクト期間中の現地調
		査に基づき追加された他の 2 つのアドホックコース(井戸管理、組織
		管理)は3回実施される予定である。
3-2.	活動 3-2 の各観点に	本指標は達成されている。しかし専門家によると、カウンターパート
	おける問題点と困難	は研修コースを管理する上での問題点や困難を発見することはまだ難
	の数。	しい。そのため、専門家は研修後の会議で問題点について説明をして
		いる。カウンターパートが自分で問題点を発見するにはいくらかの時
		間がかかりそうである。
3-3.	活動 3-2 に基づいた	本指標は達成されている。問題点や困難に基づいて、専門家の助けを
	研修センターの全活	借りてカウンターパートは解決策や改善方法を見つけようとした。こ
	動の改善の数。	れらの努力を通じて、大半は改善されたが、それはほとんど専門家に
		よって行われたものである。これについては、カウンターパートによ
		る継続した改善への努力が必要である。

指標 3-1 はほぼ達成している。プロジェクト期間中の研修スケジュールは、表 2-7に示すとおりである。給水施設とデータベース/GIS の2つの基幹コースは5回実施され、もう1つの基幹コースである浄水場運営と維持管理は4回実施される。水質分析と管網管理の2つのアドホックコースは2回実施される予定であり、後にプロジェクト期間中の現地調査に基づいて追加された2つのアドホックコース(井戸管理と組織管理)は3回ずつ実施される予定である。

表 2-7 研修スケジュール

年				200	08								20	09											20	10						201	11	
フェーズ						1										2	2											3						
研修No.								1 🖪	目				2	回	Ħ				3回	目					4	回目				5 E	1 F	匚		合計
1. 研修コース	4	5	6	7 8	9	10	11	12	1	2	3 4	1 :	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9 10) 1	1 12	2	1 2	3	
(1) 浄水場維持管理(21)							*							•	*					*											7	¥		4回
(2)給水施設(22)									*	·			*						*									*				*		5回
(3)データ管理/GIS(16)										¥	t		7	\			,	k							*			1	ł					5回
(4)水質分析(15)																				,	⋆										*			2回
(5)組織管理 (15)																,	☆								1	₹				☆				3回
(6)井戸管理 (21/9)														×							, ,	☆		*	4									3回
(7)管網管理(15)																										*			*					2回
研修実施回数							1			1	1		2	1	1		1	1	1	1	1	1			2	2		2	2	1 2	2	1 1		24
講師数							6			5	5		10	7	5		3	3	2	4	4	5			10	6		17	7 .	4 8	3 ,	4 4	Į.	102
研修生数							21		2	2 1	6		37	21	20		15	15	22	17	17	19			37	30		38	3 1	5 30	0 2	1 22	2	435

出典:専門家チーム

指標 3-2 は達成している。各研修報告書は研修中の問題点や解決方法について報告している。表 2-8 は PDM4 上の活動 3-2 で言及された各観点での問題点や困難を並べたものである。 しかし、専門家は、カウンターパートが研修コースを管理する上での問題点を見つけることにまだ困難があるとしている。 専門家は研修コース実施後カウンターパートに問題点を知らせている。 カウンターパート自身が問題点を見つけるにはまだ時間がかかりそうである。

指標 3-3 は達成している。いままでに改善された点は表 2-8に示されている。問題点や困難に基づいて、カウンターパートは、専門家による支援の下、解決や改善策を見つけようとした。その努力を通じて、問題点の大半は改善された。しかし、それらの改善点の大半は専門家により行われており、改善のためのカウンターパートによる継続的な努力が必要とされる。

表 2-8 問題点と改善策

観点	問題点	改善策
コースのニーズと	スーダンにおける研修コース	約 50 冊のテキストや参考書が日本から供与され
内容の整合性	の教材やテキストがない。	た。
	研修期間を長くするべきだ。	研修スケジュールが既に決まっていたため、変更
		できなかった。
	研修コース以外の内容の研修	_
	を実施することが要請された。	
	宿泊施設の能力により、より多	新しい研修センターが計画されている。
	くの研修コースを同時に実施	
	することができなかった。	
	2回目の井戸管理コースで、研	分析結果は 3 回目の研修コース内容に反映され
	修生の弱点が分析された。	た。さらに、振り返り試験の実施や実習問題の開
		発などのような弱点を克服するための手段が取
		られた。
教材の内容とその	著作権に対する低い認識。	カウンターパート本邦研修についての講義が行
インターフェイス		われた。
	機材の定期的維持管理の不足。	教材や機材の管理のためのマニュアルの開発と
		指導。
講師の能力とプレ	いくつかの講師は低い評価を	2人の講師が交代したが、適切な人材が限られて
ゼンの方法	受けた。	いるために、交代することが不可能であった。

2-2-4 プロジェクト目標

プロジェクト目標は、「PWCT が研修実施体制を確立する」である。成果の達成の項で述べたように、PWCT は、専門家の指導を受けて、就業規則やスタッフの業務分掌、研修実施体制、研修コースの管理に関する 12 のマニュアル、予算管理システム、研修コース実施に関する 4 つのマニュアルを作成し、研修実施計画に沿って今までに 18 の研修コースを実施した。研修コースを管理、実施するために、カウンターパートは、専門家の指導の下、さまざまな面で課題はあるが、研修コースを計画、実施、管理し、また、問題に対して解決策を見出し、将来の研修コースにフィードバックを行った。

以上を勘案すると、PWCT は、本プロジェクトの活動を通して研修実施体制を確立したと言えるため、プロジェクト目標は達成したと判断される。しかし、カウンターパートの能力のさらなる向上のためには、専門家によるモニタリングを行いながら研修コースを実施し続けることが必要である。なお、実施体制確立を検証するため、プロジェクトの終盤には、カウンターパートのみで研修コースを実施する予定である。

表 2-9 プロジェクト目標指標の達成状況と見込み

指標	達成状況と見込み
1. 研修生による研修コースの評	本指標は既に達成している。17 の研修コースを通じた講師と研修
価平均点が90%以上になる。	コースの評価平均点はそれぞれ 91 点、90 点である。これらの平均
	点は最初から高かった。
2. 研修生による研修管理の評価	本指標はプロジェクト終了に向けた継続的な努力をもって、達成さ
平均点が 90%以上になる。	れる見込みである。17 研修コースを通じた研修管理、宿泊設備、
	食事の評価平均点はそれぞれ 85、82、72 点である。
3. 少なくとも 90%以上の研修生	すべての研修生が修了証を得ている。研修生に対する試験結果の平
がコースを満足に修了した証	均点は60点で、概ね合格点に達したと言える。
明書を得る。	

指標 1. では、プロジェクトチームは講師と研修コースに関する研修生の評価シートを作成 した。講師に対する評価は次の評価項目で構成される。それは基本的態度、スピーチ、講義の 構成、時間管理、研修ツールであるが、研修コースの評価については、評価項目はコースによ って異なる。

表 2-10に示すとおり、17の研修コースを通じた講師に関する評価平均点は91点であっ た。

1回*1 9回 | 10回 | 11回 | 12回 | 13回 | 14回 | 15回 | 16回 | 17回 | 平均点 2回 3回 4回 5回 6回 7回 8回 WTP|WSF| GIS |WSF| GIS |WM | OM |WTP| GIS | WS |WTP|WQA|WM |WM | GIS | OM |PNM コース В C D Ε 合計 講師の数 100点中の 平均点*2

表 2-10 講師に関する研修生の評価

表 2-11に示すとおり、17の研修コースを通じた研修コースの評価平均点は90点である。 研修生が満足した点の1つは、理論と実践で構成され、ビデオの活用や会社訪問などを含んだ 教授法であった。

^{*1.} 各グレードの割合(%)(A, B, C, D, E)

^{*2.} 各グレードの点は次の通りとした: A=90, B=70, C=50, D=30, E=10

表 2-11 研修コースに関する研修生の評価

	1回*1	2回	3回	4回	5回	6回	7回	8回	9回	10回	11回	12回	13回	14回	15回	16回	17回	平均点
コース	WTP	WSF	GIS	WSF	GIS	WM	OM	WTP	GIS	WS	WTP	WQA	WM	WM	GIS	ОМ	PNM	
A	83	51	42	65	64	51	74	83	71	59	77	57	38	57	84	84	46	64
В	17	40	47	33	33	39	24	12	25	36	19	33	44	41	16	16	43	30
С	1	8	9	2	2	8	1	4	3	4	3	7	12	2	0	0	8	4
D	0	1	1	0	1	2	1	0	1	1	1	2	2	0	0	0	2	1
Е	0	0	1	0	0	0	0	0	0	0	0	2	4	0	0	0	1	0
合計	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
100点中の																		
平均点*2	96	87	84	92	91	86	94	95	92	90	94	87	80	90	96	96	85	90

^{*1.} 各グレードの割合(%)(A, B, C, D, E)

講師と研修コースの評価は最初から高いレベルであったため、指標1は既に達成している。

指標2については、専門家は研修コース管理、宿泊設備、食事の評価シートを作成した。

表 2-1 2に示すとおり、研修コース管理の評価平均点は 85 点であり、これは目標に近い。 もしプロジェクト終了までに継続して研修コース管理の改善に努力すれば、平均点は 90 点を 超えるだろう。

表 2-12 研修コース管理に関する研修生の評価

質問	1^{*1}	2	3	4	5	6	7	8	9	10	11	12	13	14	平均点
A	69	61	50	52	48	42	41	34	69	55	38	31	46	45	49
В	24	33	43	34	50	46	47	52	25	30	48	42	44	31	39
С	5	5	5	9	0	11	10	12	3	13	9	20	7	21	9
D	0	2	2	5	0	0	0	2	0	0	3	5	0	3	2
Е	2	0	0	0	2	2	2	0	2	2	2	2	3	0	1
100点中の 平均点 ^{*2}	91	89	87	85	87	84	83	82	91	86	82	77	84	82	85

^{*1.} 各グレードの割合(%)(A, B, C, D, E)

表 2-13に示すとおり、宿泊設備に関する研修生の評価平均点は82点である。

表 2-13 宿泊設備に関する研修生の評価

コース	1回*1	2回	3回	4回	5回	6回	7回	8回	9回	10回	11回	12回	13回	14回	15回	16回	17回	平均点
A	76	51	55	58	52	54	59	42	51	34	50	47	40	72	51	31	49	51
В	20	32	31	37	34	29	20	41	28	37	27	23	34	23	28	34	31	30
С	3	8	8	4	7	11	6	12	11	14	14	15	10	3	11	29	13	11
D	0	5	5	0	5	3	5	3	7	6	5	7	8	2	7	4	4	4
Е	1	4	1	1	2	3	10	2	3	9	4	8	8	0	3	2	3	4
100点中の						_												
平均点*2	93	82	85	89	84	84	81	82	82	74	81	76	76	92	82	75	82	82

^{*1.} 各グレードの割合(%)(A, B, C, D, E)

^{*2.} 各グレードの点は次の通りとした: A=90, B=70, C=50, D=30, E=10

^{*2.} 各グレードの点は次の通りとした: A=90, B=70, C=50, D=30, E=10

^{*2.} 各グレードの点は次の通りとした: A=90, B=70, C=50, D=30, E=10

比較的低い評価点となったのは、トイレやシャワー設備の頻繁な故障や研修生用の個室がないことが原因としてあげられる。しかしながら、建物を劇的に改築しなければトイレやシャワー設備の問題は解決できない。さらに、講義室や宿泊設備は研修センターとしてデザインされていないオフィスビルディングに設置されている。このため、研修コースの適切な実施のためには研修センターの建物を建設する必要がある。PWCTは、壁に注意書きを張って、バスルームの適切な使用法や衛生環境の維持に関して研修生の意識を高めるよう工夫した。

PWC 総裁による情報では、50 人の研修生を擁することができる新研修センターの建設予算が確保され、建設作業が来年初頭から始まる予定とのことである。PWC は人的資源や PWCT 活動の拡大に応える予算を増やすことも計画している。

表 2-14に示すとおり、食事に関する研修生の評価平均点は72点である。

コース	1回*1	2回	3回	4回	5回	6回	7回	9回	10回	11回	12回	13回	14回	15回	16回	17回	平均点
ユース	II	스빈	기凹	4년	기비	이쁘	(<u>U</u>	9凹	1이티	11번	14번	19미	14년	10回	10미	17円	十均点
A	65	30	36	30	24	35	44	14	17	22	23	11	73	15	20	50	32
В	30	48	48	47	29	40	29	26	29	35	25	12	25	26	30	40	32
С	5	13	8	13	20	23	9	33	20	35	23	18	2	33	47	8	19
D	0	9	8	10	17	4	7	12	15	4	17	26	0	12	3	2	9
Е	0	0	0	0	10	0	11	15	19	4	12	33	0	14	0	0	7
合計点	82	70	72	69	58	72	68	52	52	63	56	38	84	53	63	78	65
100点中の																	
平均点*2	91	78	80	77	64	80	75	58	58	70	62	43	94	59	70	86	72

表 2-14 食事に関する研修生の評価

提供されている食事は、スーダンの平均的食事よりも上質であるものの、研修生の一部は食事の質について不満を述べている。苦情に応えるため、PWCT は食事サービス業者を数回変更したものの、評価の改善には至らなかった。研修生の出身地域の全ての伝統的な食事を反映することも難しい。全コースを通じて同じ食事を提供したので、研修生が飽きたことによることも評価が低くなった一因と考えられる。

食事以外では、指標2は研修コース管理の継続的な改善により達成される見込みである。

指標 3 は一部達成される見込みである。今まで全研修生が高い出席率により修了証を受け取った。講義に対する研修生の平均理解度は 60 点であることから、概ね合格点に達したと言える。一方、研修生の一部は、試験は理論に加えて実践的な項目を含むべきだとコメントした。これについては改善の余地があると考えられる。

^{*1.} 各グレードの割合(%)(A, B, C, D, E)

^{*2.} 各グレードの点は次の通りとした: A=90, B=70, C=50, D=30, E=10

表 2-15 試験結果

年	2008				20	09						20	10					
SWC	1回	2回	3回	4回	5回	6回	7回	9回	10回	11回	12回	13回	14回	15回	17回	合計	平均	順位
Northern	34	75	42	76	72	74	48	73	79	79	64	57	60	70	56	959	64	3
River Nile	65	50	30	61	14	77	73	43	73	89	73	66	61	61	76	912	61	5
Red Sea	18	62	72	71		74	43	67	72	79	69	53	不参加	56	不参加	736	61	5
Kassala	50	51	85	60	69	65	30	67	77	不参加	66	不参加	不参加	57	58	735	61	5
Gedaref	71	69	27	63	60	88	68	27	69	83	59	67	75	41	64	931	62	4
Khartoum	43	45	42	56	68	48	48	不参加	67	80	63	51	44	不参加	69	724	56	13
El Gezira	71	72	88	74	92	42	65	88	83	73	60	56	82	90	59	1095	73	1
Sennar	59	48	59	60	98	不参加	43	94	61	82	61	不参加	不参加	67	54	786	66	2
White Nile	56	56	27	57	62	82	73	41	76	77	66	64	65	34	72	908	61	5
Blue Nile	56	39	15	37	50	71	40	33	51	68	50	63	40	不参加	64	677	48	14
	52	54	12	不参加	50		65	47				59	61	42	86			9
		61	21	53											67			12
				不参加														14
South Darfur										不参加		_						9
Western Darfur	52	52	不参加	56	57	62	不参加	71		71	57	52	57	65	46	767	59	9
N.W.E. Company	59	56	不参加	49	不参加	不参加	60	不参加		76	不参加	不参加	不参加	不参加	不参加	373	62	
	57		38	61	64	不参加		不参加		不参加	不参加	不参加	不参加	不参加	79			
	不参加		不参加	63	不参加	不参加		不参加		不参加	67	不参加	不参加	不参加	不参加	304		
平均	52	57	44	59	62	69	53	57	64	78	63	55	61	56	63		60	
		:浄水場	· 易運営維	持管理	コース													
		:給水店	を設コー	・ス														
					7													
		: 井戸	管理コー	ース														
		:水質分	分析コース	ζ														
		: 管網管	・ 理コース	ζ														
	SWC Northern River Nile Red Sea Kassala Gedaref Khartoum El Gezira Sennar White Nile Blue Nile North Kordofan South Kordofan North Darfur South Darfur Western Darfur	SWC 1	SWC 1 2 2 2 2 2 2 2 2 2	SWC 1回 2回 3回 3回 Northern 34 75 42 River Nile 65 50 30 Red Sea 18 62 72 Kassala 50 51 85 Gedaref 71 69 27 Khartoum 43 45 42 El Gezira 71 72 88 Sennar 59 48 59 White Nile 56 56 27 Blue Nile 56 39 15 North Kordofan 52 54 12 South Kordofan 37 61 21 North Darfur 49 59 7 South Darfur 54 54 92 Western Darfur 52 52 不参加 7 7 7 7 7 7 7 7 7	SWC 1回 2回 3回 4回 Northerm 34 75 42 76 River Nile 65 50 30 61 Red Sea 18 62 72 71 Kassala 50 51 85 60 Cedaref 71 69 27 63 Khartoum 43 45 42 56 El Gezira 71 72 88 74 Sennar 59 48 59 60 White Nile 56 56 27 57 Blue Nile 56 39 15 37 North Kordofan 52 54 12 不参加 South Kordofan 37 61 21 53 North Darfur 49 59 7 不参加 South Darfur 54 54 92 47 Western Darfur 52 52 不参加 56 <t< td=""><td> SWC 1回 2回 3回 4回 5回 </td><td> SWC 1回 2回 3回 4回 5回 6回 Northern 34 75 42 76 72 74 River Nile 65 50 30 61 14 77 Red Sea 18 62 72 71 74 74 Red Sea 18 62 72 71 74 74 Red Sea 70 71 74 74 75 75 75 75 75 75</td><td> SWC 1回 2回 3回 4回 5回 6回 7回 </td><td> SWC 1回 2回 3回 4回 5回 6回 7回 9回 Northern 34 75 42 76 72 74 48 73 73 43 Red Sea 18 62 72 71 74 43 67 Kassala 50 51 85 60 69 65 30 67 Gedaref 71 69 27 63 60 88 68 27 63 60 88 68 27 63 60 65 88 68 27 63 60 65 68 48 48 78 78 78 78 78 7</td><td> SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 10回 Northern 34 75 42 76 72 74 48 73 79 River Nile 65 50 30 61 14 77 73 43 73 73 Red Sea 18 62 72 71 74 43 67 72 73 73 73 73 73 74 75 74 75 75 75 75 75</td><td> SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 Northerm 34 75 42 76 72 74 48 73 79 79 River Nile 65 50 30 61 14 77 73 43 73 89 Red Sea 18 62 72 71 74 43 67 72 79 Rassala 50 51 85 60 69 65 30 67 77 不参加 Gedaref 71 69 27 63 60 88 68 27 69 83 Red Sea 43 45 42 56 68 48 48 78 78 78 80 Red Sea 71 72 88 74 92 42 65 88 83 73 Sennar 59 48 59 60 98 不参加 43 94 61 82 White Nile 56 56 27 57 62 82 73 41 76 77 80 80 80 80 80 80 80</td><td> SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 Northerm 34 75 42 76 72 74 48 73 79 79 64 River Nile 65 50 30 61 14 77 73 43 73 89 73 Red Sea 18 62 72 71 74 43 67 72 79 69 Kassala 50 51 85 60 69 65 30 67 77 不参加 66 Gedaref 71 69 27 63 60 88 68 27 69 83 59 Standard 50 51 85 60 69 65 30 67 77 77 78 78 78 78 78</td><td> SWC 1 2 3 4 5 6 7 9 10 11 12 13 13 14 15 15 14 15 15 15 15</td><td> SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 13回 14回 Northerm 34 75 42 76 72 74 48 73 79 79 64 57 60 60 60 60 60 60 60 6</td><td> SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 13回 14回 15回 15回 14回 15回 13回 14回 15回 15回 14回 15回 13回 14回 15回 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 15□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 15□ </td><td> SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 13回 14回 15回 17回 17回 17回 18回 17回 18回 17回 18回 18□</td><td> SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 13回 14回 15回 17回 合計 Northern 34 75 42 76 72 74 48 73 79 79 64 57 60 70 56 959 River Nile 65 50 30 61 14 77 73 43 73 89 73 66 61 61 76 912 Red Sea 18 62 72 71 74 43 67 72 79 69 53 7**shu 56 7**shu 736 Kassala 50 51 85 60 69 65 30 67 77 7**shu 66 7**shu 7**shu 57 58 735 Red Sea 71 69 27 63 60 88 68 27 69 83 59 67 75 41 64 931 Rhatroum 43 45 42 56 68 48 48 7**shu 67 80 63 51 44 7**shu 69 724 18 18 18 18 18 18 18 1</td><td> SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 13回 14回 15回 7回 合計 平均 Northern 34 75 42 76 72 74 48 73 79 79 64 57 60 70 56 959 64 River Nile 65 50 30 61 14 77 73 43 73 89 73 66 61 61 76 912 61 86 86 86 86 86 87 89 73 66 87 89 73 66 61 61 76 912 61 88 88 88 88 89 74 92 76 65 68 48 48 77 77 77 77 77 7</td></t<>	SWC 1回 2回 3回 4回 5回	SWC 1回 2回 3回 4回 5回 6回 Northern 34 75 42 76 72 74 River Nile 65 50 30 61 14 77 Red Sea 18 62 72 71 74 74 Red Sea 18 62 72 71 74 74 Red Sea 70 71 74 74 75 75 75 75 75 75	SWC 1回 2回 3回 4回 5回 6回 7回	SWC 1回 2回 3回 4回 5回 6回 7回 9回 Northern 34 75 42 76 72 74 48 73 73 43 Red Sea 18 62 72 71 74 43 67 Kassala 50 51 85 60 69 65 30 67 Gedaref 71 69 27 63 60 88 68 27 63 60 88 68 27 63 60 65 88 68 27 63 60 65 68 48 48 78 78 78 78 78 7	SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 10回 Northern 34 75 42 76 72 74 48 73 79 River Nile 65 50 30 61 14 77 73 43 73 73 Red Sea 18 62 72 71 74 43 67 72 73 73 73 73 73 74 75 74 75 75 75 75 75	SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 Northerm 34 75 42 76 72 74 48 73 79 79 River Nile 65 50 30 61 14 77 73 43 73 89 Red Sea 18 62 72 71 74 43 67 72 79 Rassala 50 51 85 60 69 65 30 67 77 不参加 Gedaref 71 69 27 63 60 88 68 27 69 83 Red Sea 43 45 42 56 68 48 48 78 78 78 80 Red Sea 71 72 88 74 92 42 65 88 83 73 Sennar 59 48 59 60 98 不参加 43 94 61 82 White Nile 56 56 27 57 62 82 73 41 76 77 80 80 80 80 80 80 80	SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 Northerm 34 75 42 76 72 74 48 73 79 79 64 River Nile 65 50 30 61 14 77 73 43 73 89 73 Red Sea 18 62 72 71 74 43 67 72 79 69 Kassala 50 51 85 60 69 65 30 67 77 不参加 66 Gedaref 71 69 27 63 60 88 68 27 69 83 59 Standard 50 51 85 60 69 65 30 67 77 77 78 78 78 78 78	SWC 1 2 3 4 5 6 7 9 10 11 12 13 13 14 15 15 14 15 15 15 15	SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 13回 14回 Northerm 34 75 42 76 72 74 48 73 79 79 64 57 60 60 60 60 60 60 60 6	SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 13回 14回 15回 15回 14回 15回 13回 14回 15回 15回 14回 15回 13回 14回 15回 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 15□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 13□ 13□ 14□ 15□	SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 13回 14回 15回 17回 17回 17回 18回 17回 18回 17回 18回 18□	SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 13回 14回 15回 17回 合計 Northern 34 75 42 76 72 74 48 73 79 79 64 57 60 70 56 959 River Nile 65 50 30 61 14 77 73 43 73 89 73 66 61 61 76 912 Red Sea 18 62 72 71 74 43 67 72 79 69 53 7**shu 56 7**shu 736 Kassala 50 51 85 60 69 65 30 67 77 7**shu 66 7**shu 7**shu 57 58 735 Red Sea 71 69 27 63 60 88 68 27 69 83 59 67 75 41 64 931 Rhatroum 43 45 42 56 68 48 48 7**shu 67 80 63 51 44 7**shu 69 724 18 18 18 18 18 18 18 1	SWC 1回 2回 3回 4回 5回 6回 7回 9回 10回 11回 12回 13回 14回 15回 7回 合計 平均 Northern 34 75 42 76 72 74 48 73 79 79 64 57 60 70 56 959 64 River Nile 65 50 30 61 14 77 73 43 73 89 73 66 61 61 76 912 61 86 86 86 86 86 87 89 73 66 87 89 73 66 61 61 76 912 61 88 88 88 88 89 74 92 76 65 68 48 48 77 77 77 77 77 7

2-2-5 上位目標

上位目標は「北部スーダンにおける安定的給水のための組織能力が向上する」である。組織能力は組織、管理システム、開発や運用のための施設や予算で構成される人的組織的能力を含む。

人的能力については、PWCT が SWC のスタッフに対して研修を続け、そのスタッフが各 SWC の同僚を研修する。PWCT は研修生の技術移転をモニターし、SWC で研修ユニットを支援することも計画している。したがって、州レベルの人的能力は改善することが予想される。

組織的能力に関する情報が限定的であることは注意すべきである。日本人は安全上の理由から、北部スーダンの 15 州のうち 6 州には訪問できないため、SWC に関する情報はいくつかの州への専門家の訪問や研修生へのインタビューから得ていた。PWCT は SWC の情報を収集する努力を行ったが、全 SWC の能力に関する十分な情報をまだ集めることはできない。

さらに、上位目標を達成するために、PDM4 上の記載に加えて、以下の外部条件が満たされなければならない。

- (1) 給水サービスや技術移転のために必要な機材が SWC で調達される。
- (2) 集められた水料金が給水サービス以外の目的に使われない。
- (3) 南部独立による石油収入の落ち込みにより、国家・州予算が低下しない。
- (4) 南部スーダンの独立による紛争が起きない。

表 2-16 上位目標指標の達成見込み

	指標	達成見込み
1.	各 SWC で 7 人以上の核となる人	PWCT での継続的な研修で 7 人以上の核となるスタッフの能力
	材が育成される。	が向上したため、本指標は達成された。
2.	実施された研修コースから学ん	本指標は達成されることが予想される。7 つの SWC への現地調
	だ教訓が州予算に基づき年間給	査では、SWC 総裁から、研修生の学んだ技術を年間給水計画に
	水計画 (3-5 年間) に適用され	適用すると表明された。
	る。	

指標1の達成は、SWCで必要な機材と施設の提供次第であり、それは現時点で不確かである。PWCTは7つの全研修コースのために各SWCから1人のスタッフを招待した。表 2-17に示すとおり、SWCの大半(15州のうち11州)は、17の研修コースに対し、17人以上の研修生を送っている。研修生の主要な資格要件は、SWCにおいて将来各分野のリーダーになっていくことである。研修生はPWCTで研修を継続受講していくこととなっている。4つの州は今まで17研修コースの一部だけで全コースには研修生を送っていない。これは、研修に対する総裁の関心不足などの理由による。PWCTは総裁に対し、研修の重要性をより強く伝えるよう努力することが必要である。平均7人以上の核となる人材がSWCの大半で研修を受けることが期待されているが、実践を伴わない研修は求める人材を育成することにはならない。そこで研修生の能力向上のためには、彼らの知識や技術を向上するために必要な機材や施設が提供されなければならない。各SWCは研修生の技術移転や実践のための機材や施設を提供すべきである。

表 2-17 州別研修参加者数

	年	2008					2009								2010				合計
No	研修コース	WTP(1)	WSF(1)	GIS(1)	WSF(2)	GIS(2)	WM(1)	WTP(2)	OM(1)	GIS(3)	WSF(3)	WTP(3)	WQA(1)	WM(2)	WM(3)	GIS(4)	OM(2)	PNM(1)	百計
NO	SWC / 研修回数	1回	2回	3回	4回	5回	6回	7回	8回	9回	10回	11回	12回	13回	14回	15回	16回	17回	17回
1	Northen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
2	River Nile	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	16
3	Red Sea	1	1	1	1	0	1	1	0	1	1	1	1	1	0	1	0	1	13
4	Kassala	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	12
5	Gedaref	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	18
6	Khartoum	2	1	1	1	1	1	2	0	0	1	2	1	1	1	0	0	1	16
7	El Gezira	1	3	1	3	1	1	1	0	2	3	1	1	1	1	2	2	1	25
8	Sennar	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	0	2	14
9	White Nile	2	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1	20
10	Blue Nile	2	1	1	1	1	1	2	1	1	1	1	1	1	1	0	1	1	18
11	Northen Kordofan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
12	Southern Kordofan	2	2	1	2	1	1	2	1	1	2	2	2	1	1	1	0	2	24
13	Northen Darfur	1	1	1	1	1	3	1	0	1	1	1	1	3	3	1	0	1	21
14	Southern Darfur	1	1	1	1	1	2	1	1	1	1	1	1	3	3	1	1	1	22
15	Western Darfur	1	1	1	1	1	3	0	1	1	1	0	1	3	3	1	1	1	21
16	N.W.E.Company	1	2	0	2	0	0	1	0	0	2	1	0	0	0	0	0	0	9
17	PWC	1	1	1	1	1	0	1	2	1	1	0	0	0	0	0	2	1	13
18	Hawata Project	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	4
	合計	21	22	16	20	15	19	20	12	15	22	17	17	20	19	14	12	17	298
		WT	浄水場約				58												
		WSF	給水施調				64												
		GIS			S = -	ス	60												
		WM	井戸管理				58												
		WQA		斤コース			17												
_		OM	組織管理				24												
		PNM	管網管理	合計			17 298												
				百訂			298												

指標2は規模の違いにかかわらず、SWCにより達成されることが期待される。2010年8月

の7つのSWCへの現地調査と本終了時評価調査団によるSWCへの訪問では、訪問先のすべてのSWC総裁がPWC研修コースの重要性を唱えており、予算の大小はあれ、各州の給水計画を作成するためにPWC研修コースの技術を適用するとしていた。さらに、2010年に4、5州で灌漑・水資源省が設立されたことも、水が州レベルで優先事項となったことを示している。

2-3 実施プロセスに関する特記事項

2-3-1 コミュニケーション・意思決定・実施体制

プロジェクトのコミュニケーション、意思決定、実施体制は概ね良好であるが、いくつかの 問題点もある。

専門家、カウンターパート、JICA の間のコミュニケーションはプロジェクト期間中非常に円滑だった。プロジェクトの初期には、本プロジェクトがスーダンへの日本 ODA の長い休止期間後の第 1 号案件だったため、スーダン側は JICA による支援方法が、カウンターパート、即ち PWCT への技術移転であることを理解しなかった。そのため、専門家や JICA は本プロジェクトの目的やそれがどのように動くかについてスーダン側に説明した。さらに、各 SWC の総裁が参加する 4 つの JCC が今までに開催された。各 JCC では、専門家や JICA が PDM とは何かやその進捗について説明し、また現状に合わせるためそれを改定したりした。毎週のカウンターパート会合は、マニュアルや専門家によって作成された作業表に基づいて、研修コースの準備、実施、評価の各ステップにおける進捗をチェックするために開催された。プロジェクトの後半には、PWC 総裁と PWCT センター長、専門家総括と JICA の間の月次会合で、プロジェクトが直面している事柄について話し合われた。

本プロジェクトに関連する意思決定は常に明確で、必要以上に時間がかからなかった。PWCT、PWC、専門家と JICA の間のよいコミュニケーションにより、緊急なニーズが発生した時でもすぐに決定が行われた。

専門家の支援の下に、PWCT はその組織体制と研修コースを実施する組織体制を確立した。カウンターパートはプロジェクトの初期に交代したが、プロジェクトはプロジェクト関係者の間のよいコミュニケーションを維持することによって、円滑に実施された。PWCのプロジェクトへの支援はプロジェクトの円滑な実施にも貢献した。

プロジェクト初期、SWC の総裁に研修の重要性を伝えるための努力が行われた。総裁の何人かは彼らが多忙であるために、研修へ SWC の人材を送ることに合意しなかった。研修の内容や ToT システムを知ることによって、総裁は研修の重要性を唱えるようになり、研修へ人材を送ることに合意した。

一方、プロジェクト関係者は PDM に基づいてプロジェクトを管理するべきである。状況やニーズに適応するため PDM は 3 回改訂されたが、プロジェクト関係者はプロジェクト目標の指標 1、2 を同じように理解していなかった。中間レビュー報告書に見られるようなこれらの指標に対する違った解釈は、PDM の改訂時反映されるべきである。

2-3-2 技術移転

当初指名されていたカウンターパートの全員が PWC の部長で、彼らは PWC の仕事で忙しく PWCT にいない状況だった。そこで、カウンターパートは初年度に、PWCT で働く意欲があり、 新しいことを学びたい若い人たちに全員交代された。 プロジェクト初期、カウンターパートは 専門家の不在期間中、研修コースを準備することが難しかったが、徐々に状況は改善している。

第3章 5項目による評価結果

3-1 妥当性

プロジェクトの妥当性は高い。

プロジェクトを取り巻く政策環境は、中間レビュー時から変化はない。プロジェクトはスーダン政府の政策に整合している。2009 年 10 月版の国家給水衛生政策の第 1 ドラフトは、給水のための人的資源の開発を優先課題の 1 つとして言及している。四半期戦略計画(2007-2031 年)が研修の重要性を強調している。PWC5 年間計画(2007-2012 年)は、SWC の州レベルでの研修を PWC が支援すべきであるとしている。

プロジェクトは日本の ODA 政策とも整合している。日本の対スーダン政府開発援助の国別援助計画(2008年)は重点支援セクターとして水と衛生をあげている。第 4 回アフリカ開発会議(TICAD IV)は、効果的な水資源管理と安全な水と衛生設備へのアクセスも支援分野としている。

プロジェクトは北部スーダンにおける持続的な給水のための緊急ニーズに焦点を当てている。スーダンにおける給水セクターの研修は 10 年間以上なかった。プロジェクトは北部スーダンにおける給水セクターの研修ニーズを満たしている。各研修コースはプロジェクトチームによる現地調査で州の緊急ニーズとして確認された。コースの内容は現地調査と研修コースの後の研修生とのインタビューに基づいてまとめられた。現地調査は SWC での他のニーズも確認しており、PWCT の将来の研修コースの計画に考慮する必要がある。しかしながら、SWC の十分な情報はまだ収集されておらず、プロジェクトチームはプロジェクト終了までに収集することを計画している。

プロジェクトは各 SWC で各分野のスタッフを研修し、その後研修生が同僚を教えるという ToT システムを採用している。各州の大きさや研修の重要性を考えると、SWC レベルでの機材や研修システムが不適切なため、ToT がすべての研修需要を満たすのは不可能である。将来 PWCT において各州からより多くのスタッフを研修することが必要である。

プロジェクトは PWC と PWCT のニーズを満たしている。2007 年に、PWC5 年間計画は PWC が SWC を研修により支援すべきだと唱えている。これが PWCT が設立された理由である。プロジェクトは PWCT が研修実施システムを確立することを支援した。国連児童基金(United Nations Children's Fund: UNICEF)は PWC の支援と、ハンドポンプの建設・維持管理を 20 年間以上支援してきた。プロジェクトの給水施設コースはこの支援と相乗効果を持っている。

日本は給水セクターで技術的優位性を持っており、優れた研修施設も有している。日本は高い レベルの給水技術を持ち、それはスーダンにおける現在の給水状況に適応し得る。

3-2 有効性

プロジェクトの有効性は高い。

プロジェクト目標はいくつかの課題を持ちながらもほぼ達成される見込みである。研修実施シ

ステムはほぼ完成し、カウンターパートは研修コースを計画、実施、管理する能力を獲得した。一方で、PWCT の組織体制、即ち就業規則、予算管理や会計手続きのようなものを完成させるには時間がかかるだろう。カウンターパートが講師の質を管理するために、研修実施・管理のすべての段階をマスターするのも時間がかかるだろう。研修コースの適切な実施のために、新研修センターが建設されなければならない。

3 つの成果はプロジェクト目標の達成に貢献している。研修コースの計画・実施と改善のためのフィードバック・管理は、研修コースの実施システムを確立するために必要不可欠な要素である。

プロジェクト目標を達成するための外部条件、即ち「センター予算が継続的に確保され、組織構造は大きく変化されない」が今までに達成されなかった。プロジェクトが開始されてから、PWCTにより提案された予算のうち、平均で90%が承認された。PWCT予算は毎年増加したが、それは灌漑・水資源省によるプロジェクトの高い関心とPWCの強い支援を示している。

以下の項目が、プロジェクトの有効性への貢献要因となった。

- (1) PWC 総裁と PWCT センター長の強いリーダーシップとプロジェクトに対するオーナーシップ。
- (2) プロジェクトチーム、JICA、日本大使館の間の良好な関係と密接なコミュニケーション。 それぞれのトップ間の月次会合は PWCT の中長期課題を含む、プロジェクトが直面する 問題に即時に対応するのに役立った。
- (3) 他の JICA 案件や日本の草の根無償プロジェクトからの支援を通じて、カウンターパートが次の能力を獲得した。
 - ① カウンターパートは予算管理研修を受講した。予算計画を立案することにより、予算管理能力を改善できた。
 - ② カウンターパートは PWCT で、施工管理研修に参加した。これによりこの分野の重要性を関係者に知らせるものであった。
 - ③ ハルツーム農村部において、井戸掘削、給水施設の建設、機材の調達を通じて、専門家はプロジェクト実施方法をカウンターパートに指導した。
 - ④ カウンターパートの本邦研修は、プロジェクトの有効性を上げた。カウンターパートは日本の研修センターをモデルとし、PWCT も模倣しようという意欲を持った。このように本邦研修はカウンターパートのプロジェクトに対するオーナーシップを高めた。

プロジェクトの初期は以下のようなプロジェクトの有効性に対する阻害要因があったが、後に すべて克服された。

- (1) 当初多くの必要な機材が調達機材に含まれていなかったので、機材の提供が遅れた。日本からの機材の到着の遅れにより、先ず、実習は大学や軍の施設のような他の施設で行われなければならず、研修コースの効果的な実施を妨げた。次に、水質分析コースは 2年次の後半に機材到着後ようやく研修が始められた。
- (2) 当初指名されていたカウンターパートは、その役割を果たすことができなかった。彼ら

は PWC の仕事に忙しく、カウンターパートとして働く時間もない部長レベルだった。 そのため、若い職員に交代された。

3-3 効率性

プロジェクトの効率性は高い。

3つの全成果はほぼ達成している。カウンターパートと PWCT は研修コースを実施する経験がなかったため、専門家による技術支援は、カウンターパートが研修を計画、実施、モニタリングできるようになるには十分だった。しかしながら、プロジェクト後にカウンターパートだけで業務が適切にできるかは難しいと考えられ、その仕事をモニターする必要がある。PDM に記載された活動は成果を達成するためにもおしなべて適切だった。

1年後、プロジェクトは PWCT 組織体制の構築や研修コースの準備に集中した。17の研修コースが1年半のうちに開催され、さらに7つのコースが残りの半年間で開催される予定である。プロジェクト後半2年の間の研修コースの集中的なスケジュールから、プロジェクトは効率的に活動を実施したといえるだろう。

成果を達成するための外部条件としては、第 1 に、「指導のためのコースの研修生はセンターで滞在して、講師として働きつづける」は、誰が「指導のためのコースの研修生」か明確でない。第 2 は、「研修センターのスタッフがセンターで交代なく働き続ける」については、当初指名された 6 人のカウンターパートは、その役割を果たすことができないため、プロジェクト 1 年目に交代になった。これはプロジェクトの効率的な技術移転を阻害した。しかしながら、新しい、若いカウンターパートはプロジェクトの残りの期間に働き続けた。そのためこの条件はほぼ満たされた。

専門家はカウンターパートと良い関係を持っている。その結果、専門家はカウンターパートの 信頼を得た。これはプロジェクトの効率性にも貢献した。

プロジェクトにより調達された機材は、日本からの機材の遅れはあったが確かに提供された。その後、調達機材と車両は適切に活用された。カウンターパートの本邦研修も、専門家がその内容を計画したこともあり的確だった。さらに、プロジェクト予算はニーズに応えるために増加した。

スーダン側のインプットとして、講師代の支給、KTCや水質分析室の建設、消耗品・スタンドバイ発電機の提供、研修生用宿泊設備の建設が行われた。

3-4 インパクト

プロジェクトのインパクトの見込みは高い。

上位目標はいくつかの条件のもと達成される見込みである。各州 7 人の核となる人材の育成は 既に始まっている。何人かの研修生は技術移転を SWC の同僚に行った。同僚に教えることによ り、彼らは知識や技術を確実なものとし、彼らの能力は向上した。 給水セクターの組織能力については、研修を重視した国家水政策の下、PWCTマスタープランの作成は専門家の指導のもと進行中であり、これはプロジェクトの正のインパクトである。2010年8月の現地調査は、研修の正の副次効果として、3つの州でいくつかのデータベースが作成されており、7つの井戸がリハビリされていることを確認した。しかしながら、大半のSWCの総裁は研修の重要性を認識しているが、研修生の大半は研修のための機材や施設が限られている問題に直面している。研修生による技術移転のSWC間での違いは、総裁が研修関連にどの程度重要性を置いているか、またSWCレベルでの給水分野の予算額が多いかによる。ゲダレフ州では、研修施設は必要機材を備えて建設された。これは他の州のモデルとなり得る。3つの州は研修センター建設も計画している。訪問したSWCの総裁は、PWCTの研修での技術や知識を州の給水計画に適用することに関心を持っている。さらに、北部スーダンにおける安定的な給水のための組織的能力の開発のために、効果的に給水運営できるPWCとSWCの組織体制、効果的な水道料金表、資金管理、情報管理のような事項についても発展させる必要がある。

このように上位目標の達成は、北部スーダンにおける研修コースと給水事業全般の予算が配分され、実施されるだけでなく、上述の事項が実現される必要がある。

上位目標を達成するために、PWCTと SWC は以下のような課題に直面している。

<PWCT>

- ・ 多様なニーズに応えるために、様々な技術レベルで異なる技術分野の研修コースや、計画・ 財産管理や料金表などの運営面の研修コースを計画・実施する。
- 効果的な研修システムのためにすべての SWC の人的資源データベースを開発する。
- ・ 州を訪問することにより、SWCで技術移転状況をモニターする。

<SWC>

- ・ 研修や給水サービス全般のための予算を確保する。
- ・ 必要な機材や研修施設を持つ研修ユニットを作る。

外部条件については、第1に、「機材がプロジェクト期間中PWCTで使われるよう設置される」は、上位目標達成のためではなく、プロジェクト目標達成のための条件である。第2に、「研修コースを終えた研修生のモチベーションが維持される」は、技術移転のための適切な機材や施設があるかどうかにかかっており、これについては現在大半の州で整備されていない。

次の事項が上位目標を達成するために満たされるべきその他の外部条件である。

- ① SWC において給水サービスと研修のために必要な機材が調達される。
- ② 給水サービスの収入が給水サービス以外の目的に使われない。
- ③ 国家・州予算が将来大幅に変化しない。
- ④ 政治的に安定的な状況が維持される。
- 一方、次の事項がスーダンと日本におけるプロジェクトの想定外の正のインパクトである。
 - ① プロジェクトは長期間のスーダンに対する日本の援助停止後再開第1号案件である。プロジェクト実施の成功や広報活動により、日本の援助に対するスーダン政府と国民の期

待が高まった。

② プロジェクトチームは日本のメディアに対する広報活動も行い、JICA ウェッブサイトに プロジェクトの進捗の報告をした。これら広報活動は、プロジェクトの日本人に対する アカウンタビリティーを高めた。

3-5 持続性

プロジェクトの持続性の見込みはいくつかの課題があり、中程度から高いといえる。

政策・組織面では、国家水政策は現在ドラフトであるが、給水における人的資源開発の重要性については変更なく完成される見込みである。PWCTマスタープランは PWCTの基本的な役割と長期活動計画を描いており、これらは灌漑・水資源省の高い関心と PWC からの強い支援が継続すれば実現される可能性が高い。さらに、プロジェクトの支援とともに、PWCT は早い発展を遂げた。これは持続性の面から高く評価される。

次の事項が持続性における正の側面である。

- (1) 3-4で示したとおり、大半の SWC 総裁が給水サービスの改善のための研修の重要性 を唱えたため、SWC は技術や知識を給水計画に適用することが期待されている。
- (2) 新研修センターの建設は 2011 年 1 月に開始されるだろう。これは適切な宿泊設備を持って研修コースと研修生の数を増加することを可能にする。
- (3) 研修実施システムは予算の確保とともに、PWC 総裁と PWCT センター長のリーダーシップで継続することが望まれる。
- (4) 給水サービスのための組織関連の事項については、SWC は給水施設の維持管理を村レベルに移管する計画に応えて、研修コースは村レベルでの料金徴収活動や機材管理への支援も含んでいる。

次の事項が組織と資金面でのいくつかの課題である。

- (1) 研修プログラムや研修生の数が増加する見込みである。そのためには予算と人員の増加が必要である。
- (2) 必要な予算の確保のためには、PWCT は PWC から独立した銀行口座を持つべきである。
- (3) 良い講師を探すためには、他の研修センター、一般大衆、ケナナ砂糖会社などの民間企業とより広範に情報共有することが必要である。
- (4) 効果的な研修コースのためには、PWCT と SWC の間の関係は改善されなければならない。SWC レベルの技術移転や研修ニーズに関する PWCT によるモニタリングシステムも構築されるべきである。

技術面においては、次の事項がプロジェクトにより開発された研修実施システムを維持してい く上での課題である。

(1) カウンターパートは研修コースを彼らだけである程度は実施できるが、いくつかの作業の実施に関しては、より努力を必要とする。専門家による継続的なモニタリングはカウ

ンターパートの作業の適切な実施のために望ましい。

- (2) カウンターパートは研修コースの高度なレベルの管理のための PC スキルや、技術的知識や能力の向上が必要である。
- (3) PWCT は研修コースのための独自のテキストを作成する。
- (4) 講師の質を確保するために、講師の継続的な評価が行われなければならない。
- (5) PWCT は予算管理や実施の評価を行う。

環境面では、環境に配慮した手段、即ち日本から調達した梱包材や機材などが活用された。

3-6 効果発現のための促進要因

3-6-1 効果発現を可能にする要因

次の事項が正の効果の発現を可能にした。

- ・ カウンターパートと専門家、JICAの間の良いコミュニケーションがプロジェクトの円滑 な実施に貢献した。
- ・ PWC の総裁がプロジェクトに対して強く支援している。これは、PWCT 予算の確保、増加などにも見られる。
- ・ カウンターパートの本邦研修から、彼らのプロジェクトに対するオーナーシップの向上 と実務への効果的なフィードバックが行われた。
- ・ 研修コース実施の回数をふやすことにより、カウンターパートは研修コースの管理と実 施能力を向上させ、専門家とカウンターパートの間の信頼を築いた。
- ・ スーダン側、日本側の互いの信頼はプロジェクトのさらなる発展を導いた。

3-6-2 正の効果発現を阻害する要因

次の事項が正の効果発現を阻害する要因となった。

- ・ カウンターパートは以前同様の経験をしたことがなかったため、問題発見や時間管理、 コースの評価などを行うことが難しかった。
- ・ PWCT 予算は PWC に属しているため、PWCT 独自の予算管理が難しく、突然の支払い に対応できない。
- ・ いくつかの SWC はコースの受講料や交通費の支払いに問題があり、研修生を送れなかった。
- ・ 大半の SWC は研修機材や施設を備えていないため、技術移転は研修生の意欲があっても 行うことができなかった。

第4章 結論

本評価調査の結論は以下のとおりである。

- (1) プロジェクト目標はプロジェクトの終了までに達成される見込みである。
- (2) 上位目標の達成のためには、いくつかの外部条件が満たされる必要がある。
- (3) 評価5項目において、プロジェクトの評価結果は一般的に高い。
 - 1) プロジェクトの妥当性は高く、有効性や効率性も高い。
 - 2) 実施プロセスは概ね良いが、いくつかの点で問題がある。
 - 3) プロジェクトのインパクトはいくつかの条件があるが高い見込みである。
 - 4) 研修実施を維持するためには、乗り越えるべき課題がいくつかある。したがってプロジェクトの持続性は中程度から高いといえる。
- (4) PWCT は、PWC の総裁と PWCT のセンター長の強いオーナーシップとリーダーシップ、 JICA スーダン事務所からの集中的な支援、プロジェクトの効果的管理により、早い発展を 達成した。
- (5) 研修の効果を高めるために、PWCT は SWC が自身で研修が行えるよう、研修ユニットを 設立するための支援をすべきである。研修ユニットへは PWCT が支援する。
- (6) プロジェクト期間の延長は行わない。

第5章 提言及び教訓

5-1 提言

評価調査団はスーダン側と JICA がプロジェクトの終了までと、プロジェクト後、それぞれの期間で実現すべき具体的な活動を検討することを提言する。

5-1-1 プロジェクト終了までに実現すべき提言

- (1) カウンターパート自身による研修コースの実施 持続性の人的組織的能力を高めるために、日本人専門家による少ない関与のもと、カウンターパート自身のイニシアティブにより、残りの研修を実施すべきである。
- (2) 全 SWC の人的資源データベースの作成 PWCT は SWC の正確な研修ニーズを把握するため、全 SWC の人的資源データベースを 作るべきである。それにより、PWCT はプロジェクト終了後実施すべき新たな研修コース を計画することができる。

5-1-2 プロジェクト終了後実現すべき提言

(1) PWCT の研修能力の拡大

既存の宿泊施設では一度に約 25 人の研修生しか受け入れられず、各 SWC の大きな研修需要に比して小さい。PWCT の施設、予算、人的資源は拡大すべきである²。

- (2) PWCTの中・長期開発計画の完成と承認 PWCTの中・長期開発計画が完成され、スーダン政府によって承認されることが期待される。
- (3) 研修プログラムの多様化

SWC の多様な研修ニーズに応えるために、PWCT は多くの技術テーマで、異なる技術レベルの研修コースや、プロジェクト計画、資金管理、水道料金表などの事務レベルの研修コースなどの研修プログラムを開始することが望ましい。

- (4) PWCT 予算のための独立銀行口座 効果的かつ効率的な予算管理のために、PWCT は独立した銀行口座を持つべきである。
- (5) SWC に研修ユニットを設置するための PWCT からの支援

PWCT は SWC の多様なレベルの人材に給水サービスの知識や技術を伝達するための研修 ユニットを組織するため、SWC に対して継続的な支援を提供することが望ましい。研修ユニットの役割の中には、SWC レベルでの技術移転状況や SWC の研修ニーズを PWCT に効果的にフィードバックすることが含まれる。

PWC の総裁からの情報では、50 人の研修生を擁することができる新研修センターの建設予算が確保され、建設作業が来年 初頭から始まる予定とのことである。PWC は人的資源や PWCT 活動の拡大に応える予算を増やすことも計画している。

(6) PWCT スタッフによるマニュアルの効果的な活用 PWCT スタッフは PWCT の効果的な管理のための管理マニュアルを活用すべきである。 これらのマニュアルは必要があれば、適切に改定されるべきである。

5-2 教訓

5-2-1 PWCTの急速な発展に貢献した要因

プロジェクトの急速な進展に貢献した正の要因はいくつかある。

- (1) PWC の総裁や PWCT センター長の強いオーナーシップとリーダーシップ
- (2) 日本人専門家リーダーの長期派遣期間
- (3) JICA スーダン事務所からの集中的支援
- (4) 他の関連 JICA プロジェクト (ダルフールプロジェクトなど) への支援により得られた相乗効果
- 5-2-2 1つの研修コースを何回かに分けて行うことによる正の効果

1つの研修コースを何回かに分けることにより得られた正の効果は、以下のとおりである。

- (1) 研修期間中に接触する機会を増加させたことにより、研修生、専門家、コースコーディネーター間の互いの理解が高まった。
- (2) 研修コースの管理を増加させることにより、コースコーディネーターの能力向上が高まった。
- (3) 研修コース管理における技術移転の機会を増やしたことにより、コースコーディネーターと専門家の間の信頼関係が築かれた。
- (4) 各研修コース期間を 2 週間に制限したことにより、多忙な研修生がコースに出席しやすくなった。

5-2-3 効果的な本邦研修

カウンターパート本邦研修は主要なカウンターパート全員に対して行われ、また専門家が研修内容を計画したため、適切で効果的な研修となった。彼らの研修業務に対する意欲、プロジェクトに対するオーナーシップの向上につながり、その後の業務によいフィードバックが見られた。

第6章 団長所感

6-1 地方視察

6-1-1 幹部人材の育成

今次調査で、ハルツーム南方のエル・ゲジーラ、センナール、ホワイト・ナイルの 3 州の SWC を視察し、SWC の DG,PWCT 研修生と意見交換した。 3 州ともこれまで 7 名の研修員をハル ツームでの 7 つの研修コースに派遣しているが、その 7 名はいずれも、SWC の部長(Department Head)、あるいは各ロカリティーの支局長や、SWC の幹部であり、SWC での人材育成における 核となるべく要員を派遣していることが確認できた〔いずれの研修生も BSc(Bachelor of Science)、あるいは MSc(Master of Science)を得ている〕。

6-1-2 給水施設の現状

上述の 3SWC の給水施設としては、いわゆるレベル 2 施設 (管井戸、発電機、水中モーターポンプ、公共水栓、あるいは管井戸、ディーゼル・エンジン、レシプロ・ポンプ、公共水栓)が最も多く設置されており、その他に、浄水施設を備えた都市給水施設は 2~5 カ所、自然の地形を利用した溜め池タイプの施設が 100~200 カ所あり、全て SWC が直営で運営、維持管理を行っている。既に給水普及率は 85%程度 (村落 80%,都市 95%、エル・ゲジーラ)に達しており、SWC の最大の関心事は、既存施設の健全な O/M であり、特に数の多いレベル 2 タイプ (Water Yard と呼ばれている)の O/M が問題である、という言及があった。エル・ゲジーラでは村落給水施設の総数は 2,120 カ所、そのうち健全に稼動しているのは 815 カ所のみで、6 割近い施設が問題を抱えていることになる。

6-1-3 SWCにおける人材育成の努力

上述の 3SWC の DG は、人材育成が最も重要事項であることを認識しており、研修施設の建設に取り掛かっている。しかし、いずれも具体的な計画は策定されておらず、そのための組織も編成されていない。

エル・ゲジーラ SWC から Water Supply Facility コース(水中モーターポンプ、発電機、配電盤の構造、メンテナンス)に派遣された研修員は、SWC で同様な題目で 1 日だけのワークショップを開催して、PWCT での研修成果を SWC の同僚に技術移転を行っており、21 名の参加者を得ている。しかし、その参加者は全てエンジニアであり、実際に村落給水のメンテナンスを担当しているテクニシャン・クラスの人材ではない。

各 SWC の DG の最大の関心事は、上述の Water Yard が適切な O/M されることであり、これらを現場で担当している人材の育成である。各 SWC からは日本側に対して、現場で Water Yard のポンプや発電機の維持管理に当たっている人材を OJT で訓練して欲しいという要望があった。具体的には、SWC が建設する研修施設に実際の Water Yard を設置し、その施設を活用して実技指導を行う研修コースを立ち上げて、運営することである。

6-2 日本人専門家と先方幹部、カウンターパートとの信頼関係

本プロジェクトでは、日本人専門家と PWC, あるいは SWC の幹部、C/P との良い信頼関係が醸されている、と感じる。これには、JICA 事務所による強烈なバックアップ、担当者が頻繁にPWC を訪れてコミュニケーションを密に図っていること等に負うところが大きいと思われる。もう一つの要因は、プロジェクトのリーダーが長期間(年間 8 カ月)現地に滞在し、スーダン側人員と頻繁に面会し、コミュニケーションを密にしていることも信頼関係の醸成に大きく貢献しているものと考えられる。リーダーの派遣元では、リーダークラスの人材を一つのプロジェクトに長期間派遣するのは、経営上または人繰り上難しいことであろうし、また、生活環境の厳しい状況に長期間滞在する専門家ご自身のご苦労もあろうが、今後とも状況が許す限りこのような体制で臨むことが望ましいと考えられる。

以 上

添付資料

- 1. ミニッツ・合同評価報告書
- 2. PDM
- 3. PO

MINUTES OF MEETING BETWEEN

JICA TERMINAL EVALUATION TEAM

AND

THE SUDANESE AUTHORITIES

ON

JAPANESE TECHNICAL COOPERATION PROJECT

FOR

HUMAN RESOURCES DEVELOPMENT FOR WATER SUPPLY

 $\mathbb{I}\mathbb{N}$

THE REPUBLIC OF SUDAN

The Sudanese Government and Japan International Cooperation Agency (hereinafter referred to as "JICA") jointly organized the Terminal Evaluation Team (hereinafter referred to as "the Team"), respectively headed by Eng. Mohamed H. M. Ammar and Dr. Yuji MARUO, for the purpose of conducting the terminal evaluation for the technical cooperation project for "Human Resources Development for Water Supply" (hereinafter referred to as "the Project"). The Team has carried out intensive study and analysis of the activities and achievements of the Project, and prepared the Joint Terminal Evaluation Report attached hereto (hereinafter referred to as "the Report"), and presented it to the Joint Coordination Committee (hereinafter referred to as "JCC") held on 1st November, 2010.

After discussions on the major issues pointed out in the Report, the JCC accepted the contents of the Report and took note of the recommendations made in it. The representatives of the Sudanese side and the Japanese side for the JCC agreed to convey their respective authorities concerned the matters referred to in the Report to ensure necessary measures to be taken for the successful completion of the Project.

Khartoum, 2nd November, 2010

Dr. Yuji MARUO

Leader,

JICA Terminal Evaluation Team

.♀^/ Eng. Mohamed H. M. Ammar

Director General

Public Water Corporation

witnessed by

Mr. Mahmaoud Haroun A/elgabar

Director

Financial Bilateral Cooperation Department

Ministry of International Cooperation

ATTACHED DOCUMENT

Both parties agreed upon the contents of the Terminal Evaluation Report shown as attachment 2, which was approved by the JCC on 1st November, 2010.

(end of document)

Attachment:

- 1. JCC Attendance List
- 2. Joint Terminal Evaluation Report

MM

JA Commission of the Commissio

ATTACHMENT 1

Joint Coordination Committee (JCC) Attendance List

Date: November 1, 2010

Public Water Corporation (PWC)

Dr. Sherif El Toham Chairman of Board

Public Water Corporation Training Center (PWCT)

Ms. Eatidal Elrayah Malik Director

Dr. Hashim Abdel Rahim Director of Administration

Mr. Egbal Bakheit Course Coordinator
Mr. Montasir Bashary Course Coordinator

Mr. Osama Abdulmajid Wais Assistant Coordinator

Ms. Hanan M. Mahmoud Secretary

Ms. Maha Ismail Al Amin Lab Assistant

State Water Corporation (SWC)

Eng. Elsadig Mohd Tahamed White Nile Director General
Mr. Mohammed Bushra White Nile Assistant Engineer
Eng. Abdel Bagi Nor Eldaim El Gezira Director General

Ms. Batoul Saad Faggad El Gezira Training Coordinator

Eng. Noureldin Adam Osman North Darfur Director General
Eng. Ahmed Abdelgasim M. West Darfur Director General
Eng. Ahmed Elradi Ali Sennar Director General
Eng. Gaafan Abdalla River Nile Director General

Hawata Project

Eng. Mohamed Abdelagdir Director General

<u>UNAMID</u>

Mr. Mohamed Tani Consultant

JICA Sudan Office

Mr. Kenichi Shishido Resident Representative

Mr. Daishiro Murakawa Assistant Resident Representative

ЛСА Terminal Evaluation Team

Dr. Yuji Maruo Team Leader Senior Advisor, JICA HQ
Mr. Hayato Sato Evaluation Planning Program Officer, JICA HQ

Ms. Tamahi Yamauchi Evaluation and Analysis IC Net Ltd.

JICA Project Team

Mr. Mitsuro Uemura Team Leader

Mr. Masao Uematsu Data Management / GIS

Mr. Makoto Yamamoto Pipe Network Management

Mr. Tarig H. Bukhary Office Staff

ATTACHEMENT 2

JOINT EVALUATION REPORT

on

THE PROJECT

FOR

HUMAN RESOURCES DEVELOPMENT

FOR

WATER SUPPLY

IN

THE REPUBLIC OF SUDAN

Khartoum, Sudan 2nd November, 2010

MM Js

List of Abbreviation and Acronyms Used

C/P Counterparts

DG Director General

JCC Joint Coordination Committee

JICA Japan International Cooperation Agency

MIC Ministry of International Cooperation

M/M Minutes of Meetings

M/M Man Month

ODA Official Development Assistance

OJT On the Job Training

PDM Project Design Matrix

PO Plan of Operations

PWC Public Water Corporation

PWCT Public Water Corporation Training Center

R/D Record of Discussions

SWC State Water Corporation

ToT Training of Trainers

UNICEF United Nations Children's Fund

TICAD Tokyo International Conference on African Development

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1. Introduction

1-1 Purpose of the Terminal Evaluation

The terminal evaluation activities were performed with the following objectives;

- 1) To conduct a comprehensive assessment of the achievements and implementation process of the Project.
- 2) To analyze the achievement of the Project in terms of the Development Assistance Committee (DAC) five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact and Sustainability).
- 3) To make recommendations on the Project regarding the measures to be taken for further improvements and securing sustainability of the Project.
- 4) To draw the lessons learned from the Project implementation.
- 5) To participate in the Joint Coordinating Committee (JCC) meeting to share the results of the terminal evaluation, contribute to the better understanding of the improvement as well as ensuring the sustainability of the Project.

1-2. Members of the Evaluation

1-2-1, Sudanese Side

Mr. Mahmoud Haroun A/elgabar Director of Financial Bilateral Cooperation Department,

Ministry of International Cooperation

Ms. Eatiadal Elrayah Malik Director of Public Water Corporation Training Center

1-2-2. Japanese Side

Dr. Yuji MARUO Leader/ Director, Senior Advisor, Global Environment Department, JICA

Mr. Hayato SATO Evaluation Planning/ Program Officer, Water Resources Management

Division II, Global Environment Department, JICA

Ms. Tamahi YAMAUCH1 Evaluation and Analysis/ IC Net Limited

1-3. Schedule of the Evaluation

A series of meetings and discussions were held from 13th October to 2nd November among Sudanese governmental authorities and institutions relevant to execution of the Project, Project team, and Terminal Evaluation Team.

1-4. Methodology of the Evaluation

The Project was evaluated based on the Project Design Matrix (PDM) of the Project, which is a summary table describing the outline of the Project. The evaluation carried out referring to the PDM version 4, which was approved by Joint Coordination Committee (JCC) in November 2009.

The evaluation took the following steps.

(1) Verification of project performance

The degree of project achievements, such as Input, Activities, Outputs, and Project Purpose, were assessed with reference to Objectively Verifiable Indicators stated in the PDM version 4. To carry out this, various methods were applied including questionnaire, interviews, site observation, workshop, and discussion with relevant stakeholders.

(2) Examination of Project Implementation Process

The process of the project implementation was assessed from the various points.

(3) Evaluation by Five Evaluation Criteria

The following five evaluation criteria are applied to the project evaluation.

Relevance:

Relevance of the Project was considered from a viewpoint of the validity of the Project Purpose and Overall Goal in connection with the development policy of the Government of Sudan and the needs of beneficiaries of the Project.

Effectiveness:

Effectiveness whether the Project has actually benefited the target group and whether the project is effective. It also assesses whether the Project Purpose is being achieved as expected and whether that is in the result of the project's Outputs.

Efficiency:

Efficiency verifies whether the project was efficient in terms of effective use of resources. The relationship between Inputs and Outputs is reviewed. In essence, Efficiency examines whether the input cost is appropriate for the degree of achievement on the Outputs and the Project Purpose.

Impact:

Impact examines direct effects extended by the project in the long run and indirect effects. The analysis also includes the positive and negative impacts that were not expected when the project was planned.

Sustainability:

Sustainability of the Project is focused on institutional, financial and technical aspects by examining the current extent to what the achievement of the Project is sustained or expanded.

(4) Recommendations and Lessons Learned

The Joint Review Team made the recommendations and drew the lessons learned based on the results of Review.

2. Outline of the Project

2-1. Background

The provision of adequate and safe water supply services for human is one of the essential issues in the Republic of Sudan. And also the Government of Sudan has conducted the significant efforts to improve the critical water supply situation. According to the Quarter Century Strategy for Water Supply Plan (2007-2031), the specific objectives of the strategy are to achieve by the end of the strategy period, a consumption rate of 50 liter/capita/day and 150 liter/capita/day for rural and the urban population respectively.

On the other hand, PWC was the responsible and organizational authority for water supply projects in Sudan, the responsibilities on operation and maintenance for the water supply facilities have been transferred from PWC. The present role of PWC is construction of the large-scale water supply facilities, coordination of international assistance, monitoring of SWC and human resources development by this decision of the government water supply policy.

SWC has responsibility for the construction of small water supply facilities other than maintenance of urban and rural water supply facilities. As for the water supply population of each SWC, it is quite different from State of Khartoum (4,500,000), Sate of Gezira (3,050,000), Red Sea and Blue Nile State (about 300,000). In addition, the types of the water source and the water supply facilities in SWC are different. Furthermore, an average of engineer in each SWC is around 80.

Various water related problems occur in each SWC by the drastic change of organizational situation in Sudan. There are problems of pump and generator in the villages of Sudan. Particularly, new generator and electric motor pumps are spreading in Sudan recently. Therefore, the engineers cannot cope with sufficient troubleshooting but only experienced on conventional reciprocating pump. In addition, the operation and maintenance technology of water treatment plant is not sufficient in each state. As a result, water supply in each SWC becomes unstable.

Under this situation, the Government of Sudan has decided to transfer the training function to PWC. And a new building of PWC including a training center was built in Khartoum. Although PWC Training Center has opened in 2006, all of the staff doesn't have sufficient experience on training management and implementation. Therefore the Government of Sudan requested the technical cooperation project to the Government of Japan for training ability improvement of the staff of PWCT.

2-2. Summary of the Project

The outline of the project described in PDM4 is as follows;

(1) Overall Goal.

Institutional capacity for stabilizing water supply in the northern Sudan is enhanced.

(2) Project Purpose

PWC Training Center establishes the system for the implementation of Training.

- (3) Outputs
- 1) PWC Training Center acquires abilities to implement and plan training courses.
- 2) PWC Training Center acquires administrative abilities necessary for managing training courses.
- PWC Training Center acquires the abilities of problem solution and feedback on training courses.

The change and detail of the PDM are in Annex 1.

- 2-3. Administration of the Project
- (1) Project Director

Director General, Public Water Corporation (PWC)

(2) Project Manager

Director, Public Water Corporation Training Center (PWCT)

(3) Course Coordinator

Training Course Management/Water Supply

Water Supply Facilities (Machinery and Electric)

Data Management/GIS

Operation and Maintenance of the Water Treatment Plant/Maintenance Pipe Networks

Well Management

Education Technology/Organizational Management

Water Quality Analysis/Data Base

(4) Administrative Staff

3. Achievement of the Project

- 3-1. Inputs
- 3-1-1. Japanese side
- (1) Experts

It is planned a total of 9 Experts in 9 areas of expertise were assigned for a total of 65.9 months by the end of the Project. The details of the dispatch of the Experts are shown in the Annex3.

(2) Provision of Machinery and Equipment

The equipment procured by the project in Japan and Sudan is shown in the Annex 4 and 5. The expense for procurement in Japan was amounted to 39,519,900 Japanese Yen, while the expense for procurement in Sudan was amounted to 22,080,124 Japanese Yen. The expense for the equipment brought by Experts was amounted to 1,563,133 Japanese Yen in 2008, 1,151,400 Japanese Yen in

2009, as shown in the Annex 6. The expense for procurement and equipment in 2010 is not planned. The operational cost of Japanese side was amounted to 2,986,237, 3,876,271 Japanese Yen in 2008 and 2009, respectively, and is planned 5,616,039 Japanese Yen in 2010, which includes personnel, documents, rental vehicle, consumables, and so on, as shown in the Annex 7.

(3) Training in Japan

A total of 8 C/Ps were accepted for training to learn about Training System of Japan and Water supply management.

	Table 5-1. Critianing in Japan										
Name of Trainees	Resignation	Total of M/M									
Ms. Eatidal Elrayah Malik	Director of PWCT	0.46									
Mr. Hashm Abdul Raheem	Director of Administration of PWCT	0.46									
Mr. Muzamil Mohammed	Course Coordinator	0.43									
Mr.Bashary Ibrahim	Course Coordinator	0.43									
Mr.Abdela Majed	Course Coordinator	0.43									
Mr.Egbal B,Alamir	Course Coordinator	0.43									
Mr.Osama Wais	Assistant Course Coordinator	0.43									
Mr.Aladin Wais	Assistant Course Coordinator	0,43									
Total		3.5									

Table 3-1: C/P training in Japan

3-1-2. Sudanese side

Sudanese side provided 18 CP as shown in the Annex 8. The office space for the Experts, Kilo Ten Training Center (KTC, Workshop of PWCT), water quality analysis laboratory, accommodation were provided, amounting to 396,555 SDG for the expenses for construction, and 36,600 SDG for the expense for maintenance for the equipment as shown in Annex 9.

3-2. Achievement of Outputs

3-2-1. Output 1

The Output 1 is 'PWC Training Center acquires abilities to implement and plan training courses'. For implementing and planning training courses, PWCT needs to grasp the training needs of the trainees (in this Project, from SWCs) to plan the contents of the training courses and their schedule, and to implement the courses according to the schedule. PWCT activities started at the same time as the Project. Hence the Expert team helped to establish the training implementation system. Because of the capacity of PWCT, it was planned that PWCT train the leaders of each SWC who later train other colleagues in their SWCs through the training of trainers (ToT).

Table 3-2: Achievement of Output 1

Indicator	Achievement Status
1-1. More than 80% of the works done by	The indicator is achieved. The ratio of the work shared by
course coordinators in training course	the course coordinators in the 7 training courses in 2010
management and implementation.	was 84% on average.

1-2. Established annual plan, manual, materials and syllabus of more than 3 principal and 4 ad hoc training courses.	The indicator is achieved. Based on the needs grasped in the field survey, the contents of the training courses were developed. Then, syllabuses were prepared by Experts. 4 manuals for evaluation and management of the course were developed. Annual plans were developed according to the progress of the Project. Materials were provided by each lecturer. Hence when all the courses are completed, materials were compiled for the course.
1-3. Established training site (KTC)	KTC was constructed with equipment in January 2010.
1-4. Improved Evaluation to the lecturers of all training courses.	This indicator was partly achieved. 6 out of 12 lecturers of all the training courses served as lecturers more than twice improved evaluation results, while. 4 lecturers received lower marks in evaluation than before.

The Indicator 1-1 was achieved. On the 34 work items of management and implementation of the training courses, the share of the total work by the course coordinators in the seven training courses in 2010, i.e. from the 11th training course to the 17th training course, was 84% on average. On the seven training courses, the number of items for which more than 80% of the work was shared by course coordinators, was 25.4 on average out of the total 34 items. On all the 17 training courses conducted so far, the average share of the work by course coordinators was 73%. Thus the course coordinators who had not previously worked for implementation and management of training courses increased their work share as the Project proceeded. However, the work share ratio by course coordinators was around 50% in items including training schedule, preparation of questionnaire for trainees, preparation for exams, and after training meeting and evaluation, which requires further effort. For managing each training course, the C/P team was established with chief course coordinator and assistants, stabilizing the implementation system.

Table 3-3: Work Ratio of PWCT Staff Members

									Work I	tatio of i					Average				
	Work Lieus	Ist	2nd	3rd	4th	5th	6th	7th	Sth	9њ	10ds	1105	lTıh	13th	14(2)	1561	1669	17⊞	of11th
No	work tiens	WTP	WSF	GES	wsr	GIS	WM	WTP	ОМ	CHS	WSF	WIP	WOA	14.4	WM	GS	084	P255	(%)
 	5 61	0	50	50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	Security of the generator	80	90	95	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
⊢	Arrangement of residence	40	50	50	80	60	60	40	95	50	100	80	70	80	90	50	95	50	74
\vdash	Preparations for orientation	40	70	80	100	90	80	20	90	100	100	100	109	90	100	100	90	100	97
-	Preparation of trainee data	20	70	80	90	100	80	20	50	100	100	100	100	100	100	100	100	80	97
5	Preparation of lecturer data	40	90	60	70	40	70	60	80	40	80	100	90	90	90	30	80	50	76
6	Discussion and coordination with the lecturer	10	80	50	80	40	50	50	70	40	80	50	10	80	60	30	70	20	49
7	Training schedule	30	90	30	90	60	50	100	80	90	70	100	50	(4)	100	90	95	100	8,5
8	Training place					80	50	100	95	70	80	100	80	80	90	80	100	100	90
9	Textbook making	20	80	20	90 90	100	50	100	70	50	90	100	100	100	100	100	20	100	99
10	Printing work of the textbook	0	100	0		50	40	50	50	70	80	50	50	60	80	80	ļ —	0	53
11	Preparations for examination paper	50	80	30	70		70	50	50	90	90	80	50	60	100	90	100	100	83
12	Confirmation of equipment for training	50	80	30	90	50	40	50	70	40	0	100	10	50	70	-413	80	U	50
13	Preparation of Questionnaire for trainee	0	0	0	0			100	50	50	100	100	100	.50	100	50	100	E0	83
14	Preparation of evaluation sheet	- 6	0	0	50	30	40	20	70	50	50	100	20	50	70	40	80	70	61
15	Pre training meeting	0	0	0	0	40	40			80	100	80	100	h0	90	90	100	70	87
16	Orientation	50	50	50	80	70	80	10	100	60	100	100	100	60	100	100	100	70	90
17	Photography of the training	10	10	40	70	50	80	50	100		100	100	100	100	100	100	100	100	100
18	Food providing service	100	100	100	100	100	100	100	001	100	1	100	100	160	100	100	100	80	97
19	Enforcement of the examination	80	100	100	100	100	60	100	50	100	100	-	1	1		100	100	100	100
20	Enforcement of evaluation of the lecturer	90	100	100	100	100	100	100	70	100	100	168)	100	100	100	1	1	1	1
21	Enforcement of evaluation of the training course	90	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
22	Enforcement of evaluation of the residence	90	100	100	100	100	100	100	100	100	100	50	LINU	190	[(8)	100	100	90	91
23	Enforcement of examination and inspection	50	90	60	100	70	50	50	50	90	80	100	100	80	100	90		80	92
24	Analysis of the examination	0	0	50	80	50	50	80	50	50	80	XD.	0	70	80	50	-	100	63
25	Training certificate making	0	0	60	80	70	70	100	100	100	001	100	100	80	90	1(10	100	100	96
26	Award of excellence making	0	0	0	80	20	70	20	100	100	100	100	100	80	190	100	 	100	95
27	Traince interview	0	10	10	80	10	50	50	60	50	50	100	50	50	100	100	XO.	50	76
28	Closing ceremony	50_	50	50	50	70	80	80	100	100	100	80	100	80	100		100	60	91
25	Payment of allowance of trainee	100	100	100	100	100	100	100	100	100	60	100	100	HKO		100	100	100	
30	Payment of between	100	100	100	100	100	100	100	100	100	100	80	100	100	100		100	100	97
31	Analysis of a questionnaire	0	0	0	0	0	50	50	60	30	0	160	Ð	50	100		100	50	67
32		0	0	30	80	30	50	70	100	40	100	70	50	50	100	50	\$00	100	
33	After training meeting and evaluation	20	20	20	40	0	40	100	0	30	50	100	20	40	50	40	80	50	54
-	Training report making	0	0	20	50	20	50	100	0	20	50	100	80	-10	100		100	80	81
	Average		55	49	76	62	68	71	75	73	82	91	74	77	93	81	94	78	84
	More than 80%	8	16	10	24	13	13	18	18	18	26	30	22	21	31	23	28	23	25
_		WT		er Treatmo		_													l
		WSF		r Sopply Manage	racisty mont/GIS	1													,
			: Wel	Manager	Analysis	4													
		O.74	Orga	nization e	Manage	9													1
		PNM	:Pipo	letwork ?	innacerae	nl										w			

The Indicator 1-2 was mostly achieved. Based on the needs survey by the preliminary study mission of the Project in November 2007, it was decided to implement three principal and two ad hoc courses. After the Project started, three field surveys to eight SWCs were conducted in August and November 2008 to grasp the water supply situation and the training needs. Based on the survey results, the detailed contents of the five training courses were developed, and it was decided to implement two more ad hoc courses. Thereafter the Experts prepared the syllabuses for the courses. The Experts prepared the manuals on the following matters: management and evaluation of the training courses; evaluation of the lecturers; and developing training reports. All the manuals are to be finalized by the end of the Project. The annual plans were developed and revised annually

according to the progress of the Project. The materials were developed by each lecturer while each course was implemented, which are compiled to be the standard materials for the seven current training courses of PWCT after all the courses are implemented.

Table 3-4: List of Manuals of PWCT

		Target Group									
No	Title	Manager	Staff	Assistant	Trainee						
1	Regulation of PWCT	0	0	0							
2	Management Manual of the Account	. 0	0								
3	Management Manual of the Budget	0	0								
4	Management Manual of Documents & Texts	0	0	0							
5	Data Management Manual	0	0	0							
6	Management Manual of Equipments		0	0							
7	Management Manual of PWCT	0	0	0							
8	Management Manual of the Residence		0	0	****						
9	Entering Rule of the Lodging		0	0	0						
10	Management Manual of the Workshop	•	0	0							
11	Report Making Manual		0	0							
12	Management Manual of the Training Course			0							
13	Evaluation Manual of the Training Course		0	0	0						
14	Evaluation Manual of the Lecturer		0	0	0						
15	Evaluation Manual of the Lodging		0	0	0						

The Indicator 1-3 is achieved because KTC was established with the required equipment in January 2010. Although the PDM0 says that the necessary equipment for the training courses are provided by JICA, it was not planned to procure all of them at the beginning of the Project. As the equipment procurement from Japan was delayed, so was the establishment of KTC.

The Indicator 1-4 was partly achieved. Out of the 12 lecturers of the training courses who served more than twice, six received better evaluation from the trainees. On the other hand, four lecturers received lower marks. However, according to the Experts, the evaluation of lecturers by the trainees is more of a reflection of how the lecturers and trainees get along with one another than a genuine measurement of how well the lecturers teach the trainees. Some low-marked lecturers give good lectures. Two lecturers who performed poorly were replaced, but it was not possible to replace other lecturers who received low marks due to the limited availability of suitable human resources in Sudan.

3-2-2. Output 2

The Output 2 is 'PWC Training Center acquires administrative abilities necessary for managing training courses'. As mentioned above, the Project is to start training implementation by establishing.

such items as the training implementation system, organization, regulations, and budget control. Since PWCT was established in 2007 and no PWCT staff members had ever managed training courses, the Experts helped them develop up to 12 manuals for the management of training courses and explained how to use them.

Table 3-5: Achievement of Output 2

Indicator	Achievement Status
2-1. Revised regulations and TOR of the staff in activity 2.	This indicator is likely to be achieved. Regulations of PWCT including TOR of the staff members are being revised according to the changing needs and situations. They will be finalized in January 2011.
2-2. Proper management of the improved necessary materials and texts of the training courses.	This indicator is achieved. Texts and materials are stored in the Experts room and properly managed for the use of C/Ps and lecturers. Lecture on copyrights was given to C/Ps. After the equipment were installed, the Expert on management of equipment explained to workshop staff members how to maintain equipment using a list of equipment and manuals for maintenance.
2-3. Proper management of the Center budget	This indicator is mostly achieved. The budget management system was developed based on the manual on the subject. The budget table of PWCT was developed. The budget is managed in line with the manual, however, since PWCT doesn't have a separate bank account from PWC, which doesn't allow proper budget control of PWCT and occur occasional delays in payment.

The Indicator 2-1 is likely to be achieved by the end of the Project. Regulations of PWCT including TOR of the staff in management of the training were developed in July 2008. However, all the management regulations follow the PWC ones as PWCT is part of PWC. Moreover, the regulations are so complex that they must be revised to accommodate the needs and situations of the training center. They are being revised and to be finalized in January 2011.

The Indicator 2-2 is achieved. The indicator was developed in the PDM4 because there were no references on these courses in the beginning of the Project, and the provision of the necessary equipment was delayed. After the mid-term evaluation, some references were provided during the C/Ps training in Japan, since such references are not available in Sudan. For proper management of the materials and texts, copyright management is important. The C/P training in Japan included lectures on copyrights because of low awareness of copyrights in Sudan. The materials and texts are stored in the Experts room and properly managed for the use by C/Ps and lecturers. After the equipment were installed, the Expert on management of equipment explained to workshop staff members how to maintain equipment using developed list of equipment and manuals for maintenance.

The Indicator 2-3 is mostly achieved. As mentioned in the Indicator 2-1, the budget management and accounting also follow the ones of PWC. The management manual of the budget of PWCT was developed in July 2008, but the manual is being revised to meet the current needs and not yet finalized. Moreover, in the first year that the PWCT budget became a part of the PWC budget, the training activity cost was not clearly accounted for in the PWC budget. Then the Experts helped establish the system of budget management of PWCT composed of PWCT Director, Administrative Manager, Accounting Manager, and the Expert. In 2009, the budget table of PWCT from 2008 to 2010 was developed. The table is now developed up to 2011, which shows a continuous increase of the PWCT budget. However, due to that PWCT bank account is not separate from the one of PWC, the proper management of the budget is not allowed and sudden financial needs are hardly satisfied as the accounting procedure of PWCT has to go through PWC.

3-2-3. Output 3

The Output 3 is 'PWC Training Center acquires the abilities of problem solving and feedback on training courses'. In the mid-term evaluation, this output added the aspect of feedback to future training courses. According to the trainees, training courses in Sudan have no feedback system, which means that course coordinators are not accustomed to problem solving and feedback. The Experts helped develop the evaluation sheets on training courses, lecturers, and accommodation and food, and conduct interviews with the trainees. Based on the interviews, the counterparts and the Experts conducted after-training meetings and evaluation of the course.

Table 3-6: Achievement of Output 3

Indicator	Achievement Status
3-1. Implementation of more than four times of three principal courses and more than two times of ad hoc courses.	This indicator is mostly achieved. The two principal courses on water supply facilities and database/GIS are conduced five times, and another principal course (the operation and maintenance of a water treatment plant) is held four times. Two ad hoc courses on water quality analysis and the pipe network are held twice, and other two ad hoc courses added later based on the field survey during the Project period (well management, organizational management) are conducted three times, respectively.
3-2. Number of problems and difficulties on each point of view referred in Activities 3-2.	This indicator is achieved. But the Experts suggested that C/Ps still have difficulties in finding problems and difficulties in managing training courses, to which the Experts told them about the problems in the after-training meetings. It will take some time for C/Ps to find problems on their own.
3-3. Number of improvements of all activities of the Center based on Activities 3-2.	This indicator is achieved. Based on the problems and difficulties, C/Ps, with the help of Experts tried to find solution and improvement. Through these efforts, most of them could be improved. However, most of these

improvements were made by the Experts, which require continuous effort by C/Ps to improve.

The Indicator 3-1 is mostly achieved. The training schedule during the Project period is on the Table 3-7. The two principal courses on water supply facilities and database/GIS are conduced five times, and another principal course on the operation and maintenance of a water treatment plant is held four times. Two ad hoc courses on water quality analysis and the pipe network are held twice, and other two ad hoc courses added later based on the field survey during the Project period (well management and organizational management) are held three times, respectively.

2010 2011 Year Training Course Times 2nd 3rd Total 10 11 12 1 2 10 11 12 1 1.Training Course (1) Water Supply Facility (22) (2) Data Management /GIS(16) (3)O/M of Water Treatment Plant(21) (4) Water Quality Analysis (15) (5) Organizational Management (15) (6) Well Management (21/9) (7)Management of Pipe Network(15) Training Numb Number of the Lecturer Number of the Trainces

Table 3-7: Training Schedule

The Indicator 3-2 is achieved. Each training report includes the problems encountered in the training and solutions to them. The Table 3-8 lists the problems and difficulties on each point of view referred in Activities 3-2. However, the Experts observed that C/Ps still have difficulties in finding problems in managing training courses. The Experts let the C/Ps know about problems after the training courses. It will clearly take some time for C/Ps to find problems on their own, and this affects sustainability.

The Indicator 3-3 is achieved. Improvements made so far are listed on the Table 3-8. Based on the problems and difficulties, C/Ps, with the help of Experts tried to find solution and improvement. Through these efforts, most of them could be improved. However, most of these improvements were made by the Experts, which require continuous effort by C/Ps to improve it.

Table 3-8: List of problems and improvements

Field	Problem	Improvement
Contents of the course materials and their interface	There are no materials and texts on the training courses in Sudan.	Around 50 texts and references were provided from Japan.
	Training period should be longer.	Since the training schedule was already established, it could not be changed.
	Training of items other than the	Overseas training is implemented.

L ,	field of training courses is	<u> </u>						
	asked.							
-	Because of the capacity of	New training center is planned.						
	accommodation, the more							
	training courses could not be							
	implemented at the same time.							
	In the 2 nd course on well	The result of the analysis was reflected in						
	management, weaknesses of the	the contents of the 3 rd training course.						
	trainees were analyzed.	Moreover, measures to overcome						
		weaknesses such as implementation of the						
4-4-4-form		review exam, development of problems for						
		practice were made.						
Contents of course	Low awareness of copy right	Lecture was provided in C/P training in						
materials and their		Japan.						
interface	Lack of periodical maintenance	Development and guidance of manuals for						
mioriaee	of equipment	management of materials and equipment.						
Capacity and	A few lecturers received low	Two lecturers were replaced, but it was not						
presentation methods	marks in evaluation.	possible to replace others due to limited						
of lecturers	marks in evaluation.	availability of suitable human resources.						
of fectorers	TT.:::41							
	University lecturers are mostly	Using videos on lectures, the Experts						
	good at presentation while other	helped C/Ps improve their training method						
	lecturers are not. However, the	in the orientation for the next training						
	latter have their own advantages	course. 5 to 6 lecturers improved their						
	in other aspects of lectures.	training method.						
	Lecture was not in line with the	Training on teaching method was						
	text.	implemented. After that it was improved.						
Capacity of	Delay of making exams	To put them rigid deadlines.						
coordinators and	Insufficient analysis on	The special guidance was made for capacity						
procedure established	evaluation	development for coordinators.						
in 1-1.	Low capacity of developing	Development and guidance of report						
	reports.	making manual.						
	C/Ps tend to depend on Experts.	Thorough guidance to overcome weak						
		items						
Capacity of	PWCT does not inform the	The regulations of PWCT are developed						
administrators and	PWCT personnel of their	and to be finalized. Young new C/Ps are						
regulations/procedures	mission. Thus PWCT personnel	more motivated and ready to work.						
established in 2-1	are not motivated to work hard.							
	There was no regulation of	It would be finalized in January 2011.						
	PWCT.	10 Hourd 50 Illiandou in January 2011.						
	The job description was not	Job description was almost finalized in						
	clear.	2009.						
	Insufficient maintenance of	Development and guidance of management						
	equipment and facilities.	manual of equipment and facilities.						
	equipment and facilities.	manual of equipment and factities.						

3-2-4. Project Purpose

The Project Purpose is 'PWC Training Center establishes the system for the implementation of training'. As stated in the achievement of the Outputs, with the support of the Experts, PWCT developed its regulations and the TOR of its personnel, the training implementation system, 12 manuals for management of training courses, the budget management system, four manuals for implementation of training courses, and implemented so far 18 training courses according to the schedule. For management and implementation of the training courses, C/Ps acquired abilities,

although limited in a number of ways, to implement, plan, and manage training courses, find solutions to problems, and provide feedback to future training courses, with the technical support of the Experts. It is fair to say that PWCT established almost an entire training implementation system from scratch during the Project period. However, to build the capacities of the C/Ps, it is necessary to keep implementing the training courses with monitoring by the Experts. At the end of the Project, the Experts are to have C/Ps implement the training courses on their own.

Table 3-9: Achievement Status of Project Purpose and Prospects

	Indicator	Achievement Status and Prospects
1.	The average grade of evaluation of the trial training courses by the trainees marks more than 90%.	This indicator is already achieved. The average score through 17 training courses in evaluation of lecturers and training courses are 91 and 90, respectively. These scores have been high from the beginning.
2.	The average grade of evaluation of the administration by the trial course trainees marks more than 90%.	This indicator is likely to be achieved with continuous effort toward the end of the Project. The average scores in 17 training courses in evaluation of management of training courses, accommodation, and food service are 85, 82, and 72, respectively.
3.	At least 90% of the trial course trainees gain certificate of successful completion of the course.	All the trainees earned a certificate of course completion. However, some trainees did not manage to grasp the course contents well.

On the Indicator 1, the Project team developed the evaluation sheets for trainees on lecturers and training courses. The evaluation sheet on lecturers, which applies to all lecturers, covers the following items: basic behaviour, speech, development of lecture, time management, and training tools. For evaluation of the training courses, the evaluation items differ depending on the course.

As shown in the Table 3-10, the average score of lecturers in 17 training courses is as high as 91.

Table 3-10: Evaluation of Lecturers

	1st*1	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	Average
Course	WTP	WSF	GIS	WSF	GIS	WM	OM	WTP	GIS	WS	WTP	WQA	WM	WM	GIS	ОМ	PNM	
A	75	52	66	58	81	55	66	66	71	69	73	64	48	72	71	71	54	65
В	22	35	27	33	18	37	30	28	26	28	26	28	31	24	26	26	36	28
С	3	8	6	8	1	8	4	4	3	3	1	7	13	3	2	2	9	5
D	0	4	1	0	0	0	0	2	0	0_	0	1	7	1	1	1	. 1	1
Е	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0_	0
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
No. of lecturers	6	5	5	5	3	Ĩ	6	3	3	2	4	4	5	5	4	-5	5	77
Average mark out of 100*2	94	85	91	88	9,6	88	92	91	93	92	94	90	82	93	93	93	87_	91

^{*1.} Percentage of each grade (A, B, C, D, E)

^{*2.} Score is counted as follows: A=90, B=70, C=50, D=30, E=10

As shown in the Table 3-11 below, the average evaluation score of training courses in the 17 training courses is 90. One of the points that the trainees were satisfied with was the teaching methodology, which consists of theory and practical training, using videos, and visits to companies.

Table 3-11: Evaluation of the Training Course

	1st*i	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	Average
Course	WTP	WSF	GIS	WSF	GIS	WM	OM	WTP	GIS	ws	WTP	WQA	WM	WM	GIS	ом	PNM	
A	83	51	42	65	64	51	74	83	71	59	77	57	38	57	84	84	46	64
В	17	40	47	33	33	39	24	12	25	36	19	33	44	41	16	16	43	30
С	. 1	8	9	2	2	8	1	4	3	4	3	7	12	2	0	0	8	4
D	0	1	1	0	1	2	1	0	1	1	1	2	2	0	0	0	2	1
E	0	0	1	0	0	0	0	o	0	0	0	2	4	0	0	0	I	0
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Average mark out of 100*2	96	87	84	92	91	86	94	95	92	90	94	87	80	90	96	96	85	90

^{*1.} Percentage of each grade (A, B, C, D, E)

The Indicator 1 is already achieved because the evaluation scores on both lecturers and training courses have been high level since the beginning.

On Indicator 2, the Experts developed evaluation sheets on management of the training course, accommodation, and food service.

As shown in the Table 3-12, on management of training courses, the average score is 85, which is close to the target. If a continuous effort is made to improve the management of training courses until the end of the Project, the average score may exceed 90.

Table 3-12: Evaluation of the Management of Training Courses

Question	1*1	2	3	4	5	6	7	8	9	10	11	12	13	14	Average
A	69	61	50	52	48	42	41	34	69	55	38	31	46	45	49
В	24	33	43	34	50	46	47	52	25	30	48	42	44-	31	39
C	5	5	5	9	0	11	10	12	3	13	9	20	7	21	9
D	0	2	2	5	0	0	0	2	0	0	3	5	0	3	2
E	2	0	0	0	2	2	2	0	2	2	2	2	3	0	1
Average mark	82	80	78.	77	79	75	75	74	82	78	73	69	76	73	77
Average mark out of 100 ^{*2}	91	89	87	85	87	84	83	82	91	86	82	77	84	82	85

^{*1.} Percentage of each grade (A, B, C, D, E)

As shown in the Table 3-13, the average evaluation score of accommodation is 82.

^{*2.} Score is counted as follows: A=90, B=70, C=50, D=30, E=10

^{*2.} Score is counted as follows: A=90, B=70, C=50, D=30, E=10

Table 3-13: Evaluation of Accommodation

Course	1st*1	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	Average
A	76	51	55	58	52	54	59	42	51	34	50	47	40	72	51	31	49	51
В	20	32	31	37	34	29	20	41	28	37	27	23	34	23	28	34	31	30
С	3	8	- 8	4	7	11	6	12	11	14	14	15	10	3	11	29	13	11
D	0	5	5	0	5	3	5	3	7	6	5	7	8	2	7	4	4	4
E	. 1	4	. 1	Ţ	2	3	10	2	3	9	4	8	8	0	3	2	3	4
Average mark out of 100*2	93	82	85	89	84	84	81	82	82	74	81	76	76	92	82	75	82	82

^{*1.} Percentage of each grade (A, B, C, D, E)

The comparatively low average score was caused by such factors as frequent troubles of toilet and shower facilities and lack of individual rooms for trainees. However, it is impossible to address the problems of toilet and shower facilities without drastic renovation of the building. Moreover, the accommodation including lecture rooms is situated in an office building which is not designed as a training center. Thus it is necessary to construct a training center building for proper implementation of training courses. Nevertheless, PWCT worked to raise awareness of trainees on proper use of bathrooms and maintenance of sanitary living conditions by putting posts on walls.

As shown in the Table 3-14, the average score on evaluation of food service is 72.

Table 3-14: Evaluation of Food Service

Course	1st*1	2nd	3rd	4th	5th	6th	7th	9th	10th	11th	12th	13th	14th	15th	16th	17th	Average
Α	65	30	36	30	24	35	44	14	17	22	23	11	73	15	20	50	32
В	30	48	48	47	29	40	29	26	29	35	25	12	25	26	30	40	32
С	5	13	8	13	20	23	9	33	20	35	23	18	2	33	47	8	19
D	0	9	8	10	17	4	7	12	15	4	17	26	0	12	3	2	9
E	0	0	0	0	10	0	11	15	19	4	12	33	0	14	0	0	7
Average mark	82	70	72	69	58	72	68.	52	52	63	56	38	84	53	63	78	65
Average mark out																	
of 100 ^{°2}	91	78	80	77	64	80	75	58	58	70	62	43	94	59	70	86	72

^{*1.} Percentage of each grade (A, B, C, D, E)

The trainees complained about the quality of food. To address the complaints, PWCT changed the caterer a few times, but did not manage to improve the score. However, the food provided is better than average food in Sudan. It is also difficult to adapt to all the different food traditions of SWCs. In addition, the low score may have been caused by the provision of the same food throughout the courses, which made trainees fed up.

^{*2.} Score is counted as follows: A=90, B=70, C=50, D=30, E=10

^{*2.} Score is counted as follows: A=90, B=70, C=50, D=30, E=10

Except for the food service, the Indicator 2 is likely to be achieved with continuous improvement in management of the training courses required.

The Indicator 3 is likely to be partly achieved. 100% of the trainees gained a certificate of course completion so far based on their good attendance. Regarding the trainees' understanding of the lectures, the average examination score is 53, which was lower than PWCT had expected. A major cause of the low average score is that some trainees were so inadequate in their knowledge and techniques that they did not meet the minimum requirements of a trainee. Meanwhile, some trainees commented that the examination should include part of practical work in addition to theory. This is for future consideration.

Year Itah 11th 12th 13th 14th 15th Th SWC lst 2nd 3rd 4th 5th 6th 7th 9th Total Average Ranking 1 Northern River Nile 3 Red Sea O [Kassala 4î Gedaref 6 Khartoum 7 El Gezira 42. 8 Sennar \$2 62. 9 White Nilt 10 Blue Nile 6\$ 37 11 North Kordofan 12 South Kordofan 13 North Darfur 14 South Darfur 15 Western Darfur 16 N.W.E. Company Ð a 17 PWC 18 Hawata Project n ß 50 44 Average :Water Treatment Plant :Water Supply Facility Data Management/GS :Well Management :Water Quality Analysis

Table 3-15: Examination Results

3-2-5. Overall Goal

:Pipe Network

The Overall Goal is 'Institutional capacity for stabilizing water supply in Northern Sudan is enhanced'. Institutional capacity includes the capacity of personnel and institutions which consist of organization, management system, facilities and budget for development and operation.

As to the capacity of personnel, PWCT continues to train personnel of SWCs who train their colleagues in each SWC. PWCT also plans to monitor the technical transfer of the trainees and support the training units at SWCs. Hence the capacity of personnel at the state level is expected to improve.

It should be noted that access to information on institutional capacity is limited. The information on the SWCs was obtained from the Experts' visits to some states and from interviews with the trainees since Japanese nationals are not allowed to visit 6 out of the 15 states in Northern Sudan due to security reasons. PWCT did its best to collect information on SWCs, but was still unable to collect enough information on the capacity of all the SWCs.

Moreover, to achieve the Overall Goal, the following important assumptions in addition to those mentioned in PDM4 must be met.

- 1) Necessary equipment for water supply service and training courses are procured at SWCs.
- 2) Collected water charges are not used for purposes other than water service.
- 3) National and state budgets do not decrease due to low petroleum revenue caused by separation of Southern Sudan.
- 4) Conflicts due to independence of Southern Sudan do not occur.

Table 3-16: Prospects of Overall Goal

	Indicator	Prospects
1.	Capacity building for more than 7 core personnel at each SWC.	With continuous training at PWCT, more than 7 core personnel would develop their capacity. For conducting technical transfer, whether the equipment and facilities will be provided in SWCs is uncertain.
2.	Applied annual water supply plan (3-5 years) with the State budget based on lessons learned from the implemented training courses.	This indicator is expected to be achieved. On the field survey on 8 SWCs, DGs of SWCs suggested that they apply the techniques learned by the trainees to the annual water supply plans.

The achievement of the Indicator 1 depends on the provision of the needed equipment and facilities at the SWCs, which is not certain at this time. PWCT invited one staff member from each SWC for all the seven training courses. As shown in the Table 3-17, a majority of the SWCs, i.e. 11 out of the 15, sent trainees more than 17 personnel in the 17 training courses. The main requirement of the trainees is that they become future leaders of respective fields in the SWC. The trainees are to continue training at PWCT. Four states did not send more than 17 trainees in total so far possibly due to various reasons including lack of interest of the DG in the training. PWCT needs to work harder to communicate with the DGs on the importance of training. More than seven core personnel on average are expected to be trained in a majority of SWCs, but training without practice does not develop the personnel's capacity in a genuine sense. Hence for capacity building of trainees, the necessary equipment and facilities to improve their knowledge and techniques must be provided. Each SWC should provide those equipment and facilities for technical transfer to and practice of the trainees.

Table3-17: Number of Attendants by States

广	Year	2008					2009								2010				
No	Training Course	WT(I)	WSF(I)	GIS(1)	W\$F(2)	G2S(2)	WM(t)	WT(2)	O/M(t)	GS(3)	WSF(3)	W/T(2)	wQA(t)	WM(2)	WM(3)	CiS(4)		PRMO	Total
	SWC/Training Number	151	2nd	3rd	4th	5th	Gh	Άh	. Han	Яb	10th	llth	1201	13th	14th	15th	lfen s	1715	13
3	Nonhan	l	i	11	- 1	1	1	1	84% 1 8A-	1	1	1	0.00	_1_	1	_1_	100		17
2	River Nile	1	1	J	1 !	1	1	1	S (1)	1	. 1	1		1			111		16
3	Red Sea	ì.	1		1	Ð	1	1	0.5	1	1	1	2277	1	- 0	1	0	1	13
4	Kassala	1	1	1	1	1	1	1	2013	1	l l	0	\$100 pt	:0	2 O ·	1	0	18	12
5	Gedaref	1	1	1	_1_	1	1	- 1		111	1 .	1	原的形	_1_		_1_	经方额	2	_18
6	Khanoum	2	1	1	1	1	· : 1	2	w u	0	ì	2	111	1 / 1		Ð	30	1	16
7	El Gozina	t	3	1	3	1	3	- 1	3-20 @	2	3	1	101	1	1	2	2		25
8	Sennar	1	1	1	1	1	Ü	- 1	200	0	1	11	800 1 00%	1		1	0.0		_ 14
9	White Nile	2	1	1	1	1	1	2	William .	1		2_		17	1	1	110		20
10	Blue Nile	3	1		1	1	1	_2_	270]	L_	1_	1	1		0	138		18
	Northen Kordofan	1	1	1	1	1	1	_ 1	海道1等 。	11	11	1	28 N	1		1_	2万100	1	17
12	Southern Kordofan	2	2,	11_	2	1	1	2	27/102		2	2_	478276	1	1	. 1	0.0	100	24
13	Northen Darfur	1)	3 .	ı	級的級	1	1	1	361	3 :	:3 :	1	0.0	10	21			
14	Southern Darfur	ı	1	1	1	1	2	1	施100	1	1	1	WELVE.	3	3	1	2001 M	20 C	22
15	Western Darfur	t	1	1	1	1	3	0	WK 188	11	1	0	(銀)第	3	3	1	3.1	01.0	21
16	N.W.E.Company		2	0	2	0	0	I	0	. 0	2	1	0	0	0	0			9
17	PWC	ı	1	1	1		0	I	4828	11	1	0	0	ø .	0	0	2	1	13
18	Hawata Project	0	1	0	1_1_	ð	0	0	# CO	0	1	0	1	: 0 - 5-	3 0 5	0	0	2000	4
L	Total	21	22	16	20	15	19	20	7.12 E	15	22	17	第17 年	20	19	14	1120	测17万	298
		WT		Treatmet		58	ļ												
		WSF		Supply F		64	ļ.												
		CES		danagem	****	60													1
		WM		lanagem		53	1												
İ		WOA		Qualsy		3717													ŀ
		CVM			lanagen		1												
		SPAM	1156		1000		l												
			To	tal		298	l												

The Indicator 2 is expected to be achieved by the SWCs irrespective of the scale. The field survey on seven SWCs in August 2010 and the visit to a SWC by this Evaluation Mission showed that all the DGs urged the importance of PWCT training courses and the DGs would apply the techniques of the PWCT training courses to develop their water supply plan regardless of limited budgets. Moreover, the establishment of Ministry of Irrigation and Water Resources in four or five states in 2010 indicates that the water issue is given priority at the state level.

3-3. Issues on the Implementation Process

3-3-1. Communication, Decision Making, Implementation System

Communication, decision making, and the implementation system are mostly good, but face a few issues.

Communication among the Experts, C/Ps and JICA was very smooth throughout the project period. In the first period of the Project, the Sudanese side did not understand the type of JICA support – technical transfer to a C/P, i.e. PWCT - since this Project is the first project after a long cessation of Japanese ODA to Sudan. Therefore, the Experts and JICA explained to the Sudanese side what this Project is about and how it is supposed to work. In addition, four JCCs with the DGs from SWCs were held, In each JCC, the Experts and JICA explained what the PDM is and its progress, and revised it to match the current situations. Weekly C/P meetings were also held to check the progress in each step of preparation, implementation, and evaluation of training courses, based on the

manuals and the work table developed by the Experts. Also in the latter half of the Project, monthly meetings between DG of PWC and Director of PWCT, the Experts leader and JICA were held to discuss issues facing the Project.

Decision making related to this Project has been always clear and has not taken more time than necessary. Because of the good communication among PWCT, PWC, the Experts and JICA, decisions are made quickly even when an urgent need has arisen.

With the support of the Experts, PWCT developed its own structure as well as the organizational structure for implementing training courses. Although C/Ps were replaced in the first period of the Project, the Project has been implemented smoothly by maintaining good communication among the stakeholders. The support of PWC to the Project also contributed to the smooth implementation of the Project.

In the first period, efforts were made to tell DGs of SWC the importance of the training. Some DGs had not agreed to send SWC personnel to the training for they have much work at SWCs. Upon knowing the training contents and the ToT system, the DGs urged the importance of the training and agreed to send the personnel to the training.

Meanwhile, the stakeholders should be encouraged to manage the Project based on the PDM. Although the PDM was revised three times to adapt to the situation and needs, the stakeholders have not shared the same understanding of the Indicators 1 and 2 of the Project Purpose. The different interpretations of these indicators as shown in the mid-term evaluation report should be reflected in the revision of PDM.

3-3-2. Technical Transfer

All the C/Ps who were originally assigned were the directors of PWC. Since they were busy at work in PWC, they were not in PWCT. All the C/Ps were replaced in the first year with younger ones who are eager to work in PWCT and learn new things. In the first period of the Project the C/Ps had difficulty in preparing for the training courses during the absence of the Experts, but the situation is gradually improving.

4. Evaluation Results by Five Evaluation Criteria

Evaluation based on the five criteria is made on three levels: high, moderate, and low.

4-1. Relevance

The relevance of the Project is high.

The political surroundings of the Project remain the same as at the time of the mid-term evaluation. The Project is in line with Sudanese government's policy. The final draft of the National Policy for Water Supply and Sanitation of October 2009 refers to human resource development for water supply as one of its priorities. The Quarterly Century Strategic Plan for 2007-2031 stresses the importance of training. The PWC 5-year plan (2007-2012) states that PWC should support SWC at the state level in training.

The Project is also in line with the Japanese ODA policy. The country assistance program for Sudan of the Japanese ODA (2008) stipulates water and sanitation as two of the focal assistance sectors. TICAD IV also addressed effective water resource management and access to safe water and sanitation facilities.

The Project targets the urgent needs for sustainable water supply in Northern Sudan. The training of the water supply sector in Sudan was limited for more than 10 years. The Project meets the training needs in the water sector in Northern Sudan. The themes of the training courses were confirmed as the urgent needs of the states in the field surveys by the Project team. The contents of the courses were developed based on these field surveys and the interviews with the trainees after the training courses. The field surveys also identified other specific needs in some SWCs that PWCT needs to consider in planning courses in the future. However, since not enough information of SWCs has been collected so far, the Project team plans to collect it by the end of the Project.

The Project applied the ToT system by training of one personnel member on each field at each SWC who later trains his or her colleagues. Given the large area and demands of each state, it was not possible for ToT to cover all the demands while equipment and the training system at SWCs were inadequate. It is necessary in the future to train at PWCT more personnel of each state.

The Project matches the needs of PWC and PWCT. In 2007, the PWC 5-Year Plan stated that PWC should support SWCs by training. That is why PWCT was established. The Project helps PWCT establish the training implementation system. UNICEF helped PWC construct hand pumps and maintain them for more than 20 years. The water supply facility course of the Project complements this support with a multiplier effect.

Japan has technical advantage in water supply sector, and also has excellent training facilities. Japan has high-level water supply technologies which can be adapted to the current water supply situation in Sudan.

4-2. Effectiveness

The effectiveness of the Project is high.

The Project Purpose will mostly be achieved with some challenges. The training implementation system is almost complete and the C/Ps acquired abilities to implement, plan, and administer training courses. Meanwhile, it will take time to finalize organizational arrangements of PWCT such as regulations and budget management and accounting procedures. It also takes time for C/Ps to master all the steps of training implementation and management so that they can control the quality of lectures. For proper implementation of training courses, a new training center must be constructed.

The three Outputs help achieve the Project Purpose. Planning, implementing with feedback for further improvement, and managing the training courses are the necessary and sufficient elements to establish the implementation system of training courses.

The important assumptions to achieve the Project Purpose, i.e. 'Budget for the Center is secured continuously and the structure of the organization is not changed dramatically' have been fulfilled so far. Since the Project started, 90% of the proposed budget by PWCT has been approved on average. The PWCT budget was increased every year, which shows the high concern of the Ministry of Irrigation and Water Resources about the Project and the strong support of PWC.

Here were several contributing factors to the effectiveness of the Project.

- 1) The strong leadership and ownership toward the Project of DG of PWC and Director of PWCT.
- 2) The good relations and close communication among the Project team, JICA and the Embassy of Japan. Monthly meetings among their leaders helped address quickly the problems facing the Project including the mid- and long-term challenges of PWCT.
- Through support from other JICA projects and Japanese assistance projects, the C/Ps gained the following abilities.
 - a) The C/Ps received budget management training, which improved their abilities to manage a budget by developing the budget plan.
 - b) The C/Ps took part in the training on construction and maintenance at PWCT, which made the stakeholders aware of the importance of this field.
 - c) Through digging of wells, construction of water supply facilities, and procurement of the equipment in rural Khartoum, the Experts guided C/Ps on how to implement a project.
- 4) The training courses in Japan for all the C/Ps raised the effectiveness of the Project. The C/Ps saw the training centers in Japan as a model and were inspired to have the PWCT emulate them. Thus the training courses raised the C/Ps' ownership of the Project.

The first period of the Project saw several impeding factors to the effectiveness of the Project as follows, all of which were later overcome.

- 1) The provision of the necessary equipment was delayed because they had not been originally listed for procurement. The delay in the provision of the equipment from Japan caused the following consequences: 1) the practical courses had to be held in other institutions such as universities or military facilities, hindering the effective implementation of the courses; and 2) the water quality analysis course started its training after the provision of the equipment in the latter half of the second year.
- 2) The originally assigned C/Ps were unable to fulfil their mandates. They were directors who were too busy at work in PWC to function as C/Ps. Thus they were replaced by younger C/Ps.

4-3. Efficiency

The efficiency of the Project is high.

All the three Outputs were mostly achieved. While the C/Ps and PWCT had no experience in implementing training courses, the technical support of the Experts to C/Ps was efficient enough to enable the C/Ps to plan, implement, and manage training. However, it is necessary to monitor the work of the C/Ps even after the Project period to ensure that they can properly conduct the work by themselves. Meanwhile, the activities mentioned in the PDM were generally adequate to achieve the Outputs.

After the first year, the Project concentrated on arranging the organization of PWCT and preparation of the training courses. 18 training courses were held in a year and half and six more training courses are to be held in the remaining six months. Given the intensive schedule of training courses in two years, it is fair to say that the Project implemented the activities efficiently.

As for the important assumptions to achieve outputs, the first assumption, i.e. 'Trainees in the course for instructions will stay and continue working at the Center as instructors' is not clear on who the trainees are in the course for instructions. The record on the second assumption, i.e. 'Staff members of the Training Center will continue working at the Center without transfer', is mixed. Six C/Ps were replaced in the first period of the Project as they were unable to fulfil their mandates, which hindered the efficient technical transfer of the Project. However, the new, younger C/Ps kept working for the rest of the Project period. Hence this assumption was mostly fulfilled.

The Experts have a good working relationship with C/Ps. As a result, they gained the trust of C/Ps. It also contributed to the efficiency of the Project.

Meanwhile, the assignment periods and the dispatch of the Experts were inadequate to meet the following demands.

- Since the necessary equipment were not procured as planned, the Experts had to do extra work of listing the equipment, developing specifications, and managing the procurement and installation of the equipment. Considering the large number of equipment to be procured, an expert on procurement should also be dispatched.
- 2) As extra work, the Experts helped design the interiors of KTC and the water quality laboratory.
- 3) After the mid-term evaluation, the survey on the effects of the training courses at the state level was added as a requirement.

The equipments procured by the Project were adequately provided despite the delay in the ones from Japan. After the provision, the equipment and supplied vehicles were properly utilized. The C/Ps' training courses in Japan, whose contents the Experts helped plan, were also adequate. Moreover, the Project budget was increased to meet the needs.

As for the Sudanese inputs, the fees for lecturers, construction of KTC and water quality laboratory, necessary consumables and expenses for the training courses, standby generator, and accommodation for the trainees were all provided with some limitations.

4-4. Impact

The expected impact of the Project is high.

The Overall Goal is expected to be achieved with several conditions. The capacity building of 7 core personnel at each state has already started. Some trainees already conducted transfer their knowledge and techniques to other colleagues at SWCs. By teaching other colleagues they would ascertain their knowledge and technique, so that their capacity would be developed.

As to the institutional capacity of water sector in general, under the National Water Policy which put importance on training, the development of PWCT Master plan is underway with the support of Experts, which is the positive impact of this Project. The field survey in August 2010 revealed that, as positive by-products of the training, several databases were developed in three states, and seven wells were rehabilitated. However, most of the trainees faced the problems of limited equipment and facilities for training, although most of the DGs of SWCs urge the importance of the training. The difference among the SWCs on conducting technical transfer by the trainees lies in how much importance the DG puts on training-related issues and the availability of the total budget for water supply. In Gedaref state, the training facilities were constructed with necessary equipment, which

could be a model for other states. Three states also plan to construct training centers. The DGs are interested in applying the techniques and knowledge from the PWCT training to their water supply plan regardless of the scale. Moreover, for developing institutional capacity for stabilizing water supply in Northern Sudan, it is necessary to address other issues such as organizational structure of PWC and SWCs for effective water administration, effective tariff scales, financial management, and information management.

Hence the achievement of the Overall Goal will depend not only on the availability of the budget for training courses and for water supply in general in Northern Sudan, but also on the above-mentioned issues.

To achieve the Overall Goal, PWCT and SWCs face the following challenges.

<PWCT>

- > To respond to diverse needs, PWCT plans and implements other training programmes on different fields at various technical levels, and on administration programmes in such aspects as planning, financial management, and tariff structure.
- > PWCT develops the Human Resource database of all SWCs for an effective training system.
- > PWCT monitors the technical transfer situation at SWCs by visiting the states.

<SWCs>

- > SWCs secure the budgets for training and water supply service in general.
- > SWCs develop a training unit with necessary equipment and training facilities.

As for the important assumptions, the first important assumption, i.e. 'Equipment are installed at PWCT to be utilized during the project period', is not intended for achieving the Overall Goal but the Project Purpose. The second assumption, i.e. 'Motivations of trainees who completed the training course are sustained', depends on the availability of proper equipment and facilities for technical transfer.

Here are several other important assumptions to achieve the Overall Goal.

- 1) Necessary equipment for water supply service and training courses are procured in SWCs.
- 2) Revenue of water supply services is not used for purposes other than water service.
- 3) National and state budgets do not change drastically in the future.
- 4) The stable situation will be maintained.

Meanwhile, the following were unexpected positive impacts of the Project on Sudan and Japan.

1) The Project is the first project after a long cessation of Japanese aid to Sudan. Because of the

- successful implementation of the Project and public relations activities, the expectation of the Sudanese government and the people toward Japanese assistance was raised.
- 2) The Project team also conducted public relations activities to the Japanese media, and reported the Project's progress on the JICA website. Such undertakings helped fulfil the accountability of the Project to the Japanese.

4-5. Sustainability

The expected sustainability of the Project is moderate to high with several challenges.

In the political and institutional aspects, the current draft National Water Policy is expected to be finalized without change in the importance of human resource development in water supply. The PWCT Master Plan describes the long term plan of the PWCT activities and suggests the principle functions to be realized because of the high interest of the Ministry of Irrigation and Water Resources and the strong support from PWC. Moreover with the support of the Project PWCT enabled quick improvement which is highly evaluated in terms of sustainability.

The followings are positive elements in terms of sustainability:

- 1) As mentioned in 4-4, the SWCs are expected to apply the techniques and knowledge to their water supply plan regardless of the scale, for most of the DGs urge the importance of the training to improve water supply service.
- 2) The construction of the new training center would start in January 2011, which enables increase of number of courses and trainees with proper accommodation.
- 3) The training implementation system is expected to be sustained with a secured budget and the leadership of DG of PWC and Director of PWCT.
- 4) Regarding the organizational issues for water supply service, in response to the plan which SWCs would transfer the whole maintenance of water supply facilities at the village level, the training course includes the tariff collection work and maintenance of equipment at the village level.

The followings are several challenges in the organizational and financial aspects.

- 1) The number of training programmes as well as that of trainees are planned to be increased. That requires more budget and personnel.
- 2) For securing a necessary budget, PWCT should have separate bank account from the PWC in the future.
- 3) In order to look for good lecturers, it is necessary to share information more extensively with other training centers, the general public, and private firms such as Kenana Sugar Company.
- 4) For effective training courses, the relationship between PWCT and SWCs must be improved,

and PWCT's monitoring system on SWCs' technical transfer and needs is also to be developed.

In the technical aspect, the following are the challenges in sustaining the training implementation system developed by the Project.

- C/Ps are able to implement the training courses by themselves to some extent but there are some items which C/Ps requires more effort. Continuous monitoring by the Experts is desirable for proper implementation of the C/Ps' work.
- C/Ps need PC skills and technical knowledge and abilities for an advanced level of management of training courses.
- 3) PWCT develops its own texts of the training courses.
- 4) To ascertain the quality of the lectures, continuous evaluation of the lecturers is to be conducted.
- 5) PWCT requires evaluation of its budget control and implementation.

In the environmental aspect, environmentally conscious measures, such as utilizing the packing materials of the equipment procured from Japan for making furniture and cover of the office stationery, are taken.

5. Factors related to the realization of positive effects

5-1. Factors enabling the realization of positive effects

Followings are the factors enabling the realization of positive effects.

- > Good communication between C/Ps, Experts, and JICA contributed to smooth implementation and achievement of the Project Purpose.
- > Strong support of DG of PWC to the Project.
- > Ownership development and effective feedback from the good C/Ps trainings in Japan
- > By increasing the number of implementation of training courses C/Ps develop their capacity of management and implementation of the training courses and create trust between Experts and C/Ps.
- > The mutual trust by both parties creates further development of the Project.

5-2. Factors obstructing the realization of positive effects

Followings are the factors obstructing the realization of positive effects.

- > Since they had not have the similar experience, C/Ps have had difficulties in finding problems, time management, and evaluation of the course, etc.
- > Since PWCT budget belongs to PWC, the budget management of PWCT is sometimes difficult, such as in sudden payment.

- > Some SWCs which have problems of paying fee and transport for the course could not send the trainees.
- > Since most of the SWCs don't have equipment and facilities for training, the technical transfer could not be conducted even with the trainees' efforts.

6. Conclusion

Conclusion of this Evaluation is as follows.

- > The Project purpose will be achieved by the termination of the Project.
- > The Overall goal is expected to be achieved with several conditions.
- > On the five evaluation criteria the evaluation results of the Project is generally high.
 - The relevance of the Project is high and its effectiveness and efficiency are also high.
 - The implementation process is mostly good with a few issues to concern.
 - Impact of the Project is high with several conditions.
 - In order to sustain the training implementation, there are several challenges to overcome. Hence the sustainability of the Project is moderate to high.
- PWCT achieved quick progress with strong ownership and leadership of the DG of PWC and Director of PWCT, intensive support from JICA Sudan Office, and effective management of the Project.
- ➤ In order to enhance the effect of the training PWCT should support to establish the training units in SWCs so that they could conduct their own training, which could be supported by PWCT.

7. Recommendations and Lessons learnt

7-1. Recommendations

The Evaluation team recommends that the Sudanese side and JICA consider the following concrete actions to be taken by the termination of the Project, and after the Project, respectively, as follows:

- 7-1-1. Recommendations by the termination of the Project
- (1) The conduction of training courses by C/Ps themselves

C/Ps should conduct the remaining training courses on their own initiatives with the least involvement of Japanese Experts in order to enhance human and institutional capacity for sustainability.

(2) Compilation of Human Resource database of all the SWCs

PWCT should compile Human Resource database of all the SWCs in order to grasp the precise training needs so that they could plan the new training courses to be implemented after the completion of the Project.

7-1-2. Recommendations after completion of the Project

(1) Expansion of the training capacity of PWCT

The current training capacity of about 25 trainees at one time based on the limited accommodation capacity is too small compared to the vast demands of the SWCs. The capacity in terms of facilities, budget and human resources of PWCT should be expanded.¹

(2) Completion and authorization of mid- to long-term development plan of PWCT

The mid- to long-term development plan, which has been elaborated by PWCT, should be completed and authorized by the Sudanese government.

(3) Diversification of training programmes

To respond to diverse needs of SWCs, PWCT should initiate much more training programmes on various engineering topics, with different technical levels, and on administrative programmes as well, in such topics as project planning, financial management, water tariff structure, etc.

(4) Independent bank account for PWCT budget

For the effective and efficient budget management PWCT should have independent bank account.

(5) PWCT's support to establish training unit in SWCs

PWCT should provide continuous support to SWCs in institutionalizing a training unit for the effective dissemination of knowledge and skills of water supply services to various levels of SWCs personnel. The function of the training unit includes effective feedback of the results of the technical transfer and the training needs of SWCs to PWCT.

(6) Effective utilization of the manuals by PWCT staffs

PWCT staffs should utilize the management manuals for the effective management of PWCT. Those manuals should be revised properly, whenever it is necessary.

7-2. Lessons learnt

(1) Positive elements to achieve the quick progress of PWCT development

There are several positive elements which contributed jointly to enable the quick progress of the

¹ There is very encouraging information that according to the DG of PWC the budget for construction of the new training center with accommodation capacity of 50 trainees is secured and construction work will be started from early next year. PWC is also planning to increase human resources and the corresponding budget for responding to the expansion of PWCT activities.

Project as follows,

- > Strong ownership and leadership of DG of PWC and Director of PWCT
- > Long assignment period of the leader of Japanese Experts
- > Intensive support from JICA Sudan Office
- > Ripple effects provided by supporting to other related JICA project (Darfur project)
- (2) Positive outcomes by dividing one training course into several times

 Some positive outcomes were earned by dividing one training course into several times as follows:
- > Intensifying mutual understanding between trainees, Experts and course coordinator by increasing occasions of contact during the training period.
- > Enhancement of capacity development of course coordinators by increasing the managing opportunities of training courses.
- > Trust building between Course coordinators and Experts by increasing occasions of technical transfer in management of training courses.
- > Encouragement of busy trainees to attend the courses by limiting the length of each training period into 2 weeks.

Annex 1. Project Design Matrix (PDMg)

Name of the Project: Human Resources Development for Water Supply in Sudan

The Project Target Area: Northern Part of Sudan

Project Duration: From May, Year 2008 to April, Year 2011 (3Years)

Project Target Group; Engineers and Technicians of Water Supply Sector (At least 1000) Indirect Target Group; All the staffs of Water Supply Sector (At least 12000 people)

Gummary of the Project	ladicalor	Procuremoni Means	External Condition
< OVERALL GOAL > Water supply in Sudan is stabilized	Non-operation time for water supply facilities by states decreases significantly Quantity of water from water supply facilities by states increases significantly	1,2. Operation roport of each facility	Political stability continues A large-scale change of structure does not occur the water supply sector
PROJECT PURPOSE > PWC Training Center establishes the system for the implementation of Training	Average grade of evaluation of the trial training courses by the trainees marks mere then 90% Average grade of evaluation of the administration by the trial courses trainees marks more than 90% At least 90% of the trial course trainee gain certificate of successful completion of the course	1,2. Summary of evaluation 3. Ratio between Number of Certificate given and total number of trainee attended courses	Traines who complete courses continue working a their organization Equipments are installed at PWC to utilize the slu of the Traines who completed courses Motivations of trainess who completed the training course are sustained
OUTPUTS > PWC Training Center acquires abilities to implement and plan training courses 	1-1. Evaluation for the procedures for planning and implementing the training courses by experts and course coordinators is improved 1-2. Annual plan, materials and curriculum of more than 3 courses and at least 1 ad hoc course are astablished 1-3. Trainers and OJT sites are identified for more than 3 principal courses and at least 1 ad hoc course 1-4. Evaluation for the technical skill of trainers by experts is improved after the complementary training	1-1. Records of the Project (list of trainer, equipment) 1-2. Record of needs analysis 1-3. Record of implementation of training courses 1-4. Records of the Project 1-5. 6 Evaluation report	Budget for the Center is secured continuously und Structure of the organization is not changed dramatically
2. PWC Training Contor acquires administrative abilities necessary for maneging training courses		2-1. Records of the project 2-2. Records of material 2-3. Budgetary records 2-4. Number of documents established and improved (If	
3. Improvements and lessons are extracted from the trail implementation of training courses	3-1. Three principal courses are implemented at least 5 times each. Two ad hec courses are implemented at least once each 3-2. Number of problems and difficulties on each point of view referred in Activities 3-2	3-1. Records of trainings 3-2. Number of points which should be implemented	
< ACTIVITIES >	< INPUTS >	· · · · · · · · · · · · · · · · · · ·	
1-1. Establishment of the monual for planning, managing and evaluating training courses 1-2. Training of course coordinators utilizing the manual above 1-3. Supplemental survey and examination (technical level, subject, background of the traines, etc.) 1-4. Design of principal and ad hoc training courses based on 1-3 1-5. Preparatory of annual plan, curriculum, training materials, tools, equipments, and machinary for principal and all hoc training courses 1-6. Identification of trainers and field training sites for principal and ad hoc training courses from related organizations (PWC, GWWD, SWCs, Universities, Private Companies, etc.) 1-7. Supplemental training regarding the know-how for trainers of principal and ad hoc training courses 1-8. Establishment of avaluation methods training courses 1-9. Improvement of the manual written in 1-1, on the basis of problems identified in 3-2	Water Supply Facilities / Machinery and Electrics Operation and Maintenance of the Treatment Plant	Sudanese Side 1. Allocation of Counterparts 2. Travel Allowance for Trainnes 3. Expenses for Instalation of Equipments 4. Working Condition for Jepanese Experts 5. Expenses for the Consumable Goods and Rusning Expenses foir Training	Trainees for Course for Instructions will stay and continue working at the Conter as instructors Staffs of the Training Center will continue working at the Center without transfer
2-1. Establishment of regulations and domarcation of duties for the administration training courses 2-2. Proper reservation of the training materials and texts 2-3. Decision of budgetary plan for training courses 2-4. Proceeding administrational steps for negotiation, contract, procurement and public relations 2-5. Management and maintenance of facilities for training 2-6. Improvement of the regulations and demarcation established in 2-1, on basis of problems identified in 3-2 3-1. Tentative implementation of principal and ad hoc training courses 3-2. Identification of problems in the following fields Consistency between the needs and contents of the courses Contents of course materials and their interface Capacity and presentation methods of trainers Capacity of confinators and procedure established in 1-1 Capacity of administrators and regulations/procedures astablished in 2-1	Necessary equipments for the training course. Maintenance of Pipe Network. 3. Training in Japan and other third countries Jepen, Jorden, Egypt, Ethiopia		< IMPORTANT ASSUMPTIONS > Political Stability & Peace of Order will not be worsened extremely Adequate number of personnel are assigned to Training Center -Each SWC establishes the organizational framework

Project Daskyn Matrix (POM<u>1</u>)

Name of the Project: Human Resources Development for Water Supply in Sudan

The Project Target Area; Northern Part of Sudan

Project Duration: From May, Year 2008 to April, Year 2011 (3Years)

Project Target Group: Engineers and Technicions of Weter Supply Sector (At least 1000) Indirect Target Group; All the staffs of Water Supply Sector (At least 12000 people)

Company III- Dodge	Indicator	Procutoment Monns	External Condition
Summary of the Project	Marie		
< OVERALL GOAL > Water supply in Sudan is stabilized	Non-operation time for water supply facilities by states decreases significantly Quantity of water from water supply facilities by states increases significantly	Operation report of each facility Operation report of each facility	Political stability continues A large-scale change of structure does not occur in the water supply sector
PROJECT PURPOSE > PYC Training Center establishes the system for the implementation of Training	Average grade of evaluation of the trial training courses by the trainees marks more than 90% Average grade of evaluation of the administration by the trial courses trainees marks more than 90% At least 90% of the trial course trainee gain cor	Summary of evaluation Summary of evaluation Ratio between Number of Certificate given and total number of trainee attended courses	Trainous who complete courses continue working at their organization Equipments are installed at MWC to utilize the akill of the Trainous who completed courses. Notivations of trainous who completed the training course are sustained Old and defecti
< OUTPUTS >			
1. PVC Training Center acquires abilities to Implement and plan training courses	1-1. Evaluation for the procedures for planning and haplementing the training courses by exports and course coordinators is improved 1-2. Annual plan, meterials and curriculum of more than 3 principal courses and at least 1 ad hoc course are established	1-1. Records of the Project (list of trainer, equipment) 1-2. Record of needs analysis 1-3. Record of implementation of training courses 1-4. Records of the Project and Evaluation spent	Budget for the Center is secured continuously and Structure of the organization is not changed dramatically
2. PVC Training Center acquires administrative abilities necessary for managing training courses	2-1. Evaluation for regulations and demarcations established in activities 2 by the experts and administrators is improved	2-1. Records of the project	
2. Pryo Hamile Cetter addites activities activities accessed to minimum activities	2-1. Evaluation for regulations and bentz for more than 3 principal courses see stored, maintained and used properly	2-2. Records of material	
	2-3. The budget (I	2-3. Budgetary records 2-4. Number of documents established and improved (If necessary)	
3. Improvements and lessons are extracted from the trail implementation of training courses	3-1. Three principal courses are implemented at least 6 times each. Two ad loc courses are implemented at least once each 3-2. Number of problems and difficulties on each point of view referred in Activities 3-2	3-1. Records of trainings 3-2. Number of points which should be implemented	
< ACTIVITIES >	< INPUTS >		- Trainees for Course for Instructions will stay and
I-1. Establishment of the manual for plauning, maneging and evaluating training courses I-2. Training of course coordinators utilizing the manual above I-3. Supplemental survey and examination (technical level, subject, background of the trainea, etc.) 2-1. Establishment of regulations and demarcation of duties for the administration training courses	Japanese Side 1. Experts 1. Experts 1. Training Course Management / Water Sopply / Piping and Networks 1. Water Supply Facilities / Machinery and Electrics 2. Operation and Maintenance of the Treatment Piant 2. Data Management / GIS 1. Knowledge Management / Instructional Design 1. Water Quality Analysis 2. Equipment 1. Necessary equipment for the training course "Water Supply / Mechinery and Electrica" 1. Necessary equipments for the training course "Water Supply / Mechinery and Electrica" 1. Necessary equipments for the training course "Water Supply / Mechinery and Electrica" 1. Necessary equipments for the training course "Water Gully Analysis" 1. Necessary equipments for the training course "Water Gully Analysis" 1. Necessary equipments for the training course "Meintenance of Pipe Network"	Sudannes Side 1. Allocation of Counterparts 2. Travel Allocates for Trainees 3. Expenses for Installation of Equipments 4. Working Condition for Japanese Experts 5. Expenses for the Consumbile Goods and cunning expenses for trainings	continue working at the Center as Instructors - Staffs of the Training Center will continue working at the Center without transfer
2-2. Proper reservation of the training materials and texts 2-3. Dacision of budgetary plan for training courses 2-4. Proceeding administrational steps	3. Training in Japan and other tided countries Japan, Jordan, Egrot, Ethiopia		
3-1. Tentative implementation of principal and ad foc training courses J-2. Identification of problems in the following fields - Consistency between the needs and contents of the courses - Contents of course materials and their in			≺ IMPORTANT ASSUMPTIONS > Political Stability & Peace of Order will not be warsened extremely varient annuber of personnel are assigned to Training Center Center - Each SWC establishes the organizational framework ■ The content of the cont

Remarks: PVC stands for Public Water Corporation, SWC for State Water Corporation

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Project Design Mauix (PDM2)

Name of the Project: Human Resources Development for Water Supply in Sudan

The Project Target Area: Northern Part of Sudan

Project Duration: From May, Year 2008 to April, Year 2011 (3Years)

Project Target Group: Engineers and Technicians of Water Supply Sector (At least 1000) Indirect Target Group; All the stalls of Water Supply Sector (At least 12000 people)

Summary of the Project	Indicator	Procurament Means	External Condition
OVERALL GOAL >			
Water supply in Sudon is stabilized	Non-operation time for water supply facilities by states decreases significantly Quantity of water from water supply facilities by states increases significantly	Operation report of each facility Operation report of each facility	Political stability continues A large-scale change of structure does not occur in the water supply sector
< PROJECT PURPOSE >			
PWC Training Center establishes the system for the implementation of Training	Average grade of evaluation of the trial training courses by the traineos marks more than 90% Average grade of evaluation of the administration by the trial course trainees marks more than 90% At least 90% of the trial course trainee gain certificate of successful completion of the course	Summery of evaluation Summery of evaluation Summery of evaluation Ratio between Number of Certificate given and total number of trainee attended courses	Trainees who complete courses continue working at their organization Baujanous are instelled at PWC to utilize the skill of the Traineas who completed courses Motivations of traineas who completed the training course are sustained -dyld-and-defective-construction-finalities-will-be-treate in-the-project-period
< OUTPUTS >			
1. PWC Trothing Center acquires abilities to implement and plan training courses	1-1. Evaluation for the procedures for planning and implementing the training courses by exports and course coordinators is improved 1-2. Annual plan, materials and curriculum of more than 3 principal courses and at least 1 ad hoc course are established 1-3. Lecturers and OJT sites are identified for more than 3 principal courses and at least 1 ad hoc course 1-4. Evaluation for the technical shill of lecturers by exports is improved after the complementary training	1-1. Records of the Project (list of Lecturers, equipment) 1-2. Record of needs analysis 1-3. Record of implementation of treining courses 1-4. Records of the Project and Evaluation report	Dudget for the Center is secured continuously and Structure of the organization is not changed drematically
2. PWC Training Center acquires administrative obilities necessary for managing training courses	2-1 Evaluation for regulations and demonstrate and the secretary of the secretary of	2-1. Records of the project	
es 1 400 crouning occurre modules administrative courses necessary for mathematic training courses	Judininistrators is improved 2-2. Necessary materials and texts for more than 3 principal courses are stored, maintained and used	2-2. Records of material	
	properly 2-3. The budget (income/loss) is managed properly according to the budgetary plan of the Center 2-4. Forms for accounting, public relations and contract are developed and improved on the basis of problems and difficulties extracted through activities 3	2-3. Budgotery records 2-4. Number of documents established and improved (If necessary)	
3. Improvements and lessums are extracted from the trial implementation of training courses	3-1. Three principal courses are implemented busically 5 times each. Two ad hoc courses are implemented at least once each - the number of times depends on the attention. 3-2. Number of problems and difficulties on each point of view referred in Activities 3-2	3-1. Records of trainings 3-2. Number of points which should be implemented	
< ACTIVITIES >	< INPUTS >		
1-1. Establishment of the manual for planning, managing and evaluating training courses 1-2. Training of course coordinators utilizing the manual above 1-3. Supplemental survey and examination (technical level), subject, background of the trainae, etc.) 1-4. Design of principal and ad hoc training courses based on 1-3 1-5. Proporatory of annual plan, curriculum, training materials, tools, equipment, and ,machinery for principal and ad hoc training courses 1-6. Identification of leaturers and field training sites for principal and ad hoc training courses from related organizations (PWC, GWWD, SWCs, Universities, Private Companies, etc.) 1-7. Supplemental training regarding the know-how for featurers of principal and ad hoc training courses 1-6. Identification of evaluation methods training courses 1-9. Improvement of the manual written in 1-1, on the basis of problems identified in 3-2 2-1. Establishment of regulations and demorcation of duties for the administration training	Japanese Side 1. Experts Training Course Management / Water Supply / Piping and Networks Water Supply Pacifities / Machinery and Electrics Operation and Maintenance of the Treatment Plant Data Management / GIS Guesation Technology/Organizational Management Water Quality Analysis Wali Management E. Equipment Meassary equipments for the training course "Water Supply / Machinery and Electrics" Meassary equipments for the training course "Data Management / GIS" Meassary equipments for the training course "Data Management / GIS" Meassary equipments for the training course "Malatenance of Pipa Network"	Suddnunce Side 1. Allocation of Counterparts 2. Daily and travel allowence for Truinnes 3. Lecturers allowance 4. Expenses for instalation of equipments 5. Working condition for Jopanese Experts 6. Expenses for the consumable goods and running expenses for Training 7. Straiby generator for the Teahing Center 9. Construction of Verbrand parties 10 9. Construction of Neuratory of Water quality analysis 10. Arrangement of lodging facility and equipment	Trainees for Course for Instructions will stay and conlinue working at the Center of Instructors Staffs of the Training Center will continue working at the Center without transfer
courses 2-2. Proper reservation of the training materials and texts 2-3. Decision of budgetary plan for training courses 2-4. Proceeding administrational steps for negotiation, contract, procurement and public relations 2-5. Management and maintenance of facilities for training 2-6. Improvement of the regulations and demarcation established in 2-1, on basis of problems identified in 3-2 3-1. Tentative implementation of principal and ad hoc training courses 3-2. Identification of problems in the following fields	- Necessary equipment for training source "Well Management" - Necessary equipment for workshop - Vedeta for live Project 3. Training in Japan and other third countries Japan, or others	·	< IMPORTANT ASSUMPTIONS > • Political Stability & Peace of Order will not be
Consistency between the needs and contents of the courses Contents of course materials and their interface Capacity and presentation mathods of Leatware Capacity of coordinators and procedure established in I-1 Capacity of administrators and regulations/procedures established in 2-1			Frontial anomy we reduce to Grace the not be worsened extremely *Adequate number of personnel are assigned to Transing Conter *Euch SWC establishes the organizational framework

Project Duration: From May, Year 2008 to April, Year 2011 (3Years)

The Project Target Area: Northern Part of Sudan

Project Target Group: Engineers and Technicians of Water Supply Sector (At least 1000) Indirect Target Group: All the stoffs of Water Supply Sector (At least 12000 people)

Summary of the Project	Indicator	Procurement Means	External Condition
< OVERALL GOAL > Water supply in Sudan is stabilized	Non-operation time for water supply facilities by states decreases significantly Quantity of water from water supply facilities by states increases significantly	Operation report of each facility Operation report of each facility	Political stability continues Alarge-scale change of structure does not occur in the water supply sector
PWC Training Center establishes the system for the implementation of Training	Average grade of evaluation of the trial training courses by the trainees marks more than 90% Average grade of evaluation of the administration by the trial courses trainees marks more than 90% At least 90% of the trial course trainee gain certificate of successful completion of the course	Summary of evaluation Summary of evaluation Ratio between Number of Certificate given and total number of trainee attended courses	Trainees who complete courses continue working at their organization Equipments are installed at PAVC to utilize the skill of the Trainees who completed courses. Molivations of trainees who completed the training course are statemed.
COUTPUTS > 1. PWC Training Center acquires abilities to implement and plan training courses	1-1. Evaluation for the procedures for planning and implementing the training courses by experts and course coordinators is improved 1-2. Annual plan, materials and curriculum of more than 3 principal courses and at least 1 ad hoc course are established 1-3. Leavers and OIT sites are identified for more than 3 principal courses and at least 1 ad hoc course 1-4. Evaluation for the technical skill of lectures by experts is improved after the complementory training	1-1. Records of the Project (list of Lecturers, equipment) 1-2. Record of needs analysis 1-3. Record of implementation of training courses 1-4. Records of the Project and Evaluation report	- Budget for the Center is secured continuously and Structure of the organization is not changed dramatically
2. PWC Training Center ecquires administrative oblities necessary for managing training courses	2-1. Evaluation for regulations and demarcations established in activities 2 by the experts and administrators is improved 2-2. Necessary materials and texts for more than 3 principal courses are stored, maintained and used properly 2-3. The budget fincome/loss) is managed properly according to the budgetary plan of the Conter 2-4. Forms for necounting, public relations and contract are developed and improved on the basis of problems and difficulties extracted through activities 3	2-1. Records of the project 2-2. Records of material 2-3. Budgetary records 2-4. Number of documents established and improved (if necessary)	
3. Improvements and lessons are extracted from the trial implementation of training courses	3-1. Three principal courses are implemented busically 5 times each. Two ud hoe courses are implemented at least once coch. The number of times depends on the situation. 3-2. Number of problems and difficulties on each point of view referred in Activities 3-2	3-1. Records of trainings 3-2. Number of points which should be implemented	
 ACTIVITIES > 1-1. Establishment of the manual for planning, managing and evaluating training courses 1-2. Training of course coordinators utilizing the manual above 1-3. Supplemental survey and examination (technical level, subject, background of the trainer, etc.) 1-4. Design of principal and ad hoc training courses based on 1-3 1-5. Preparatory of nanual plan, curriculum, training materials, tools, equipment, and machinery for principal and ad hoc training courses 1-6. Identification of neutrons and field training sites for principal and ad hoc training courses 1-7. Supplemental training regarding the know-how for tectorers of principal and ad hoc training courses 1-8. Establishment of evaluation methods training courses 1-9. Improvement of the manual written in 1-1, on the basis of problems identified in 3-2 2-1. Establishment of regulations and denarcation of duties for the administration training courses 2-3. Decision of fudgetary plan for training courses 2-4. Proceeding administrational steps for negotiation, contract, procurement and public relations 2-5. Management and maintenance of facilities for training 2-6. Improvement of the regulations and denarcation ostablished in 2-1, on basis of problems identified in 3-2 	Supanese Side	Sudannse Side 1. Allocation of Counterparts 2. days and travel allowance for Truinnes 3. Locatures allowance 4. Expenses for installation of equipments 5. Working condition for Japanese Experts 6. Expenses for the consumble goods and running expenses for Truining 7. Standby generator for the Training Center 9. Construction of workshop at 6th 10 9. Construction of laboratory of water quality analysis 10. Atrangement of lodging facility and equipment	Truinees for Course for instructions will stay and continue working at the Center os Instructors Stelfk of the Training Center will continue working at the Center without transfer
3-1. Tentative implementation of principal and ad hoc training courses 3-2. Identification of problems in the following fields Consistency between the needs and contents of the courses Contents of course materials and their interface Cupacity and presentation methods of Learners Cupacity of coordinators and procedure established in 1-1 Cupacity of administrators and regulations/procedures established in 2-1			< IMPORTANT ASSUMPTIONS > Political Stability & Peace of Order will not be wersoned extremely Adequate number of personnel are assigned to Trainin Center -Each SWC establishes the organizational framework
Remarks: PWC stands for Public Water Corporation, SWC for State Water Corporation	*·		

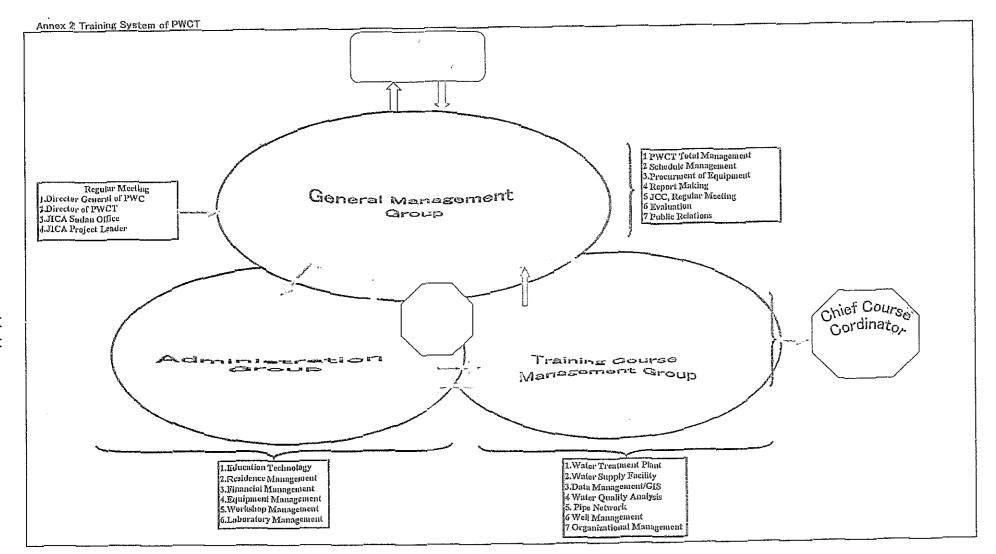
Name of the Project: Human Resources Development for Water Supply in Sudan

The Project Target Area; Northern Part of Sudan

<u>roject Target Group:</u> Staff of PWCT, PWC and SWCs, Indirect Target Group: All the stan of Water Supply Sector

SCHEMAL GOALS Any of an extractive coupting and anything for modelling used anything the modelling used anything	Summary of the Project	Indicator	Procurement Means	Extornal Condition
### Apper and the daught grown using the Apper and the coupling to a present the minimum control to the property of a coupling to a present the minimum control to the property of a coupling to a present the minimum control to the property of a coupling to the property of a coupling to a present the property of a coupling to the proper	< OVERALL GOAL >			Zilonja Oonaan
## Training Center actualitions the system for the implementation of Training Foundation Fo	Institutional capacity for stabilizing water supply in the northern Sudan is enhanced.	2. Applied annual water supply plan (3-5 years) with the State budget based on lessons learnt from the		A large-scale change of structure does not occur in
UPD Tribing Conter acquires administration by the trid contents statistics must as more contents. A content of the content to	1			
1. FWC Trisling Center acquires abilitive to impliment and pilot training courses 1. Department of the flow triple of the flow that the implimentation of the flow training course analogorame training courses 2. PWC Training Centur acquires abilities or coessary for strongly training courses 2. PWC Training Centur acquires abilities or coessary for strongly training courses 2. PWC Training Centur acquires abilities or coessary for strongly training courses 2. PWC Training Centur acquires abilities or coessary for strongly training courses 2. PWC Training Centur acquires abilities or coessary for strongly training courses 2. PWC Training Centur acquires abilities or coessary for strongly training courses 2. PWC Training Centur acquires abilities or deposits abilities or coessary for strongly training courses 2. PWC Training Centur acquires abilities or deposits abilities or coessary for strongly training courses 2. PWC Training Centur acquires abilities or deposits abilities or coessary for strongly training courses 2. PWC Training Centur acquires abilities or deposits abilities abilities or deposits abilities and the training courses 2. PWC Training Centur acquires abilities or deposits abilities and the training courses 2. PWC Training Centur acquires abilities or deposits abilities and the training courses 2. PWC Training Centur acquires abilities and present acquires abilities and present acquires and training courses 2. PWC Training Centur acquires abilities and present acquires abilities and present acquires and training courses 2. PWC Training Centur acquires and		90% 2. Average grade of evaluation of the administration by the trial courses trainces marks more than 90% 3. At least 90% of the trial course trainee gain certificate of successful completion of the	Summary of evaluation Ratio between Number of Certificate given	Equipments are installed at PWCT to be utilized during the project period. Motivations of trainees who completed the training.
The contraction of the mean of the property of personal property of the contraction of the property of personal property of the contraction of the property of the property of the property of the contraction of the property of the proper	< OUTPUTS >			
2. Prov Training Center sequence and TOM of the staffs earlisty 2 2. Proport and common measuremarkers deathless of problem solution and foot and fine limited persons 2-3. Proport and common management of the Center budget on the International Center of the Internation of the International Center of I	1. PWC Training Center acquires abilities to implement and plan training courses	Implementation 1-2. Established annual plan, manual, materials and syllabus of more than 3 principal and 4.ad hoc training courses 1-3. Established training site (PWCT workshop)	1-2. Annual Plan, monuals, materials and syllabaus 1-3. Situation of the workshop	
2. Proor Tealing Center sequence tile addities of problems solution and fire-information of this Center Pudge. 2. Proor management of this Center Pudge. 2. Proor management of this Center Pudge. 2. Implementation of the manual or planning, nameling and evaluating training courses. 3. Implementation of the manual or planning, nameling and evaluating training courses. 3. Implementation of the manual or planning, nameling and evaluating training courses. 3. Implementation of the manual or planning, nameling and evaluating training courses. 4. Design of principal and a low training course series and existing course are series. 5. Supplementation of the manual or planning, nameling and evaluating training courses. 5. Supplementation of the manual or planning, nameling and evaluating training courses. 5. Supplementation of the manual or planning, nameling and evaluating training courses. 5. Supplementation of the manual or planning, nameling and evaluating training courses. 5. Supplementation of the manual evaluation of the planning of the plan	2. PWC Training Center acquires administrative abilities necessary for managing training courses		2-1. Records of the project	
ACTIVITIES > 1. Indication of phanning, can easing and evaluating training courses 2. The control of the natural for phanning, can easing and evaluating training courses 2. Thirding of correct coordinators utilizing the namural above 1. Supplemental survey and examination (continued level, adulped, background of the training courses 2. Thirding of correct coordinators utilizing the namural above 1. Supplemental survey and examination (continued level, adulped, background of the training courses 2. Thirding of correct coordinators utilizing the namural above 1. Supplemental survey and examination (continued level, adulped, background of the training courses 2. Thirding of correct coordinators under the property of the propert		2-2. Proper management of the improved necessary materials and texts of the training courses	2-2. Records of material	
ACTIVITIES > 1. Indication of phanning, can easing and evaluating training courses 2. The control of the natural for phanning, can easing and evaluating training courses 2. Thirding of correct coordinators utilizing the namural above 1. Supplemental survey and examination (continued level, adulped, background of the training courses 2. Thirding of correct coordinators utilizing the namural above 1. Supplemental survey and examination (continued level, adulped, background of the training courses 2. Thirding of correct coordinators utilizing the namural above 1. Supplemental survey and examination (continued level, adulped, background of the training courses 2. Thirding of correct coordinators under the property of the propert	3. PWC Training Center acquires the abilities of problem calcul-		2x1 Records of teninings	
ADDITION Contract Contract of the manual for planning, managing and evaluating training courses		ad hoc courses 3-2. Number of problems and difficulties on each point of view referred in Activities 3-2	3-2. Number of points which should be	
1-1. Establishment of the namual for planning, managing and evaluating training courses 1-2. Training of occure coordinators (librating the namual above 1-3. Supplemental survey and examination (technical level, subject, background of the training courses 1-4. Dealty of principal and a lot be training courses stated on 1-3 and the craining courses stated on 1-3 and the craining courses 1-3. Dealty of principal and a lot be training courses (represented to the craining courses) -3. Dealty of principal and a lot be training courses (represented to the craining courses (represented to the craining courses) -3. Supplemental training reporting to know-how for lecturers of principal and a lot training courses 1. Alteration of Counterparts -3. Supplemental training reporting to know-how for lecturers of principal and a lot training courses (represented to the courses) -3. Supplemental training reporting to know-how for lecturers of principal and a lot training courses (represented to the course of reporting courses) -3. Supplemental training reporting to know-how for lecturers of principal and a lot training courses (represented to the course of reporting courses) -3. Supplemental training reporting to know-how for lecturers of principal and a lot training courses (represented to the course) -3. Supplemental training reporting to know-how for lecturers of lecturers and fundamental or equipments (represented to the course of report training courses (represented to the course) -3. Supplemental training courses (represented to the training courses) -3. Supplemental training courses (represented to the training courses) -3. Supplemental training courses (represented to the training courses) -3. Supplemental training courses (represented to the training courses) -3. Supplemental train				
-2. Proper reservation of the training materials and texts -3. Decision of budgetary plan for training courses -4. Proceeding administrational steps for negetiation, contract, procurement and public relations -5. Management and maintenance of facilities for training -6. Improvement of the regulations and demarcation established in 2-1, on basis of problems identified in 31. Tentative implementation of principal and ad hoc training courses -2. Identification of problems in the following fields - Consistency between the needs and contents of the courses - Contents of course materials and their interface - Capacity and presentation mothods of Lecturers - Capacity of cordinators and procedure established in 1-1 - Capacity of administrators and regulations/procedures established in 2-1.	1-3. Supplemental survey and examination (technical level, subject, background of the trainee, etc.) 1-3. Supplemental survey and examination (technical level, subject, background of the trainee, etc.) 1-4. Design of principal and ad hoc training courses based on 1-3 1-5. Preparatory of annual plan, curriculum, training materials, tools, equipment, and "machinery for principal and ad hoc training courses 1-6. Identification of lecturers and field training sites for principal and ad hoc training courses from related organizations (PWC, GWWD, SWCs, Universities, Private Companies, etc.) 1-7. Supplemental training regarding the know-how for lecturers of principal and ad hoc training courses 1-8. Establishment of evaluation methods training courses 1-9. Improvement of the manual written in 1-1, on the basis of problems identified in 3-2	Japanese Side 1. Experts Training Course Management / Water Supply Water Supply Facilities (Machinery and Electrics) Operation and Maintenance of Water Treatment Plant/ Maintenance of Pipe Networks Data Management / GIS Education Technology/Organizational Management Water Quality Analysis/Data Base Well Management Equipment Necessary equipments for the training course of "Water Supply Facilities (Machinery and Electrics)" Necessary equipments for the training course of "Data Management / GIS" Necessary equipments for the training course of "Water Quality Analysis" Necessary equipments for the training course of "Maintenance of Pipe Network" Necessary equipment for training course of "Maintenance of Pipe Network"	1. Allocation of Counterparts 2. Daily and travel allowance for Trainnes 3. Lecturers allowance 4. Expenses for installation of equipments 5. Working condition for Japanese Experts 6. Expenses for the consumable poods and running expenses for Training 7. Standby generator for the Training Center 8. Construction of workshop at Km 10 9. Construction of laboratory of water quality analysis 10. Arrangement of lodging facility and	continue working at the Center as Instructors • Staffs of the Training Center will continue working
	2-2. Proper reservation of the training materials and texts 2-3. Decision of budgetary plan for training courses 2-4. Proceeding administrational steps for negotiation, contract, procurement and public relations 2-5. Management and maintenance of facilities for training 2-6. Improvement of the regulations and demarcation established in 2-1, on basis of problems identified in 3-2 3-1. Tentative implementation of principal and ad hoc training courses 3-2. Identification of problems in the following fields Consistency between the needs and contents of the courses Contents of course materials and their interface Capacity and presentation methods of Lecturers Capacity of coordinators and procedure established in 1-1	· Vehicle for the Project	***************************************	- Political Stability & Peace of Order will not be worsoned extremely -Adequate number of personnel are assigned to Training Center
	Remarks: PWC stands for Public Water Corporation, SWC for State Water Corporation			

Remarks: PWC stands for Public Water Corporation, SWC for State Water Corporation



Annex 3

	***************************************					rair	ning	Sch	edı	ile :	and	A۶			nen	rt o	f J	IC/	ĄΕ	хре	erts										_	7 400 400 40				
Year Year				20	08			1			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		20	09											20:	10							201	1		ĺ
Phase						1				-						,	2		****		<u> </u>							3								-
Training Course Times								ls	t				2n	ıd					31	:d	: سعد		فيارسنجف	-	41	h					51	h	,		To	tal
1.Training Course	4	5	6	7 8	3 9	10	11 1	2 1	. 2	3	4	5	6	7	8	9	10	11	12	-1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
(1) Water Supply Facility (22)							介								-					7/7													4			5
(2) Data Management /GIS(16)									<u> </u>				ŕ						企						삵				<u>~~</u>							5
(3)O/M of Water Treatment Plant(21)					<u> </u>				<u>.</u>	i.			72	-			,	الم														Á				4.
(4) Water Quality Analysis (15)																					1				_			_			ار 	<u> </u>				2
(5) Organizational Management (15)				_ _	_												7-1							_ _	2	습					砼	_	<u> </u>			3
(6) Well Management (21/9)														合								4		_J^	7								<u> </u>		1	3
(7)Management of Pipe Network(15)								_ _																		<u>4- </u>				A						2
Training Number							1		1	1			2	1	1		1	1	1	1	1	1			2	2			2	1	_2	_	1			4
Number of the Lecturers							6		5				10	7	5		3		(7	5				10	6			4	4	-8		4	_		9
Number of the Trainces		_					21		22	16			37	21	20		15	15	22	17	17	19			37	30			32	15	30	21	22			29
2.Training in Japan					L							A											3	7									Ш			2
3. JICA Evaluation																																				
(1) Intermediate Evaluation												ĺ																								1
(2) Final Evaluation									}																											1
(3)JCC			Ĭ.	Ä						ly.																			[5
4. Expert Dispatch	4	5	6	7 8	3 9	10	11 1	2 1	. 2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		4M/M
(1)Mr.Uemura Mitsuro				200				-	76 pa apa.77	i i		1	Tribbas.	ATTENTA	<u>991</u>		* *** ********************************	বিভালে নৈত	777	e sispore		党		12	1383	OWN DESCRIPTION	3	i e						1		M/M
(2)Mr.Ando Yusuke			C	<u> </u>			<u> </u>							딕						<u> </u>]												1			M/M
(3)Mr.Iwamoto Masatoshi												Ĺ					Ţ.											<u> </u>				327	2			M/M
(4)Mr.Uematsu Masao				4				_		7		- 1												C ₂₂	(Gry)				72.73]					10.	SM/M
(5)Mr.Onodera Jun										5				믁	5		i	3] [Ť				5	10.	BM/M
(6)Mr.Matsuo Shunsaku																				=	1										二	=			5.5	M/M
(7)Mr.Saito Masakazu								-												Ľ,				4	<u>=</u>	ן כ									6.0	M/M
(8)Mr.Yamamoto Makoto												i													F]	7							3. 3	M/M
(9)Mr.Shichijyo Kan																										\equiv									1.0	M/M

Annex 4 List of equipments procured in Japan

	quipment List Procured in Japa:					
No.	Equipment Name	Specification Specification	Riaker	Q'ty	Unit Price	Amount(Yen)
1	Metal Shears	Model:MS-12	Senkithi	1	4,100	4,100
	Metal Saw	[Model:1010600	Gisuke	ī	l 1,000 l	1,000
2	Spare Blade	HS-06	Gisuke	1	600	600
		Model DN5218S with dry battery		2	15,800	31,600
3	Insulated Resistance Mater	Instruction Manual	Sanwa	2	100	200
		Traceability Report		2	5,000	10,000
		Model:3151		1	35,000	35,000
4	Ground Resistance Meter	Instruction Manual	Hikoki	1	100	100
		Traceability Report		1	8,000	8,000
		Model:9824/9820		- Value		0
		9824-01		1	1,600	1,600
	{	9824-02	-	1.	2,000	2,000
5	Insulated Driver Set	9824-03	Kunipex	1	3,000	3,000
		9820-2.8		1	J,100,	1,100
		9820-4.0		1	1,200	1,200
		9820-5.5		1	1,500	1,500
		Piping diagram display panel		1	2,870,000	2,870,000
6	Piping Diagram Display Panel	Standard accessory	Kamata			0
7	Water Leakage Detector	lModel:HG-10AII	Fujitec	3	517,400	1,552,200
		Model:DA-121 with battery		3	107,000	321,000
8	Recording Pressure Gauge	Recording pen	Aich Tokei	12	800	9,600
]	Recording Paper		600	95	
		Model:PG-610-C		3	45,600	136,800
9	 Loudspeaker	Set down transformer	Nanzu	3	4,000	12,000
		Model:WA-1822				0
. 10	Wireless Microphone	Portable Wireless Amplifier	$\neg \mid_{TDA}$	3	102,600	307,800
	and Speaker System	Tuner Unit		6	51,800	
1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Wireless Handy Microphone		6	40,500	
	Laboratory Table set				1	0
	Table Comer			1	120,000	120,000
ļ ì		SSE-127		3	170,000	
		SSE-157	_	1	330,000	····
11	Table Side	SSE-187		6	340,000	
		SSE-247	Shibata	2	340,000	680,000
		SSE-307		2	460,000	<u> </u>
	Balance Table	TM-127		2	240,000	
ļ		FCF-2412		2	980,000	
į	1	FCF-3615		-	1,410,000	<u> </u>
	Laboratory Table	Fluorescent Lamp	\dashv	36	800	28,800
	1	Total	1		1	14,400,000

Νo.	Equipment Name	Specification	Maker	Q'ty	Unit Price	Amount(Yen)
	Display Model set	Model: 32BMSP	Megakemu	1	920,000	920,000
		Model: 1305		1	420,000	420,000
		Model: 1213		1	790,000	790,000
		Model: 374A		1	450,000	450,000
1		Model: 2105		1	180,000	180,000
		Model: 2106B		1	180,000	180,000
		Model: 2104		1	195,000	195,000
		Model: 2106		1	195,000	195,000
		Model: 2103		1	470,000	470,000
	Programmable Logic Controller	Model: MICREX-F70 NC1X1604	Fuji Electric System	1	25,000	25,000
		Model: NL4N-WNSB		1	80,000	80,000
		Model: FLT-ASFKA		1	72,000	72,000
		USB2.0 cable (L1.5m)		1	12,200	12,200
2		Model:NC1P-E0		1	72,200	72,200
		Model:NC1S-1		1	25,500	25,500
		Model:NC1B-02		1	13,300	13,300
		Model:NC1Y16R-08		ì	28,900	28,900
3	Pipe Detector	Model : PL-960	Fujui Tecom	4	800,000	3,200,000
4	Ultrasonic Liquid Flow meter	Model: Portaflow-C	Fuji Electrici System	1	1,100,000	1,100,000
		Model: FSD220Y1		1	200,000	200,000
		DC power adapter		1	25,000	25,000

Draft chamber Digital Burette MLSS/Sludge Interface Borehole Camera	Miodel:OBG00005 Model:OBG00007 Model:0CC00023 Model:143A014 Model: DSS-157C8 Spare fluorescent lamp (36W) Model:182-001 Model:262-103 Model: SS-5Z Model: iDo 300F-II Centralizer Tripod Model:GZ-MG880	Shibata Jencons Kasahara Chemical	2 2 2 1 3 4 4 1 1 1	2,850 2,850 6,300 950 1,720,000 900 108,000 16,200 260,000 4,600,000 100,000 150,000 140,000	5,700 5,700 12,600 1,900 1,720,000 2,700 432,000 64,800 260,000 4,600,000 150,000 140,000 25,119,900
Digital Burette MLSS/Sludge Interface	Model:OBG00007 Model:0CC00023 Model:143A014 Model: DSS-157CS Spare fluorescent lamp (36W) Model:182-001 Model:262-103 Model: SS-5Z Model: iDo 300F-II Centralizer Tripod	Jencons Kasahara	2 2 2 1 3 4 4 1	2,850 6,300 950 1,720,000 900 108,000 16,200 260,000 4,600,000 100,000	5,700 12,600 1,900 1,720,000 2,700 432,000 64,800 260,000 4,600,000 100,000
Digital Burette MLSS/Sludge Interface	Model:OBG00007 Model:0CC00023 Model:143A014 Model: DSS-157CS Spare fluorescent lamp (36W) Model:182-001 Model:262-103 Model: SS-5Z Model: iDo 300F-II Centralizer	Jencons Kasahara	2 2 2 1 3 4 4 1	2,850 6,300 950 1,720,000 900 108,000 16,200 260,000 4,600,000 100,000	5,700 12,600 1,900 1,720,000 2,700 432,000 64,800 260,000 4,600,000 100,000
Digital Burette	Model:OBG00007 Model:0CC00023 Model:143A014 Model: DSS-157CS Spare fluorescent lamp (36W) Model:182-901 Model:262-103 Model: SS-5Z	Jencons	2 2 2 1 3 4 4	2,850 6,300 950 1,720,000 900 108,000 16,200 260,000 4,600,000	5,700 12,600 1,900 1,720,000 2,700 432,000 64,800 260,000
Digital Burette	Model:OBG00007 Model:0CC00023 Model:143A014 Model: DSS-157CS Spare fluorescent lamp (36W) Model:182-901 Model:262-103 Model: SS-5Z		2 2 2 1 3 4	2,850 6,300 950 1,720,000 900 108,000 16,200	5,700 12,600 1,900 1,720,000 2,700 432,000 64,800 260,000
Digital Burette	Model:OBG00007 Model:0CC00023 Model:143A014 Model: DSS-157CS Spare fluorescent lamp (36W) Model:182-001 Model:262-103		2 2 2 1 3 4	2,850 6,300 950 1,720,000 900 108,000 16,200	5,700 12,600 1,900 1,720,000 2,700 432,000 64,800
	Model:OBG00007 Model:0CC00023 Model:143A014 Model: DSS-157CS Spare fluorescent lamp (36W) Model:182-001	Shibata	2 2 2 1 3 4	2,850 6,300 950 1,720,000 900 108,000	5,700 12,600 1,900 1,720,000 2,700 432,000
Draft chamber	Model:OBG00007 Model:0CC00023 Model:143A014 Model: DSS-157CS	Shibata	2 2 2 1 3	2,850 6,300 950 1,720,000 900	5,700 12,600 1,900 1,720,000 2,700
	Model:OBG00007 Model:0CC00023 Model:143A014 Model: DSS-157CS		2 2 2 1	2,850 6,300 950	5,700 12,600 1,900
	Model:OBG00007 Model:0CC00023 Model:143A014		2 2	2,850 6,300	5,700 12,600 1,900
	Model:OBG00007 Model:OCC00023	<u>_</u>	2 2	2,850 6,300	5,700 12,600
		<u> </u>	2		
			2	2,850	5,700
pH/Ion/Dissolved 、Oxygen Meter					
	Model: 143F237		6	950	5,700
	Model:143F234		2	1,900	3,800
	Model:143F193		2	1,230	2,460
	Model:143F192	DKK-TOA	2	1,230	2,460
	Model:143F191	[2	1,230	2,460
	Model:OE-570BA		2	108,700	217,400
	Model:AE-2041		2	103,950	207,900
	Model:N-2031	·····	2	85,050	170,100
	Model:F-2021		2	113,400	226,800
	Model:CL-2021		2	85,050	170,100
	Model:GST-5741C	j	2	28,350	56,700
	Model:MM-60R		2 ·	291,060	582,120
	Ni hollow cafliode lamp		1	47,300	47,300
	Na hollow cathode lamp		I	66,000	66,000
	Mn hollow cathode lamp		1	50,600	50,600
Atomic Absorption Photometer	Li hollow cathode lamp	j	1	57,200	57,200
	Mg hollow cathode lamp	[-	I	47,300	47,300
	Pb hollow cathode lamp		ì i	57,200	57,200
	K hollow cathode lamp		I	67,100	67,100
	Fe hollow cathode lamp	Shimazu	1	47,300	47,300
	Cu hollow cathode lamp		1	47,300	47,300
	Cr hollow cathode lamp	<u> </u>	1	50,600	50,600
	Co hollow carbode lamp	─-(1 (47,300	47,300
	Cd hollow cathode lamp	─ 	1	57,200	57,200
	Silent type air compressor	 	1	408,000	408,000
	Model:AA-6300		1	5,180,000	5,180,000
Flame Spectrophotometer	Model:00156622	─	1	15,000	15,000
	Model:98905139	─	1	12.000	12,000
	Model:47359700	─ 	1	12,000	12,000
	Model:47356903	Sherwood	1 1	90,000	90,000
	Model:85101001 M851	[-			117,00
	Model:47541201 M410	T	1	846,000	846,000
		Model:85101001 M851	Model:85101001 M851	Model:85101001 M851	Model:85101001 M851 1 117,000

	5 List of equipments procured		1	U/Price	Amount	***************************************
No	Equipment	Specification	Ų Q'ťỹ	(Yen)	(Yen)	SDG
\$370	rkshop Equipment	A CONTRACTOR OF THE CONTRACTOR		1 (1617)	(TEII)	
	Mechanical Tools set	For Diesel Engine	T 1	417,656	417 656	SDP 10,070.07
	Diesel Generator	Capacity:12kVA, 3phase	1	1,113,931		SDG 25,152
	2,0301 001101101	Centrifugal Pump, Capacity 2.2kW			~	
3	Ground Type Centrifugal Pump	H:31m, Q: 210L/min	L	383,000	383,000	SDG 7,650
4	Long Desk	1m*5m	6	110,720	664,320	SDP 15,000
	Chair	j	12	14,516		SDP 4,200
	Chair	Folding type	25	1,993	49,824	SDP 1,125
7	Desk and Chair	lm*2m	1	40,302	40,302	SDP 910
8	Large wind fan		4	8,858	35,430	SDP 800
9	Cabinet	Steel made	5	16,918	84,590	SDP 1,910
10	Projector		2	79,718	159,437	SDP 3,600
11	Screen .	Mounting wall type	2	53,146	106,291	SDP 2,400
	Television	50 inch	2	318,874	637,747	SDP 14,400
13	DVD player		1	14,394	14,394	SDP 325
14	Desk	lm*1.5m	4	24,358	97,434	SDP 2,200
15	Chair	Moving type	4	8,415	33,659	SDP 760
16	Book Shelves	1m*2m*(H)2m	2	53,146	106,291	SDP 2,400
17	Table	lm*Im	, 2	1 13,286	26,573	SDP 600
18	Telephone, Fax		I	31,002	31,002	SDP 700
19	Refrigerator	2 door type	1	97,434	97,434	SDP 2,200
20	Water server	Cold and hot water	4	17,715		SDP 1,600
21	Couch	Made of wood, 4m*0.5m	1	57,574	57,574	SDP 1,300
22	Table	lm*lm	2	13,286	26,573	SDP 600
23	Chair	with shoulders	4	6,643	26,573	SDP 600
24	Workbench	3m*5m*5cm, made of wood	4	132,864	531,456	SDP 12,000
25	Shelves	1m*5m*(H)2m, made of steel	1	155,008	155,008	SDP 3,500
26	Fork lift	Manual Type	1	199,296	199,296	SDP 4,500
27	Fire Extinguisher		4	4,429	17,713	SDP 400
28	Laptop		1	77,504	77,504	SDP 1,750
29	Dram for Copy Machine] 1	275,693	275,693	SDP 6,225
30	Timer		10	2,879	28,787	SDP 650
31	Voltmeter/ammeter		10	1,550	15,501	SDP 350
32	Welding machine		1	62,003	62,003	SDP 1,400
33	Welding glasses		3	664	1,993	SDP 45
	Safety dresses & shoes	1	25	5,757		SDP 3,250
35	Spare Parts for Air Conditioner		1	33,600		SDG 800
36	Sheet Cover for Land Curser		1	24,570		SDG 585
37	Cover for Computer		25	336	8,400	SDG 200
38	Mouse Pad		15	63		SDG 22.5
39	Pinter Toner		1	159,600	159,600	SDG 3,800
40	Video Camera	1	I	52,500		SDG 1,250
41	Digital Camera		11	33,600		SDG 800
	Copy Machine		1	350,700		SDG 8,350
43	Computer		2	101,850		SDG 4,850
44	White Board		4	12,600	50,400	SDG 2,000
		Sub Total			6,881,997	,

Annex 6. List of conjument broug	th by JICA	Expert

	r 2008	0	015	U/P (SDG)	Rate	Amount(Yen)
No.	Equipment	Specification	Q'ty			
1 1	Projecter		1	1,950	52.442	102,262
2 1	Printer		1	5,800	52.442	304,164
3 (GPS		1	500	52.442	26,221
4 (Computer		2	1,900	52.442	199,280
	Screen		1.	1,750	52.442	91,774
 -		Sub Total				723,700
6 7	Tools (1)		1	168	45.881	7,708
	Tools (2)		1	810	45.881	37,164
	Tools (3)		1	170	45.881	7,800
	Tools (4)		1	340	45.881	15,600
	Tools (5)		1	1,850	45.881	84,880
E	Protter		1	12,650	45.881	580,395
	Tools(6)		1	140	45.881	6,423
	Tools(7)		1	1,400	45.881	64,233
	GIS Soft		10	32,085	98.230	3,151,710
<u> </u>		Sub Total				3,955,912
15	Copy Machine		1	19699.5	, 45.881	903,833
	Leakage Detecter		1			475,000
	Earth Resitance Meter		1			32,000
	Strobe Scope		1			152,900
10 1	Strone Scope	Sub Total	· · · · · · · · · · · · · · · · · · ·			1,563,733
<u> </u>		Grand Total	., ., ., ., .,	7		6,243,344

No.	Equipment	Specification	Maker	Q'ty	U/P(Yen)	Amount(Yen)
	Jar Tester	ModelMJS-6N	Miyamoto	1	255,000	
	Water Level Meter	Range:0-4000 NTU	Aqua	1	65,000	
	Turbidity Meter	Model:2020e	La Motte	1	238,000	
	Color Meter	Model:WA-PT-4DG	Адиа	1	95,000	95,00
•	Residual Chlorine Meter	Model:EW-510	Tanita	2	28,000	
	EC/PH Meter	Range:PH 0-14, EC:0,.1mS/m-10mS/m	ToaDKK	1	130,000	130,00
	Multi-parameter Water Quality		La Motte	. 1	312,400	312,40
	Mittitt-baranicies, mater & arms	Total	. 			1,151,40

2.Wa	ter Supply Facility Course					
	Electrical Tools set	General Electrical Tools	1	75,673	75,673 SDP	
2	Control Panel(1)	Open style of direct line start circuit	1	35,700	35,700 SDC	
3	Control Panel(2)	Open style of star-delta start circuit	1	77,700	77,700 SDC	
4	Control Panel (3)	Open style of auto-trance start circuit	1	231,000	231,000 SDC	
5	Control Panel(4)	Open style of soft (frequency) start circu	1	409,500	409,500 SDC	
6	Eclectic Motor	3phase, Capacity3.7kW	1	63,000	63,000 SDC	1,500
		Sub Total			892,573	
.For	Maintenance and Operation o	of Water Treatment Plant Course				
1	Plumbing Tools	Pipe Wrench, Chain wrench, Pipe Cutte	2	66,151	132,301 SDF	
2	Screw Machine	Up to 4inch cutting, Galvanized pipe, A	1	189,000	189,000 SDC	
3	Welding Machine for Pipe	Up to 12inch HDPE Pipe Cutting	1	94,920	94,920 SDC	3 2,260
		Plastic made, Capacity: 5 m	1	80,346	80.346	
4	Water Tank	Access Hole:6 Numbers	1	80,340	80,346 SDC	3 1,913
		Sub Total			496,567	,
. Fo	or Well Management Course					
	Air Compressor	PDS130S-5B2	l	2,688,000	2,688,000 SDC	
2	Polyethylene	linch, 150m	1	11,000	11,000 SDC	
3	Galibanized Pipe	3inch,Galvanized pipe, L=3m	50	12,000	600,000 SDC	
4	Sumle Motor Pumpbersib	Grundfos, SP46,50Hz	1	415,800	415,800 SDC	
5	Triangle Notch	L=1400mm, W=600mm, H=350mm	1	168,000	168,000 SDC	
6	Chain Block		1	37,800	37,800 SDC	
7	Lot1		1	239,205	239,205 SGI	
8	Lot2		1	39,963	39,963 SGI	
9	Lot3		1	157,157	157,157 SGI	
10	Lot4		1	209,815	209,815 SGI	
11	Lot5		1	6,327	6,327 SGI) 155:00·
		Sub Total			4,573,067	
.Fo	r Data Management/GIS Cour	se				
1.	Computer	Core due 2-2GH3-IGB Ram	20	65,070	1,301,400 USI	14460
2	Scanner	HP A3	1'	609,660	609,660 USI	
3	Laser jet printer	HP A3 B/W	3	220,680	662,040 USI	
4	Printer Desk Jet	HP A3 color	3	71,640	214,920 USI	2388
5	GPS	Garmin GPS60	.15	26,880	403,200 SD	
6.	GIS Soft wear	Arcview	10	251,100	2,511,000 USI	
7	Virus Soft wear		20	4,000	80,000 SD	
8	UPS		9	27,300	245,700 SD	3 5,850
		Sub Total			6,027,920	

Annex 7. Operational Cost of Japanese Side

No.	ltem	2008	2009	2010	Total
1	Personnel	341,714	291,840	1,268,487	1,902,041
2	Consumable	578,488	1,234,435	1,394,690	3,207,613
3	Document	45,367	349,668	416,254	811,289
4	Rental Car	1,631,510	1,895,250	1,895,250	5,422,010
5	Others	389,158	105,078	641,358	1,135,594
	Total(Yen)	2,986,237	3,876,271	5,616,039	12,478,547

Counter Part Assignment of Adminisatation Department

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No.	Name	Position	Department		10 11 12	1 2	3 4	5 6	7 8	9 1	0 11	12 1	2	3 .	4 5	6	7 8	9	10 11	12	1 2	3 3
1	Mm. Eatidal Elrayah Malik	Director of PWCT	PWCTraining Center			 	L ==	┈┸┈┈ ═┟══			~_!— ~_ ==		! 	 	=		- -					
2	Mr.Mohamed Bukab	Assistant Director	PWCTraining Center		 		!_ ;;=			<u> </u>			<u> </u>		_ _	<u> </u>	_				_	-
3	Ms. Hanan M, Mahmond	Secretary	Administration Department				_ 	 		<u> </u>	=	- <u>-</u> '-			_ _		 = ==		_ _		_ <u>'</u> _	丰
4	Mr.Hashim Abdelrahim	Director	Administration Department			 			 		=	===	<u> </u>	_ ;=								
5	Mr.Kamal H Ahamed	Director	Finquee Department																		==	彐
6	Mr.Elmokashifi Mohammed	– Manager	Workshop	Canada de la Canad						.·			<u> </u>				<u> </u>	-		_ [_
7	Mr.Bashary Ibrahim	- Arteninger	Workshop	- Constitution of the Cons							!	== =										彐
8	Mr.Abd E Ibraahim	Store Keeper	Workshop									l_ :	<u> </u>	 		┴ <u></u> ┤──┤─	_ <u></u> _			! :	<u> </u>	
9	Mr.Osman Motar Blah	Mechanician	Workshop								_ <u> </u>	! ==:j=	-L	-باا ا	_ _	//_ 	L = =	/ 		- - - -		
10	Mr.Hashim Abdelrahim	Director	Residence					 				 	1									司
11	Mr.Hussein Ali Gaboush	Manager	Residence										<u></u>									〓
12	Mr.Hisham Elamir	Director	Education Technology							<u> </u>	_				_		_ _	<u> </u>	_ _			
13	Mr.Hashim Abdelrahim	-101100001	The state of the s					<u> </u>														

			Assignment of (he I	Fraiı	ning	Cou	rse (Coor	dina	tor					-t-citte-														
				-		20	08						2	2009									20)10 <u> </u>				_	201	
No	Training Course	Name	Position	6	7	8 9	10	11	12	1 2	2 3	4	5 6	7	_8	9 10	11	12	<u> </u>	2	3	4 5	6	7	8	9 10	11	12]	1 2	3
1		Mr.Ibrahim El Zain	Course Coordinator										_ _						_ _	_	_ -	_ _			-	_	 			
2	1.Operation and Maintenance of	Mr. Hammad Abdalla	Course Coordinator				<u></u> ,		<u>-ı</u>				_ _				_		_ _	_	_ _	_	-			_ -	-	_	-	
3	Water Treatment Plan	Mr. Muzamil Mohammed	Course Coordinator	1 T	l	_ _ _		, , <u>, , , , , , , , , , , , , , , , , ,</u>		1	 <u> </u>	 <u> </u>		 				<u> </u>	, 	 _		, 	, - -,	_	<u> </u>		. -	_	<u> </u>	
4		Mr.Mohammed Bukab	Course Coordinator			<u> </u>				<u> </u>				1	-	_ _	_		_	_ .	_ _		-	_ -	_ _	-				
	2.Water Supply Facilities	Mr.Bashary Ibrahim	Course Coordinator	I						——— ——————————————————————————————————		ـــــــــــــــــــــــــــــــــــــ	<u></u>	_!! _;;			7==	ا استنتار	<u> </u> -		 	7	=					-		
6	(Machinery and Electrics)	Mr.Osama Wais	Assistant Course Coordinator								_							<u> </u>		_	_								===	
7		Mr.Aladin Wais	Assistant Course Coordingtor											_ _													-		-	
_ 8	3.Data Management GIS	Mr. Omer El Sunni	Course Coordinator				<u> </u>					<u></u>	<u></u> _				<u> </u>		<u> </u>	_	<u>_</u> Ļ:	_ _	_				<u> </u>			·'
9		Mr.Modawi Ibrahim	Course Coordinator				1										_		_ .	_ _			<u> </u>	_				-		<u></u>
10		Mr.Mohamed Hassab	Course Coordinator	\equiv		= =				_			_ _				_		_		_ _	- -	_		-	-	 -	<u>—</u> [-	-	<u> </u> j
11	4. Water Quality Analysis	Mr.Abdela Majed	Course Coordinator							<u> </u>			l					. ; ;;	<u>_</u>	<u> </u>				<u></u> -	<u></u>					
12		Dr. Zeinab Jalal	Course Coordinator											ليا				آــــل رسسب				l	 	<u>.</u>			-}			
_ 13	5.Pipe Network Management	Mr.Mohame Hassab	Course Coordinator													_								_			<u> </u> ;	<u>_</u> L		
14	2.1 the Metwork Insurabalient	Mr. Muzamil Mohammed	Course Coordinator			_ _																								
15	6.Organizational Management	Mr.Hashim Abdelrahim	Course Coordinator								C				=-		-							=;				= j=	==	
16	7.Well Management	Mr.Egbal B.Alamir	Course Coordinator		$\neg r$	_ _			-			_ل						لا	ل		جا <u>۔</u>				ـــالــــــ سنندسيس		J		_!	

Annex 9 Input of Sudanese side

1 Construction

No	Work Item	Cost(SDG)
1	Building Construction(612m ²)	321,300
2	Sanitation Unit	3,500
3	Electrical Installation	15,815
4	Outside Work	30,500
5	Pumping House and Testing Unit	13,800
6	Elavated Water Tank	4,500
7	Air Conditionor	7,140
	Total (SDG)	396,555
Tot	al Japanese Yen (39Yen∕SDG)	15,465,645

2 Maintenance(for 2010)

No.	Equipment	Q'ty	Montly Cost(SDG)	Yearly Cost(SDG)
1	Generator	1	300	3,600
2	Air Compressor	1	200	2,400
3	Welding Machine] 1	50	600
4	Spare Parts	1	300	3,600
5	Periodical Maintenance	1	500	6,000
6	Fuel and Oil	1	200	2,400
7	Electricity	2	1,500	18,000
	Total(S	DG)		36,600
	Total Japanese Yen	ı (39Yen/SD)	G)	1,427,400

Annex 10.

Terminal Evaluation of 'Project for Human Resource Development for Water Supply' Evaluation Grid (Findings)

Evaluation que	stions	Findings
Key questions	Sub-questions	
<u>Performance</u>		
* To be covered	under 'Effectiveness'	
Process		
Are the	Are there major delays? What	Since the PWCT was just established when the Project started, in the first year the Project supported to
activities on	are the causes?	develop the organization of PWCT and the training implementation system, and the preparation for the training
track?		courses. From the 2 nd year most of the training courses have started. But since the procurement of a part of the
		equipment was delayed, the start of some courses was delayed, but it did not affect the progress of whole
		project. Hence all the planned training courses have been implemented on schedule.
Is the	Is the communication among	Communication between Experts, C/Ps and JICA was very smooth throughout the Project period. In the first
programme	stakeholders smooth?	period of the Project, since this Project is the first project after long cessation of Japanese ODA to Sudan, the
properly		Sudanese side did not understand the type of JICA support – technical transfer to C/P, in this Project PWCT
managed?		Therefore, the Experts and JICA explained about the methodology of support of JICA Projects, which C/P
		understood and later very welcomed. JCCs to which the Director Generals also attended from SWCs were held
		4 times. Each time the goals were explained of its progress and revised to adapt to the situations. C/Ps meetings
		were held weekly to check progress of the work for preparation, implementation and evaluation of trainings
		based on the manuals and the work table developed by Experts. Also in the latter half of the Project monthly
		meetings between 2 Director General of PWC and Director of PWCT, Experts leader and JICA are held to
		discuss overall issues of the Project as well as other issues related to the Project.

Are the progress, objectives,	In the beginning of the Project since there was not much information about the Project, PDM was revised
and challenges based on the	twice on JCCs. In the Mid term review, in order to correspond to the situation, PDM3 was revised. While, since
PDM shared by the	the Project team developed their evaluation sheets to check the progress of the Project, the results of these were
stakeholders of the Project?	utilized to share the progress of the Project. Understanding of PDM by some C/Ps is limited.
Were the C/Ps assigned	The originally assigned C/Ps were the senior managers. In the first period of the Project it was found
adequately?	inadequate and five C/Ps were replaced to young personnel, who worked very well. One of the new C/Ps is
	employed by UNICEF WES project but has been working as a C/P as well, for he has knowledge of IT. He
	would stop working as a coordinator in PWCT after the Project and his assistant coordinator would replace him.
Did the C/Ps work properly	In each first course C/Ps could not do most of their work. But recently they are preparing the courses,
even during the time when	confirmation of the lecturer candidates, contracting the construction of the pipe model. But they can't do time
_	management properly. But according to the Experts leader, they are not doing the work adequately when the
dispatched?	Experts were not here. This is caused by that they are not motivated so that they depend on Experts.
Do the C/Ps have high ratio	It is high, for PWCT budget was increased and the KTWS was constructed by itself. What was learned in the
of sharing work and	C/Ps training in Japan was used in the work (keeping the floor clean, constructing pipe network for practice,
awareness toward the	etc.). Especially the DG and administrative director of PWCT raised their ownership after the training in Japan.
	PWCT also prepared for the stand-by generator and pay daily allowance for the training, which also shows the
	rising ownership toward the Project.
Does the Project match the	The Project targets to the urgent needs for sustainable water supply in Northern Sudan. The training of water
needs for sustainable water	supply sector was limited in Sudan in more than last 10 years. The Project corresponds to the training needs in
	water sector in Northern Sudan. The themes of the training courses were confirmed as the urgent needs of the
	states in the field surveys conducted by the Project team. The contents of the courses were developed and
	revised based on these field surveys and on the results of the interviews with trainees after the trainings.
	and challenges based on the PDM shared by the stakeholders of the Project? Were the C/Ps assigned adequately? Did the C/Ps work properly even during the time when the Experts were not dispatched? Do the C/Ps have high ratio of sharing work and awareness toward the Project? Does the Project match the

transfer	Does the Project match the	The Project supported to all the needs of PWCT which was just established in 2007. It supported to develop
appropriately	needs of PWCT?	regulations and organizational arrangement of PWCT, and various management and evaluation manuals for
done?		PWCT to establish the system for implementation of training. It supported also to enhance the budget
		management and project implementation capacity. PWCT Master plan is now being finalized with the support
		of this Project.
	Were there any	National Water Policy was amounced in February 2010, which was supported by UNDP and UNICEF,
	environmental change related	which put importance on human resource development in water sector.
	to the Project after the	
	mid-term evaluation?	

Is the Project approach adequate?	Did any difficulty happen by the different situation from what was assumed in the preliminary study? What was the progress situation in the first period of	 PDM0 described that the necessary equipment for the training would be provided by Japan. But in the beginning of the Project it was found the budget for the procured equipment in Japan was short. With discussion between PWCT and JICA the necessary equipment was listed up and the additional equipment was procured. Also despite there was such a big amount of procurement the Experts on Procurement was not originally planned, because of which the other Experts had to do extra work. The Expert also had to work for the construction and preparation for the workshop (design, procurement, support to instalment, etc.), which was not described in PDM0. In the beginning of the Project there were no PCs necessary for the database management/GIS training course. After the discussion between Experts, PWCT, and JICA, 20 PCs were provided by Japanese side before the commencement of the training course. The job description of the Project described that the existing training materials would utilized, however, there is no adequate materials even in the Universities. Therefore, some of the teaching materials were prepared by Experts. C/Ps who had been originally assigned were the directors of PWC, who were busy with work there and could not properly work as C/Ps. Therefore, in the first period of the Project they were replaced to younger staffs. In the beginning of the Project it took time for the C/Ps to understand about the technical cooperation project of JICA, since this Project is the first Project after the long cessation of Japanese assistance to Sudan. PWCT had understood that the Experts would give lectures in the training, which is not the case in JICA project. Also
•	the Project?	had understood that the Experts would give lectures in the training, which is not the case in ICA project. Also there were following obstacles to the progress of the Project: 1) C/Ps who had originally been assigned were n adequate as C/Ps for they were so busy at work in PWC, therefore, all of them were replaced within 1 year after the commencement of the Project; 2) The design and construction of PWCT Workshop and Water quality analysis laboratory was much delayed.

**************************************	Does the Project match the	• Based on the needs survey by the preliminary study mission of the Project in November 2007, it was decided
	training needs of SWCs?	to implement three principal and two ad hoc courses. After the Project started, three field surveys to eight SWCs
		were conducted in August and November 2008 to grasp the water supply situation and the training needs. Based
		on the survey results, the detailed contents of the five training courses were developed, and it was decided to
		implement two more ad hoc courses. Hence the courses matches the needs of SWCs. However, they are the
		fields of urgent needs of SWCs. There would also be other training needs, for which PWCT should later
		consider planning the courses.
		• By the evaluation and interviews after each training course, the training needs were put to the contents of the
		courses as much as possible.
	Were the benefits of the	The participation of the trainees was not evenly among SWCs, which was mainly caused by that the Director
	effects and cost burden	Generals of these SWCs do not urge the importance on training. In the case of Red Sea SWC, the contents of
	distributed equitably to each	the training do not match their situation, for they supply water using sea water.
	SWC?	
Is the	Does Japan have technical	Yes. Japan has excellent training centres for the water supply sector. Japan also has high-level water supply
approach of	advantage in the training in	technologies which can be adapted to the current water supply situation in Sudan.
the project	water supply?	
appropriate?		
Effectiveness	A Contaction	

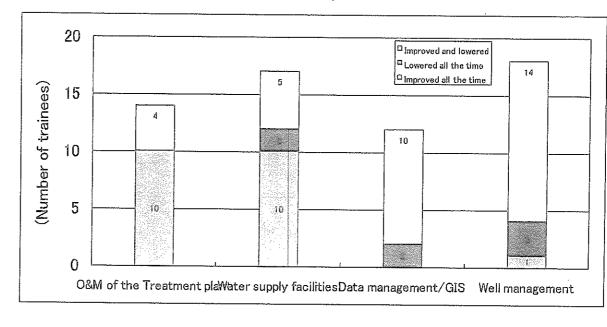
Is the project	Was the system of	The training implementation system is almost complete and the C/Ps acquired abilities to implement, plan,
purpose likely	implementation of the	and administer training courses. Meanwhile, it will take time to finalize organizational arrangements of PWCT
to be	training courses established?	such as regulations and budget management and accounting procedures. It also takes time for C/Ps to master all
achieved?		the steps of training implementation and management, especially on needs survey, problem finding, and time
		management. For proper implementation of training sessions, a new training centre must be constructed.
	Is it likely that average grade	This indicator is already achieved. The average score through 17 training courses in evaluation of lecturers
	of evaluation of the trial	and training courses are 91 and 90, respectively. These scores have been high from the beginning.
	training courses by the	
	trainees marks more than	
	90%?	
	Is it likely that average grade	This indicator is likely to be achieved with continuous effort toward the end of the Project. The average
	of evaluation of the	scores in 17 training courses in evaluation of management of training courses, accommodation, and food service
	administration by the trial	are 85, 82, and 72, respectively.
	courses trainees marks more	
- Control of the Cont	than 90%?	
	Is it likely that at least 90% of	The Indicator is likely to be partly achieved. 100% of the trainees gained a certificate of course completion so
	the trial course trainee gain	far based on their good attendance. Regarding the trainees' understanding of the lectures, the average
	certificate of successful	examination score is 53, which was lower than PWCT had expected. This was because some trainees were so
	completion of the course?	inadequate in their knowledge and techniques that they did not meet the minimum requirements of a trainee.

How did the examination results change by courses and by SWCs?

The tendency of the examination results by the courses is shown in the Table1 and Grah1.

Table 1. Tendency of the examination results by training courses The trainees whose The Uninces who The trainees whose Total trainces who The trainees who improved the last 2 examination nobenimexe boseval examination results had exams more than examination results each time No. results out of 3 were results each time improved and lowered. three times O&M of the Treatment 10 4 14 4 plant Water supply facilities 10 5 17 Data management/GIS 10 12 Well management 14 11 18 Total 33 61

Graph1. Proportion of the tendency of the examination results



添付資料1

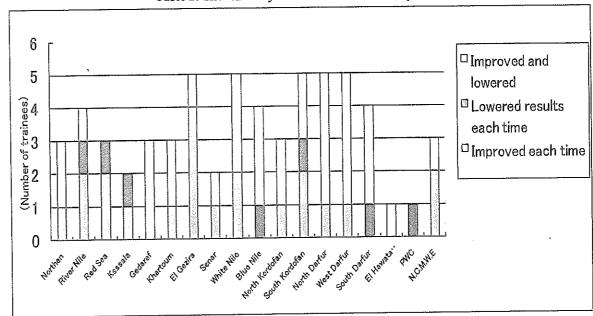
Are there any problems in the logical framework of PgDM?

Are the outputs stated in the PgDM appropriate and sufficient to attain the programme purpose? Are addition, change and/or deletion required to the outputs?

As shown in the table 1, 30% of the total trainees who had exams more than three times, improved their examination results each time, while 12% lowered results each time. And the trainees who improved and lowered the results were about half of total. In general it can be said that the results were improving. By the courses of O&M of the Treatment plant and Water supply facilities had a good improvement, while the trainees of the courses of data management/GIS and well management improved and lowered the results.

The table 2 shows the tendency of examination results by SWC.

Table 2. The tendency of examination results by SWC



By the state El Gezira SWC is the top of improvement of the exam results, followed by River Nile, Red Sea, White Nile, South Kordofan. While Kassala, Blue Nile and South Darfur SWCs are to improve their results.

It is likely that	Is it likely that more than 80%	The indicator is achieved. The ratio of the work shared by the course coordinators in the 7 training courses in
PWC Training	of the works is done by	2010 was 84% on average.
Centre	course coordinators in	2010 was 0470 on avoiage.
acquires	training course management	1
abilities to	and implementation?	
implement and	How was technical transfer	In the first course through OJT the technical transfer was done. From the second time of the courses
plan training	done in the work items whose	gradually course coordinators did the principal work supported by Experts. Concretely, Experts developed
courses?	work ratio of C/P was	forms for schedule and data, which C/Ps filled in. However, still only C/Ps could not do these work by
	improved? Could only C/Ps	themselves, for which the continuous monitoring by Experts is needed.
	do these items themselves?	
	Why is the work ratio of C/P	Since they have not done these kinds of exercise before, even after Experts taught them, C/Ps did not master
	being still low in some items	how to develop reports and solve problems. They don't feel necessity and importance on these issues. Or even
	such as questionnaire	they feel it, although they discuss about the problems, but they are not accustomed to writing on them. On the
	preparation, development of	teclinical trausfer Experts developed form of questionnaire, evaluation sheets, and methodology of analysis,
	evaluation sheets, interviews,	based on which C/Ps could analyze. Experts also explained about these importance and necessity. It seems
	analysis of evaluation sheets?	difficult for C/Ps to feel the problems. On needs analysis and evaluation C/Ps are far from conducting them by
	How was technical transfer	themselves. On these issues younger generation could overcome.
	done? What are the	
	challenges?	

	Is it likely that annual plan,	The indicator is achieved. Based on the needs grasped in the field survey, the contents of the training courses
	manual, materials and	were developed. Then, syllabuses were prepared by Experts. 4 manuals for evaluation and management of the
	syllabus of more than 3	course were developed. Annual plans were developed according to the progress of the Project. Materials were
	principal and 4 ad hoc	provided by each lecturer. Hence when all the courses are completed, materials were compiled for the course.
	training courses are	
	established?	•
	Is it likely that training site	PWCT workshop was constructed with equipment in January 2010.
	(PWCT workshop) is	T WOT WORKING WAS CONSTRUCTED TO THE SAME SAME SAME SAME SAME SAME SAME SAM
	established?	
	Is it likely that the evaluation	This indicator was partly achieved. 6 out of 12 lecturers of all the training courses served as lecturers more
	to the lectures of all the	than twice. 4 lecturers received lower marks in evaluation than before.
		man twice. 4 rectners received lower marks in ovaluation star observe
7 11 11 1	training courses is improved?	This indicator is likely to be achieved. Regulations of PWCT including TOR of the staff members are being
Is it likely that	Are regulations and TOR of	revised according to the changing needs and situations. They will be finalized in January 2011.
PWC Training	the staff in Activity 2 are	revised according to the changing needs and situations. They will be intenzed in statemy 2011.
Centre	revised?	
acquires	Are the improved necessary	This indicator is achieved. Texts and materials are stored in the Experts room and properly managed for the
adıninistrative	materials and texts of the	use of C/Ps and lecturers. Lecture on copyrights was given to C/Ps. After the equipment items were installed,
abilities	training courses properly	the Expert on management of equipment explained to workshop staff members how to maintain equipment
necessary for	managed?	items using a list of equipment items and manuals for maintenance.
managing	Is the Centre budget properly	This indicator is mostly achieved. The budget management system was developed based on the manual on
training	managed?	the subject. The budget table of PWCT was developed. The budget is managed in line with the manual.
courses?		However, since PWCT doesn't have a separate bank account from PWC, which doesn't allow proper budget
		control of PWCT and occur occasional delays in payment.

Is it likely that	Are more than 4 times of	This indicator is mostly achieved. The two principal courses on water supply facilities and database/GIS are
PWC Training	three principal courses and	conduced five times, and another principal course the operation and maintenance of a water treatment plant is
centre acquires	more than 2 times of the ad	held four times. Two ad hoc courses on water quality analysis and the pipe network are held twice, and other
the abilities of	hoc courses implemented?	two ad hoc courses added later based on the field survey during the Project period (well management,
problem		organizational management) are conducted three times, respectively.
solution and	Number of problems and	This indicator is achieved. But the Experts suggested that C/Ps still have difficulties in finding problems and
feedback on	difficulties on each point of	difficulties in managing training courses, to which the Experts told them about the problems in the after-training
training	view referred in Activities	meetings. It will take some time for C/Ps to find problems on their own.
courses?	3-2.	
	Number of improvements of	This indicator is achieved. Based on the problems and difficulties, C/Ps, with the help of Experts tried to find
	all activities of the Centre	solution and improvement. Through these efforts, most of them could be improved. However, most of these
	based on Activities 3-2.	improvements were made by the Experts, which requires continuous effort by C/Ps to improve it.
	How were the problems and	Through evaluation by trainees and conducting interview after training problems were grasped. Also after
	way of improvement	each training course review meetings were held by the team of course coordinators and Experts, on which they
	considered?	decided on the points and way of improvement.
What are the	Other than the activities in	On the second training course of pipe network, the procedure manual for group discussion was developed in
contributing	PDM4 what activities were	order for C/Ps themselves to grasp the problems and find solutions. According to the procedure manual, course
/obstructing	done in order for PWCT to	coordinators facilitate discussion.
factors to	acquire abilities to implement	
achieve	and plan training courses?	

Output1?	Was there any contributing	Since young persons were assigned as C/Ps, the activities were made effective and efficient. They themselves
	factors for PWCT to acquire	made repair and construction work of the Training Centre and pipelines. Experts supported to develop PWCT
	abilities to implement and	master plan.
	plan training courses?	
	Were there any obstructing	1) Some Director Generals of SWCs put low priority in training. 2) The training fee and transport cost are
	factors for PWCT to acquire	borne by SWCs. 3) Delay of design and construction of PWCT workshop and water quality analysis
	abilities to implement and	laboratory.
	plan training courses?	
What were the	Other than the activities in	1) Experts designed the interior of PWCT workshop and water quality analysis laboratory, selected their
contributing	PDM4, what activities were	equipment and supported procurement. This made system of training implementation more effective.
and	made in order for PWCT to	2) By teaching necessary PC skills in order to construct database for equipment management, C/Ps
obstructing	acquire administrative	themselves could revise and add database.
factors to	abilities necessary for	
achieve	managing training courses?	
Output2?	Were there any contributing	C/Ps training in Japan showed them good example of the training centres in Japan.
	factors for PWCT to acquire	
	administrative abilities?	
What were the	Were there any contributing	By introducing the team for course coordination, composed of chief course coordinator and assistants,
contributing	factors for PWCT to acquire	problems were shared among course coordinators.
and	abilities of problem solution	
obstructing	and feedback on training	
factors to	courses?	

achieve	Were there any contributing	1) Delay of payment of salary to C/Ps. 2) It is difficult to secure necessary transport measures in daily
Output2?	factors for PWCT to acquire	work.
	abilities of problem solution	
	and feedback on training	
	courses?	
What affects	What caused the high score in	Due to this methodology: after each training course they were interviewed and based on the results of the
to	evaluation by the trainees?	interviews, the next training course is improved.
achievement	Didn't the problem of	Due to limited availability of lecturers, even low evaluated lecturers had to be used. While to these lecturers
of the Project	securing lecturers affect to	improvements were requested.
purpose?	implementation of the	
	training course?	
	Didn't the level of the	It did. Inadequate trainees did hinder the progress of the courses.
	trainees affect to the	·
	implementation and results of	
	the training?	
	Were there any problems and	1) Delay of provision of the procured equipment from Japan. 2) Since there were no texts on the training
	obstacles to implement	courses, Experts made materials, but they were not complete due to limited time. 3) In the first period of
	training courses?	the Project, since there was no generator, the practical training was stopped in blackout. 4) High turnover
		of the trainees. Sudden absence. 5) High claims on accommodation and food. 6) Low examination results
		sometimes. Some of this could be solved by longer training period.
<u>Efficiency</u>		

Are the activities adequate to achieve Outputs?	Were the activities adequate and enough in order to achieve Outputs? Why was the start of the water quality analysis course delayed? Hadn't it been previously prevented?	On the whole they were adequate, though some of them have problems and were insufficient. For example, the following activities had to added: design of interior of PWCT workshop and water quality analysis laboratory; construction and management: procurement; installation and management of the equipment, etc. It took time to construct the laboratory and procure equipments. Especially since there were many equipments procured in Japan, it took time to procure them, the start of this course was delayed. If the situation was grasped in the preliminary study, it could be prevented.
Were the quantity, quality, and timing of the	Was the dispatch of the Experts adequate? Did it match the needs?	No. of Experts is not adequate. Experts did extra work without adding M/Ms. It matched to the needs.
Japanese inputs adequate?	Were the type, number, timing of provision, installation of the supplied equipments adequate?	The type of the supplied equipment, quantity, and their installation were adequate. But the timing of the provision was delayed than expected.
	Were the supplied equipment and vehicles adequately used?	The equipments were adequately used and vehicles were utilized to the maximum.

Name of the Project: Human Resources Development for Water Supply in Sudan

The Project Target Area: Northern Part of Sudan

Project Target Group: Staff of PWCT, PWC, and SWCs. Indirect Target Group: All the staff of Water Supply Sector

The Project Target Area: Northern Part of Sudan	Project Target Group: Staff of PWCT, PWC and SWCs, Indirect Target Group: All the st	taff of Water Supply Sector	
Summary of the Project	Indicator	Procurement Means	External Condition
< OVERALL GOAL >	Capacity building for more than 7 core personnel at each SWC	Training reports	Political stability continues
Institutional capacity for stabilizing water supply in the northern Sudan is enhanced.	Applied annual water supply plan (3-5 years) with the State budget based on lessons learnt from the implemented training courses	Applied annual budget plans	A large-scale change of structure does not occur in the water supply sector
< PROJECT PURPOSE >			
PWC Training Center establishes the system for the implementation of Training	Average grade of evaluation of the trial training courses by the trainees marks more than 90% Average grade of evaluation of the administration by the trial courses trainees marks more than 90% At least 90% of the trial course trainee gain certificate of successful completion of the course.	total number of trainee attended courses	Trainees who complete courses continue working at their organization Equipments are installed at PWCT to be utilized during the project period- Motivations of trainees who completed the training course are sustained
< OUTPUTS >	Course		training course are sustained
PWC Training Center acquires abilities to implement and plan training courses	1-1. More than 80% of the works done by course coordinators in training course management and implementation 1-2. Established annual plan, manual, materials and syllabus of more than 3 principal and 4 ad hoc training courses 1-3. Established training site (PWCT workshop) 1-4. Improved evaluation to the lectures of all training courses	1-1. Training reports 1-2. Annual Plan, manuals, materials and syllabus 1-3. Situation of the workshop 1-4. Training report	Budget for the Center is secured continuously and Structure of the organization is not changed dramatically
PWC Training Center acquires administrative abilities necessary for managing training courses	Revised regulations and TOR of the staff in activity 2 Proper management of the improved necessary materials and texts of the training courses Proper management of the Center budget	Records of the project Records of material Budgetary records	
3. PWC Training Center acquires the abilities of problem solution and feedback on training courses.	 3-1. Implementation of more than four (4) times of three principal courses and more than two (2) times of the ad hoc courses 3-2. Number of problems and difficulties on each point of view referred in Activities 3-2 	3-1. Records of trainings 3-2. Number of points which should be implemented	
A OTT WITTED	3-3. Number of improvements of all activities of the Center based on Activities 3-2		
 ACTIVITIES > 1-1. Establishment of the manual for planning, managing and evaluating training courses 1-2. Training of course coordinators utilizing the manual above 	< INPUTS > Japanese Side	Sudanese Side	Trainees for Course for Instructions will stay and continue working at the Center as Instructors
 1-3. Supplemental survey and examination (technical level, subject, background of the trainee, etc.) 1-4. Design of principal and ad hoc training courses based on 1-3 1-5. Preparatory of annual plan, curriculum, training materials, tools, equipment, and ,machinery for principal and ad hoc training courses 1-6. Identification of lecturers and field training sites for principal and ad hoc training courses from related organizations (PWC, GWWD, SWCs, Universities, Private Companies, etc.) 1-7. Supplemental training regarding the know-how for lecturers of principal and ad hoc training courses 1-8. Establishment of evaluation methods training courses 1-9. Improvement of the manual written in 1-1, on the basis of problems identified in 3-2 2-1. Establishment of regulations and demarcation of duties for the administration training courses 	1. Experts Training Course Management / Water Supply Water Supply Facilities (Machinery and Electrics) Operation and Maintenance of Water Treatment Plant/ Maintenance of Pipe Networks Data Management / GIS Education Technology/Organizational Management Water Quality Analysis/Data Base Well Management Equipment Necessary equipments for the training course of "Water Supply Facilities (Machinery and Electrics)"	Allocation of Counterparts Daily and travel allowance for Trainers Lecturers allowance Expenses for installation of equipments Working condition for Japanese Experts Expenses for the consumable goods and running expenses for Training Standby generator for the Training Center Construction of workshop at Km 10 Construction of laboratory of water quality analysis	Staffs of the Training Center will continue working at the Center without transfer
2-2. Proper reservation of the training materials and texts 2-3. Decision of budgetary plan for training courses 2-4. Proceeding administrational steps for negotiation, contract, procurement and public relations 2-5. Management and maintenance of facilities for training 2-6. Improvement of the regulations and demarcation established in 2-1, on basis of problems identified in 3-2 3-1. Tentative implementation of principal and ad hoc training courses	Necessary equipments for the training course of "Data Management / GIS" Necessary equipments for the training course of "Water Quality Analysis" Necessary equipments for the training course of "Maintenance of Pipe Network" Necessary equipment for training course if "Well Management" Necessary equipment for workshop Vehicle for the Project 3. Training in Japan		< IMPORTANT ASSUMPTIONS >
3-2. Identification of problems in the following fields Consistency between the needs and contents of the courses Contents of course materials and their interface Capacity and presentation methods of Lecturers Capacity of coordinators and procedure established in 1-1 Capacity of administrators and regulations/procedures established in 2-1. 3-3. Improvement of the problems identified in Activities 3-2.	o. Training in Japan		Political Stability & Peace of Order will not be worsened extremely Adequate number of personnel are assigned to Training Center Each SWC establishes the organizational framework

Plan of Operation (PO2)

	Final Van							lot										2nd				1					3rd			2009.3
	Fiscal Year Year	1st 2008													20	009		Zna						20	10		310		$\overline{}$	2011
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Items	Month	4	5	6	7	8	9	10		12	1	2	3	4 5	6	7	8 9) 10	0 11	12	1 2	3 4	5	6	7	8 9	10	11 12	! 1	
	Period																	_								_	#	_	一	_
	Evaluation																		★ Mid	-Term							★ Fina	al		
1	PWC Training Center acquires abilities to implement and plan training courses																													
1-1	Establishment of the manual for planning, managing and evaluating training courses			_																										
1-2	Training course coordinators utilizing the manual above																											_		
1-3	Supplemental survey and examination (technical level, subject, background of the trainee,etc) for principal and ad hoc training courses			-																								\rightarrow		
1-4	Design of principal and ad hoc courses based on 1-3					1											•													
1-5	Preparation of an annual plan, curriculum, training materials, tools, equipments and machinery for principal and ad hoc training courses			-																									-	
1-6	Identification of lecturer and field training sites for principal and ad hoc training courses from related organizations (PWC,GWWD, SWCs, Universities, Private Companies etc.) Supplemental training regarding the knowhow for teaching for lecturer of principal and ad hoc			-																									_	
1-7	Supplemental training regarding the knownow for teaching for lecturer of principal and ad hoc training courses																											$\overline{}$	-	
1-8	Establishment of evaluation methods for training course																													
1-9	Improvement of the manual written in 1-1, on the basis of problems identified in 3-2												•																	
2	PWC Training Centre acquires administrative abilities necessary for managing training																													
2-1	Establishment of regulations and demarcation of duties for the administration of training courses																													
2-2	Proper reservation of the training materials and texts												•																	
2-3	Decision of budgetary plan for training courses																					•								
2-4	Proceeding administrational steps for negotiation, contract, procurement and public relations																													
2-5	Management and maintenance of facilities for training												•																	
2-6	Improvement of the regulations and demarcation established in 2-1, on the basis of problems identified in 3-2																													
3	Improvements and lessons are extracted from the trial implementation of training courses																													
3-1	Tentative implementation of principal and ad hoc training courses																													
	Identification of problems in the following fields																													<u> </u>
	1)Consistency between the needs and contents of the course																													
3-2	2)Contents of course materials and their interfaces																													
0-2	3)Capacity and presentation methods of trainers																													
	4)Capacity of coordinators and procedure established in 1-1																													
	5)Capacity of administrators and regulations/procedures established in 2-1																													
	1.Basic course																													
	1)Operation and Maintenance of Water Supply Facility(Machinery and Electric Equipment)																						1						-	
	2)Operation and Maintenance of Water Treatment Plant															_							1							
Tariotes	3)Data Management/GIS											_																		
Training Course	2.Ad hoc course																													
	1)Water Quality Analysis																											-		
	2)Management of Pipe Network																													
	3)Well Management																				-									
	4)Organizational Management																								-					

- Expert 1.Project Manager/Training Course Management /Water Supply 2.Operation and Maintenance of Water Supply Facilities(Machinery and Electric Equipment) 3.Operation and Maintenance of Water Treatment Plant and Management of Pipe Networks

 - 4. Data Management/GIS
 5. Education Technology/Organizational management
 6. Water Quality Analysis
 7. Well Management