

第4章 プロジェクトの評価

第4章 プロジェクトの評価

4-1 事業実施のための前提条件

プロジェクト実施に「パ」国で必要な各種手続きは以下の通りである。

表86 施設建設及び機材据付け実施のための各種必要手続き

必要手続き	申請先	必要期間	PMDから国防省への提出書類	申請者
商用電源供給、ステップダウントランスの設置（気象レーダー塔施設用）	イスラマバード電力供給会社（IESCO）	2ヶ月	<ul style="list-style-type: none"> ➤ 申請書：1セット ➤ 建設候補地を示す地図：1セット ➤ 割当通知状：1セット 	パキスタン 気象局 (PMD)
建設許可	内閣局／首都開発庁（CDA）	4ヶ月	以下の図面及び文書を添付した申請書 <ul style="list-style-type: none"> ➤ 建築図面：6セット ➤ 構造図面：6セット ➤ 電気図面：6セット ➤ 空調・換気図面：6セット ➤ 衛生図面：6セット ➤ 構造計算書：5セット ➤ 割当通知状：1セット ➤ 土地所有証書：1セット ➤ 損失補償証書：1セット 	
周波数使用許可（気象レーダーシステム用及びウィンドプロファイラ用）	パキスタン電気通信庁（PTA）／周波数割当委員会（FAB）	2ヶ月	<ul style="list-style-type: none"> ➤ 申請書：14セット ➤ 同意書：14セット ➤ 機材の詳細技術文書：14セット ➤ アンテナパターン：14セット ➤ 送信機用スペクトル表：14セット ➤ ネットワーク図／配置図：14セット 	

<一般売上税（GST）>

経済・統計省、経済課（Economic Affairs Division：EAD、Ministry of Economic Affairs and Statistics）より提示された下図の免税手続きを行うことにより、本プロジェクトのメインコントラクターは、「パ」国において資機材購入の際に課税される一般売上税（General Sales Tax：GST）が免税される。免税手続きには、約1ヶ月を要する。

サブコントラクターが購入した資機材に関しては、免税対象とはならないので注意が必要である。

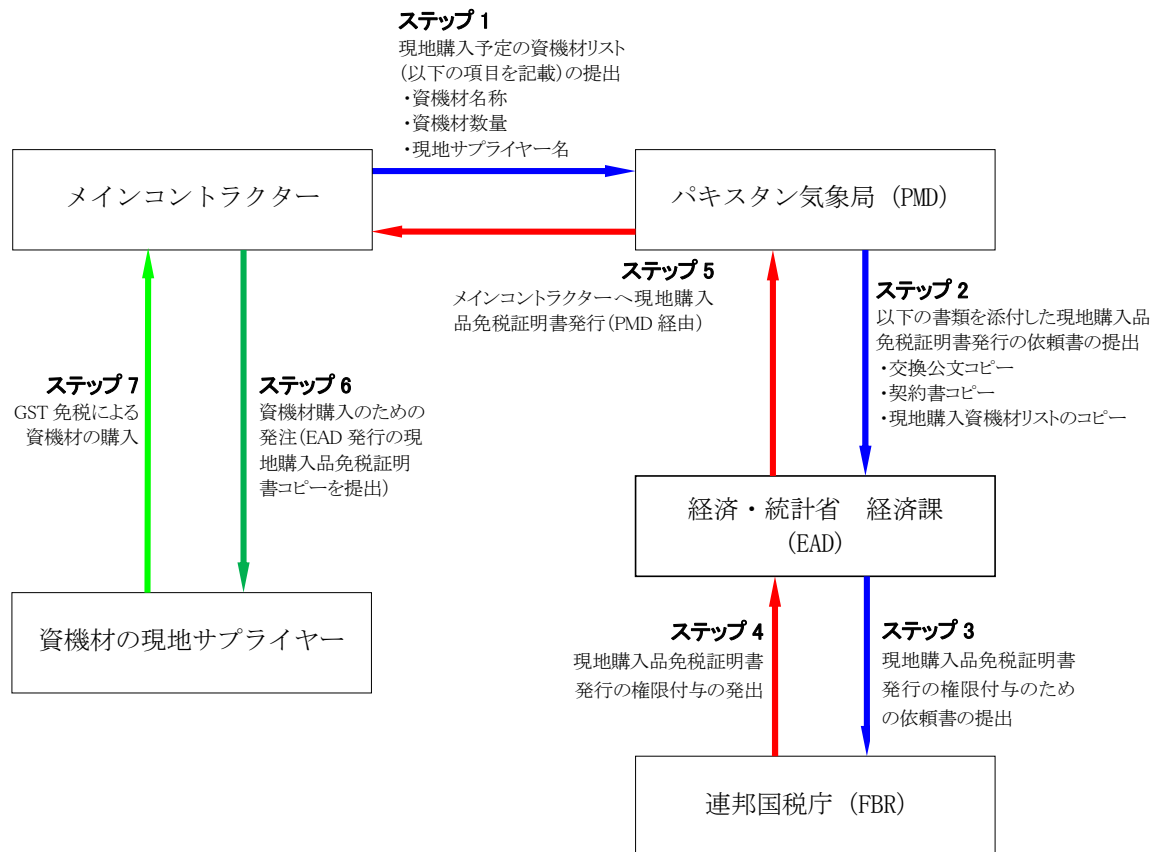


図 20 「パ」国内において購入する資機材の一般売上税免税のための手続き

4-2 プロジェクト全体計画達成のために必要な PMD による投入(負担)事項

- 1) 人的資源開発
 - a) 継続的に次世代を担う人材を雇用する。
 - b) 研修と人的資源開発計画を通じて、より優れた人材の育成を行う。
- 2) 自然災害の予防と管理
 - a) 国民への警報やその他の情報の普及を確実にを行うため、発表は複数のルートより、重複して行う。
 - b) 効果的な自然災害防止及び管理のため、防災管理機関及びマスメディアと連携を取り、国民に継続的な防災啓発活動を行う。
- 3) プロジェクトにおいて調達された機材及び建設された施設の長期運用
 - a) 定期的にシステム運用維持管理に必要な予算を確保し、プロジェクトで供給された全ての気

象機材及び施設設備機器の交換部品、消耗品の調達を行う。

- b) 盗難や破損から機材と施設設備機器を保護する。
- c) 定期的な施設の塗装及びコーキング充填を行う。

4-3 外部条件

- 1) PMD の気象情報・データ及び予警報がマスメディア (TV、ラジオ、新聞)、首相府、国家・州・県防災管理庁、連邦洪水委員会、水利電力省、県情報・公共事業部、その他各省庁、警察、その他政府関連機関、赤新月社等に活用される。
- 2) 「パ」国政府の温暖化対策、自然災害対策及び気象業務に対する政策の変更が無い。
- 3) マスメディア (TV、ラジオ、新聞)、首相府、国家・州・県防災管理庁、連邦洪水委員会、水利電力省、県情報・公共事業部、その他政府関連機関、赤新月社等の協力体制が維持される。
- 4) 本案件におけるソフトコンポーネントや現地研修を受けた PMD 職員が勤務を継続する。

4-4 プロジェクトの評価

4-4-1 妥当性

(1) 本案件の推定裨益人口

本計画は、PMD の気象観測及び大雨予警報作成能力を向上し、災害を軽減することが目的である。「パ」国において最も甚大な被害をもたらす洪水による被災者及び被害総額は計り知れず、「パ」国全体の経済発展の大きな障害ともなっている。従って、本計画の直接・間接裨益人口は、「パ」国全人口の 1.72 億人であると考えられる。「パ」国の人口増加率は、年平均 2% であり、2050 年にはインド、中国、米国に次ぐ世界第 4 位の人口を抱える国になると予想され、被災する者が増大することが懸念される。以下に、「パ」国の全人口を「パ」国の 8 つの行政区 (管区及び州) ごとに以下に示した。

表 87 「パ」国の行政区分と人口

No.	州名	州都	面積(km ²)	人口(2008年)
1	バローチスターン州	クエッタ	347,190	10,247,362
2	カイバル・パクトウンクワ州	ペシャワール	74,521	20,215,000
3	パンジャーブ州	ラホール	205,344	81,845,433
4	シンド州	カラチ	140,914	46,378,000
5	イスラマバード首都圏	イスラマバード	1,165	955,629
6	連邦直轄部族地域	ペシャワール	27,220	6,500,000
7	アザド・カシミール	ムザフアラバード	13,297	4,567,982
8	ギルギット・バルティスタン州	ギルギット	72,496	1,800,000
合計			882,147	172,509,406



(2) 本プロジェクトの目標

地球規模の気候変動が、中長期的に自然災害の頻度及び規模を増大させる可能性があり、特に自然災害多発国である「パ」国への影響は大きく現れると想定されることから、気象災害に対する早期警戒を含む災害管理体制の整備が喫緊の課題となっている。本プロジェクトにおいて、気象レーダーシステムの更新、高層気象観測システム、気象予報・開発システム、気象データ用基幹通信システム及び GTS メッセージスイッチシステムの整備を行い、特別中期気象予報センター（SMRFC）を PMD イスラマバード本局に構築する。これらの我が国の支援により、PMD の 1) 気象観測能力の強化、2) 既存の 24～48 時間以内の短期予報の更なる精度向上、3) 48 時間を超える中期予報（3-10 日後まで）を作成することができる能力の付帯、4) 予警戒の迅速な発信能力の強化、を行い自然災害による被害の軽減に寄与することを本プロジェクトの目標とする。

(3) 「パ」国の開発計画

気候変動に伴う異常気象により多大な被害が発生していることを受けて、2012 年 8 月、国家気候変動政策（National Climate Change Policy）案が気候変動省のもとで作成された。この政策には、気候変動への脆弱さと適応方法について、セクター別（水資源、農業、森林、生態系、防災等）に記載されており、防災に関しては、「パ」国政府は関係機関と協力し合って、主に以下の対策を講じていることとしている。

1. NDMA が策定した「国家災害危機管理体制」実施のための財源確保
2. 自然災害発生時における関係省庁の役割及び責任の明確化
3. サイクロンが直撃する沿岸部での早期警報システムの強化や避難計画の策定
4. 早期警報の普及や災害リスク軽減活動への住民参加
5. 洪水や鉄砲水、干ばつ等の監視、予報、早期警報システムの強化
6. 異常気象発生時に迅速な復旧が求められる電気・通信・交通等のインフラ整備

更に、上記の国家気候変動政策に対する具体的な行動計画（Action Plan）を策定し、行動計画は最優先、短期的、中期的、長期的の 4 つに分類されている。気候変動政策の効果的な実行のため、国家及び地方気候変動政策実行委員会（National and Provincial Climate Change Policy Implementation Committees）を設置し、国家及び地方気候変動政策実行委員会は半年毎に政策実行の状況等を報告する会議を開催し、5 年毎に気候変動政策の変更や更新を行うこととしている。

上記のとおり、本プロジェクトは、「パ」国の気候変動政策や防災政策とも合致するものである。

(4) 我が国の援助政策・方針

我が国と「パ」国は、長期にわたり良好な二国関係を築いており、2012年には、国交樹立60周年を迎えた。我が国の「パ」国に対する援助の基本方針（大目標）は、「経済成長を通じての安定した持続的な社会の構築」としている。「パ」国は、2050年にはインド、中国、米国に次ぐ世界第4位の人口を抱える国になると予想されている。その潜在力を十分に発揮するためには、安定的な経済状況を確保しつつ、民間主導型の経済成長を実現することを通じて、安定した持続的な社会を構築することが不可欠である。上述の大目標の達成に向けて、我が国は下記の3つを重点分野（中目標）としている。


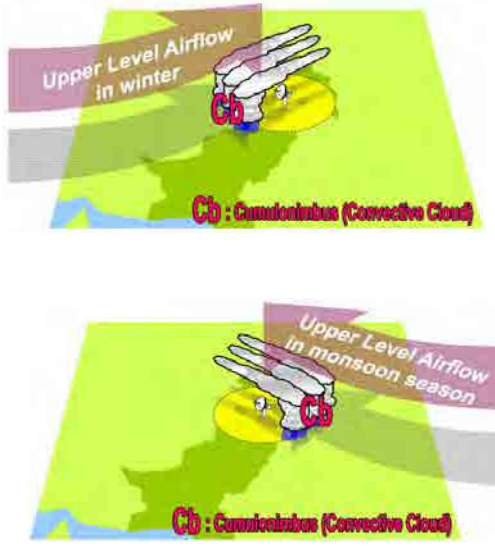
1. 経済基盤の改善
2. 人間の安全保障の確保社会基盤の改善
3. 国境地域などの安定・バランスの取れた発展

このうち、「2. 人間の安全保障の確保と社会基盤の改善」の中で、「頻発する自然災害に対する防災能力の強化につながる支援を実施する」旨が目標とされており、具体的には、早期予警報システムの整備、コミュニティレベルにおける災害対応能力の強化、防災関連機関の人材育成計画等が挙げられている。本プロジェクトにより「パ」国の気象監視体制が強化され、自然災害に対する「パ」国全体の防災能力が向上することは、我が国の国際協力として意味深いことと考える。

4-4-2 有効性

表 88 成果指標

指標	基準値 (2012 年)	目標値
危険な気象現象の監視能力の向上	風速はマニュアル観測のみ	最大 75m/秒までの風速観測：半径 200km 内
	雨量強度 1mm/h 以上の降雨探知範囲：半径 350km	雨量強度 1mm/h 以上の降雨探知範囲：半径 450km
	半径 350km 内（降雨探知範囲）における時間単位の積算雨量データなし	半径 450km 内（降雨探知範囲）における 1 時間当たりの積算レーダー雨量データ
	「パ」国の 120 の既設地上観測所による降水データの空間分解能及び観測間隔：平均 81.9km メッシュ、180 分毎	気象レーダー探知範囲内における降水データの空間分解能及び観測間隔：半径 450 キロ、2.5km メッシュ以下
	レーダー観測範囲内の雨量強度の観測：PPI モード	レーダー観測範囲内に入った場合、風速・雨量強度・位置・経路の観測：PPI モードと CAPPI モード
	6 階調の雨量定性データ	0～250mm/h の降雨強度定量データ
	測風気球による定期的な高層気象観測 高度約 1.5～3km の風向・風速	連続的な高層気象観測 モンスーン期（降水時）最大観測高度：12km までの風向・風速
気象予報能力の向上	定量的短期気象予報（72 時間先まで） <ガイダンスによる算出値> ・24 時間地域降水量 ・3 時間地域降水量（48 時間先まで） ・日最大風速値（48 時間先まで） ・日最高気温 ・日最低気温 ・日最小湿度 定量的中期気象予報（240 時間先まで） <ガイダンスによる算出値> ・24 時間地域降水量 ・日最高気温 ・日最低気温 ・日最小湿度	
気象データ／気象情報提供能力の向上	WMO 及び国際社会に対し、継続的な高層気象観測データの提供なし（地上気象データの提供のみ） SMRFC、WMO 及び国際社会（GTS 経由）に対し、継続的な高層気象観測データの提供	
イスラマバード国際空港周辺の気象監視能力の向上	イスラマバード国際空港周辺地域での主観的（目視）観測	気象レーダーシステムによる半径 200km 内の客観的広域観測
	イスラマバード国際空港に対し、気象レーダー画像の提供なし	イスラマバード国際空港に対し、インターネットによる気象レーダー画像の提供

<p>大雨予測能力の向上</p>	<p>Feng-Yun-2 (中国の気象衛星) により、上層雲 (特に対流圏上部の巻雲状の雲) を下層の対流雲より明瞭に把握</p>  <p>The diagram consists of two parts. The top part shows a satellite in orbit over a map of East Asia, with a beam of light illuminating a layer of cirrus clouds (Ci) at an upper level. A label reads 'Upper Level Airflow in winter' and 'Ci: Cirriform Cloud (Upper Level Cloud)'. The bottom part shows the same satellite and map, but with a different layer of cirrus clouds (Ci) at a lower level, labeled 'Upper Level Airflow in monsoon season' and 'Ci: Cirriform Cloud (Upper Level Cloud)'.</p>	<p>上層雲 (対流圏上部の巻雲状の雲) を Feng-Yun-2 で、また対流圏下層から発達する降水雲を気象レーダーシステムで把握</p>  <p>The diagram consists of two parts. The top part shows a satellite in orbit over a map of East Asia, with a beam of light illuminating a layer of cumulonimbus clouds (Cb) at an upper level. A label reads 'Upper Level Airflow in winter' and 'Cb: Cumulonimbus (Convective Cloud)'. The bottom part shows the same satellite and map, but with a different layer of cumulonimbus clouds (Cb) at a lower level, labeled 'Upper Level Airflow in monsoon season' and 'Cb: Cumulonimbus (Convective Cloud)'.</p>
	<p>雨雲の動向に関する短時間予測をしていない</p>	<p>気象レーダー観測データ (画像) 利用による、雨雲の動向に関する短時間予測 (0.5~1 時間以内) の実施</p>

サイクロンや降水等の自然災害により、人的、社会経済的に甚大な被害を受けてきた「パ」国の歴史と、今後一層加速するであろう地球温暖化による気候変動に伴い、頻発化、激甚化が推測される気象災害に対して、本プロジェクトは災害被害の軽減を通じて、広く人々の生活向上及び社会経済全体に寄与するものである。また PMD の運用維持管理費が軽減できるよう、本プロジェクトの機材・施設設計に当たり交換部品や消耗品を最小限とし、最も大きなウェイトを占める電気代を極力抑える設計を採用するなどの技術的な対応を行った。以上の内容により、本プロジェクトの効果や先方の組織能力等を総合的に検討した結果、本プロジェクトは妥当性が高く、有効性も見込まれると判断されるため、実施する意義は極めて高い。

資 料

資料 1. 調査団員・氏名

<第一次現地調査>

氏名	担当	所属・役職
佐藤 俊也	総括	(独) 国際協力機構 JICA パキスタン事務所 次長
佐藤 信夫	気象技術参与 1	気象庁
赤津 邦夫	気象技術参与 2	(独) 国際協力機構 JICA 地球環境部 アドバイザー
田中 顕治	調査企画/事業計画策定	(独) 国際協力機構 JICA 地球環境部 水資源・防災グループ 防災第一課 副調査役
野口 晋孝	業務主任/事業効果測定/ 解析・予警報技術指導計画	(株) 国際気象コンサルタント
森 健二	副業務主任/レーダー施設建築設計	(一般財) 日本気象協会
遠藤 肇秀	気象観測機材/運営維持管理	(株) 国際気象コンサルタント
水越 祐一	放送機材	(株) 国際気象コンサルタント (補強)
内田 善久	気象レーダー・通信機材計画/機材積算	(一般財) 日本気象協会

<第二次現地調査>

氏名	担当	所属・役職
佐藤 俊也	総括	(独) 国際協力機構 JICA パキスタン事務所 次長
佐藤 信夫	気象技術参与 1	気象庁
赤津 邦夫	気象技術参与 2	(独) 国際協力機構 JICA 地球環境部 アドバイザー
山下 望	調査企画	(独) 国際協力機構 JICA 地球環境部 水資源・防災グループ 防災第一課 主任調査役
野口 晋孝	業務主任/事業効果測定/ 解析・予警報技術指導計画	(株) 国際気象コンサルタント
森 健二	副業務主任/レーダー施設建築設計	(一般財) 日本気象協会
遠藤 肇秀	気象観測機材/運営維持管理	(株) 国際気象コンサルタント
内田 善久	気象レーダー・通信機材計画/機材積算	(一般財) 日本気象協会
猪又 裕之	施工計画/調達事情/建築積算	(株) 国際気象コンサルタント
岩田 総司	災害被害・自然条件調査 1	(一般財) 日本気象協会
宮城 昌和	業務調整/災害被害・自然条件調査 2	(株) 建設技研インターナショナル
本谷 隆行	数値予報計算機計画	(株) 国際気象コンサルタント

<第三次現地調査>

氏名	担当	所属・役職
河崎 充良	総括	(独) 国際協力機構 JICA パキスタン事務所 所長
北村 浩一	計画管理	(独) 国際協力機構 JICA 地球環境部 水資源・防災グループ 防災第一課
野口 晋孝	業務主任/事業効果測定/ 解析・予警報技術指導計画	(株) 国際気象コンサルタント
猪又 裕之	レーダー施設建築設計	(株) 国際気象コンサルタント
遠藤 肇秀	気象観測機材/運営維持管理	(株) 国際気象コンサルタント
内田 善久	気象レーダー・通信機材計画/機材積算	(一般財) 日本気象協会

<第四次現地調査>

氏名	担当	所属・役職
森 健二	副業務主任/レーダー施設建築設計	(一般財) 日本気象協会
猪又 裕之	施工計画/調達事情/建築積算	(株) 国際気象コンサルタント

資料 2. 調査行程

(1) 第一次現地調査

調査日程	官団員				コンサルタント団員					
	佐藤 俊也	佐藤 信夫	赤津 邦夫	田中 顕治	野口 晋孝	森 健二	遠藤 肇秀	水越 祐一	内田 善久	
2012年	総括 JICAパキスタン事務所 次長	気象技術参与1 気象庁	気象技術参与2 JICA地球環境部 アドバイザー	調査企画/事業計画策定 JICA地球環境部 水資源・防災グループ 防災第一課 副調査役	業務主任/事業効果測定/解析・予 警報技術指導計画	副業務主任/レーダー施設建築設計	気象観測機材/運営維持管理	放送機材	気象レーダー・通信機材計画/機材 積算	
1	9月17日	月	東京→バンコク→イスラマバード		東京→バンコク→イスラマバード					
2	9月18日	火	在パキスタン日本大使館及びJICAパキスタン事務所表敬、パキスタン気象局 (PMD)、国家防災管理庁 (NDMA) 及び経済産業省経済課 (EAD) 表敬・協議、インセプションレポートの説明		在パキスタン日本大使館及びJICAパキスタン事務所表敬、パキスタン気象局 (PMD)、国家防災管理庁 (NDMA) 及び経済産業省経済課 (EAD) 表敬・協議、インセプションレポートの説明		JICAパキスタン事務所表敬、パキスタン気象局 (PMD)、国家防災管理庁 (NDMA) 及び経済産業省経済課 (EAD) 表敬・協議、インセプションレポートの説明			
3	9月19日	水	既設気象レーダー観測所 (イスラマバード) 調査、特別中期気象予報センター (SMRFC) 調査、PMDとの協議		既設気象レーダー観測所 (イスラマバード) 調査、特別中期気象予報センター (SMRFC) 調査、PMDとの協議					
4	9月20日	木	PMDとの協議		PMDとの協議					
5	9月21日	金	資料収集、内部打合せ		資料収集、内部打合せ					東京→バンコク→イスラマバード
6	9月22日	土	PMDとの協議、内部打合せ		PMDとの協議、内部打合せ					
7	9月23日	日	午前：イスラマバード→カラチ	既設GTS/MMS及びウィンドプロファイラ調査・確認	午前：イスラマバード→カラチ	PMDとの協議、サイト調査	午前：イスラマバード→カラチ	PMDとの協議、サイト調査		
8	9月24日	月	午後：カラチ→イスラマバード	既設GTS/MMS及びウィンドプロファイラ調査・確認	午後：カラチ→イスラマバード		既設GTS/MMS及びウィンドプロファイラ調査・確認		午後：カラチ→イスラマバード	
9	9月25日	火	ミニッツ文案作成、PMD、NDMA及びEADとのミニッツ協議		PMD、NDMA及びEADとのミニッツ協議					
10	9月26日	水	ミニッツ署名		ミニッツ署名					
11	9月27日	木	イスラマバード→バンコク		PMDとの詳細協議	サイト調査、積算調査	PMDとの詳細協議、サイト調査	PMDとの詳細協議	PMDとの詳細協議	
12	9月28日	金	バンコク→東京		PMDとの詳細協議	サイト調査、積算調査	PMDとの詳細協議、サイト調査	PMDとの詳細協議	PMDとの詳細協議	
13	9月29日	土			資料収集、内部打合せ、調査報告書準備					
14	9月30日	日			資料収集、内部打合せ、調査報告書準備					
15	10月1日	月			PMDとの詳細協議					
16	10月2日	火			イスラマバード→バンコク					
					バンコク→東京					

(3) 第三次現地調査 (概略設計概要説明調査)

調査日程			河崎 充良	北村 浩一	野口 晉孝	猪又 裕之	遠藤 肇秀	内田 善久
2013年			総括 JICAパキスタン事務所所長	計画管理 JICA 地球環境部 水資源・防災グループ 防災第一課	業務主任/事業効果測定/ 解析・予警報技術指導計画	レーダー施設建築設計	気象観測機材/運営維持管理	気象レーダー・通信機材計画/ 機材積算
1	6月29日	土		東京→バンコク→イスラマバード	東京→バンコク→イスラマバード			
2	6月30日	日		内部打合せ・資料収集	内部打合せ・資料収集			
3	7月1日	月	JICAパキスタン事務所打合せ		JICAパキスタン事務所打合せ			
			PMDへ概略設計概要説明、PMDとのミニッツ協議、経済産業省経済課 (EAD) との協議		PMDへ概略設計概要説明、PMDとのミニッツ協議、経済産業省経済課 (EAD) との協議			
4	7月2日	火		PMDとの協議	PMDとの協議			
5	7月3日	水		PMDとの協議、パキスタン・ナショナル銀行 (NBP) との協議	PMDとの協議			PMDとの協議、パキスタン・ナショナル銀行 (NBP) との協議
			PMDとの協議、在パキスタン日本大使館への報告		PMDとの協議、在パキスタン日本大使館への報告			
6	7月4日	木		PMDとの協議	PMDとの協議			
7	7月5日	金	ミニッツ署名		ミニッツ署名			
				イスラマバード→バンコク	PMDとの協議			
8	7月6日	土		バンコク→東京	内部打合せ・資料収集			
					イスラマバード→バンコク			
9	7月7日	日			バンコク→東京			

(4) 第四次現地調査

調査日程			コンサルタント団員	
			森 健二	猪又 裕之
			副業務主任/リーダー施設建築設計	施工計画/調達事情/建築積算
2013年				
1	10月28日	月	東京→バンコク→イスラマバード	
2	10月29日	火	JICAパキスタン事務所表敬、パキスタン気象局との協議	
3	10月30日	水	パキスタン気象局との協議、首都開発庁 (CDA) 及び経済産業省経済課 (EAD) との協議	資料収集、積算調査、建設材料単価調査
4	10月31日	木	パキスタン気象局、首都開発庁 (CDA) との協議	資料収集、積算調査、建設材料単価調査
5	11月1日	金	パキスタン気象局との協議、資料収集、積算調査、建設材料単価調査	
6	11月2日	土	パキスタン気象局との協議、資料収集、積算調査、建設材料単価調査	
7	11月3日	日	資料収集、内部打合せ	
8	11月4日	月	パキスタン気象局との協議、環境保護庁 (EPA) との協議、周波数割当委員会 (FAB) との協議	資料収集、積算調査、建設材料単価調査
9	11月5日	火	パキスタン気象局との協議、パキスタン電気通信庁 (PTA) との協議	資料収集、積算調査、建設材料単価調査
10	11月6日	水	パキスタン気象局との協議、経済産業省経済課 (EAD) との協議	資料収集、積算調査、建設材料単価調査
11	11月7日	木	パキスタン気象局との協議、資料収集	資料収集、積算調査、建設材料単価調査
12	11月8日	金	パキスタン気象局との協議、パキスタン電気通信庁 (PTA) 及び経済産業省経済課 (EAD) との協議、JICAパキスタン事務所へ報告 イスラマバード→バンコク	
13	11月9日	土	バンコク→東京	

資料 3. 関係者(面会者)リスト

- 経済・統計省、経済課 (Economic Affairs Division, Ministry of Economic Affairs and Statistics)

Dr. Kazim Niaz	Joint Secretary
Mr. Syed Zain Gillani	Deputy Secretary
Mr. Asghar Ali	Sector Officer, ADB-Japan Wing

- パキスタン気象局 (Pakistan Meteorological Department : PMD)

イスラマバード本局 (Islamabad Head Office)

Dr. Qamar Uz Zaman Ch.	Advisor (Meteorological and Climate Affairs)
Mr. Arif Mahmood	Director General
Dr. Ghulam Rasul	Deputy Director General (Chief Meteorologist)
Mr. Hazrat Mir	Chief Meteorologist
Dr. Muhammad Hanif	Director (Forecasting)
Dr. Khalid M. Malik	Director (Agro-meteorology)
Mr. Azmat Hayat Khan	Director (Drought)
Mr. Jan Muhammad Khan	Director (Planning)
Mr. Usman Rafique	Electric Engineer, Weather Surveillance Radar
Mr. Wadar Ali	Sub Engineer
Mr. Muhamood Atif Nawaz	Sub Engineer
Mr. Ali Hussain Abbasi	Sub Engineer
Mr. Amjad Ali	Sub Engineer
Mr. Shahid Abbasi	Assistant Mechanic Sub Engineer
Mr. Abdus Rahman	Sub Engineer
Mr. Nazir Khan Niazi	Electronic Engineer

ムルタン気象事務所 (Multan Meteorological Office)

Mr. Muhammad Zawar	Deputy Director
--------------------	-----------------

カラチサイクロン警報センター (Karachi Tropical Cyclone Warning Centre)

Mr. Muhammad Touseef Alam	Chief Meteorologist
---------------------------	---------------------

ラホール地方気象センター (Lahore Regional Meteorological Centre)

Mr. Mahr Sahibzad Khan	Director
------------------------	----------

ラホール洪水予報局 (Lahore Flood Forecasting Division)

Mr. Mohammad Riaz	Chief Meteorologist
Mr. Fayyaz Nazeer	Senior Electric Engineer

- 国家防災管理庁 (National Disaster Management Authority: NDMA)

Mr. Ahmed Kamnal Member (Planning)

- 国防省 (Ministry of Defence)

Mr. Farooq Hassan Deputy Secretary (Finance)

- 連邦洪水委員会 (Federal Flood Commission: FFC)

Mr. Alamgir Khan Chief Engineer (Floods)

- 首都開発庁 (Capital Development Authority: CDA)

Mr. Mahboob Ali Khan Director, Urban Planning

Mr. Tavaeer Nawaz Deputy Director, Urban Planning

Mr. Ibtisam Peerzada Deputy Director, Building Control

- イスラマバード電力供給会社 (Islamabad Electric Supply Company: IESCO)

Mr. Mahboob Ali Khan Sub-divisional Officer, Urban Planning

Mr. Khalid Mahmood Sub Engineer, Line Superintend I

- ムルタン電力会社 (Multan Electric Power Company: MEPCO)

Mr. Abdul Mateen Khan (Engr.) Chief Engineer

- 周波数割当委員会 (Frequency Allocation Board: FAB)

Mr. Saifullah Khan Bangash Director

Mr. Imran Zahoor Deputy Director

- ハビブ銀行 (Habib Bank Limited: HBL)

Mr. Syed Ahsan Raza Manager Operations

- パキスタン国立銀行 (National Bank of Pakistan: NBP)

Mr. Shahzad Naeem Khokher Incharge Forex Dept. International Banking Department, Main Branch

- パキスタン電気通信庁 (Pakistan Telecommunication Authority: PTA)

Ms. Abida Shaukat Director, Radio Based Services (RBS)

Mr. Umair Tariq Deputy Director (Software), Radio Based Services (RBS)

Mr. Yasir Khan Assistant Director, Radio Based Services (RBS), Licensing

Mr. Anwar Ul Haq Assistant Engineer, Radio Based Services (RBS)

- 民間航空庁 (Civil Aviation Authority: CAA)

Mr. Muhammad Farooq Rashid	Airport Manager, Multan Airport
Mr. Muhammad Pervaiz	Chief Technical Officer, Multan Airport
Mr. Rana M. Ashraf	Senior Air Traffic Control Officer, Multan Airport
Mr. Iqtidar Haider	Corporate Manager, Multan Airport

- 環境保護庁 (Environmental Protection Agency: EPA)

Mr. Ijlal Hussain	Deputy Project Manager
-------------------	------------------------

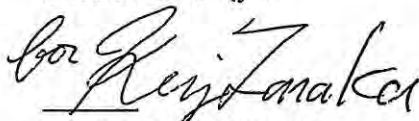
**MINUTES OF DISCUSSIONS
OF
THE PREPARATORY SURVEY (FIELD SURVEY-1)
ON
THE PROJECT ORIGINALLY TITLED
“ESTABLISHMENT OF SPECIALIZED MEDIUM RANGE WEATHER
FORECASTING CENTRE (SMRFC) AND
STRENGTHENING OF EARLY WARNING AND DISSEMINATION NETWORK”
IN
THE ISLAMIC REPUBLIC OF PAKISTAN .**

In response to a request from the Government of the Islamic Republic of Pakistan (hereinafter referred to as “Pakistan”), the Government of Japan decided to conduct a Preparatory Survey on the Project originally titled “Establishment of Specialized Medium Range Weather Forecasting Centre (SMRFC) and Strengthening of Early Warning and Dissemination Network” (hereinafter referred to as “the Project”) and entrusted the Preparatory Survey to Japan International Cooperation Agency (hereinafter referred to as “JICA”).

JICA sent to Pakistan the Preparatory Survey Team (hereinafter referred to as “the Team”), which is headed by Mr. Shiro NAKASONE, Director of Disaster Management Division1, Global Environment Department, JICA, and stayed in Pakistan from September 17 to 26, 2012.

The Team explained the contents of Inception Report to the officials concerned of the Government of Pakistan, and the Pakistani side agreed the purpose and contents of the Preparatory Survey.

Both sides held discussions and conducted a Field Survey-1 at two localities of Islamabad and Karachi. In the course of discussions and Field Survey-1, both parties confirmed the main items described in the attached sheets. The Team will proceed to further works and prepare the Field Survey-2 based on the result of the Field Survey-1.



Mr. Shiro NAKASONE
Head of the Mission
Preparatory Survey Team
Japan International Cooperation Agency
Government of Japan




Mr. Kazim Niaz
Joint Secretary (ADB/Japan)
Economic Affairs Division
Ministry of Economic Affairs & Statistics
Government of Pakistan

(SYED ZAIN GILLANI)
Deputy Secretary
Economic Affairs Division
Government of Pakistan
Islamabad

Islamabad, September 26, 2012



Mr. Arif Mahmood
Director General
Pakistan Meteorological Department
Ministry of Defence
Government of Pakistan



Mr. Ahmed Kamal
Member Disaster Risk Reduction
National Disaster Management Authority
Ministry of Climate Change
Government of Pakistan

ATTACHMENT

1. Objective of the Project

Both sides confirmed that the objective of the Project is to improve the capacity of the weather observation and forecasting through establishment of new meteorological radar system at Islamabad and installation of necessary equipment and machineries for Specialized Medium Range Forecasting Centre to mitigate the disasters caused by meteorological phenomena in Pakistan.

2. Title of the Project

The Project was originally titled "Establishment of Specialized Medium Range Weather Forecasting Centre (SMRFC) and Strengthening of Early Warning and Dissemination Network" by the Government of Pakistan. The Team explained that the title of Japanese Grant Aid project is required to reflect the contents of the Project appropriately by the Government of Japan. In this regard, the Team proposed the Pakistani side to change the title as "The Project for Strengthening Weather Forecasting and Dissemination System of Early Warning".

However, the Pakistani side requested the Japanese side to make no change in the title of the Project in order to proceed with the Project approval procedure by the Government of Pakistan without any hindrance.

Both sides agreed that the title of the Project is tentative "Establishment of Specialized Medium Range Weather Forecasting Centre -SMRFC- (Project for Strengthening Weather Forecasting and Dissemination System of Early Warning)", and to be discussed and finalized during the Field Survey-2.

3. Sites of the Project

Specialized Medium Range Forecasting Centre and available site in Pakistan Meteorological Department (hereinafter referred to as "PMD") Complex, Headquarters office, Islamabad are proposed for installation of necessary equipment and machineries and new meteorological radar system, respectively. Suitable location for new meteorological radar system is finally to be verified through the Field Survey-2.

On the other hand, locations for five (5) Upper-Air Observation Systems and Meteorological Information Dissemination Systems are to be further discussed with PMD during the Field Survey-2 after the relevancy, effectiveness and necessity of these Systems are confirmed by the Japanese side.

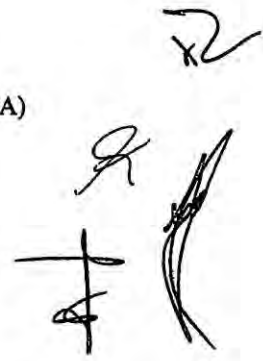
4. Responsible, Implementing and Coordinating Agency

4-1. The Responsible/Sponsoring Agency: Ministry of Defence

4-2. The Implementing Agency: Pakistan Meteorological Department

4-3. The Coordinating Agency: National Disaster Management Authority (NDMA)

The organization chart is shown in **Annex-1**.



5. Items requested by the Government of Pakistan

Both sides conducted a series of discussions to identify the requested components and recognized the purpose, necessity, benefit and emergency of the respective items. As a result, the Team almost identified the contents of the respective items and compiled the result as described in **Annex-2**.

Both sides confirmed that the items described in **Annex-2** would be intended for the further survey and the appropriateness of the request would be examined in Japan. The result of the analysis in Japan would be shared and discussed with the Pakistani side in the Field Survey-2. Therefore, Pakistani side understood that all requested items, as listed in **Annex-2**, may not be accepted as the final component of the Project.

6. Items to be procured by the Pakistani side

Both sides confirmed that the priorities of the items described in **Annex-3** are relatively lower than those in **Annex-2**; however the items in **Annex-3** are important and effective for the Project. Therefore, the Team proposed the Pakistani side to procure these items through their own resources, not out of Japan's Grant Aid to make the mutual effort for the Project. The Pakistani side agreed with the proposal and it was confirmed by the Team that a vehicle has already been purchased for the Project by the Government of Pakistan. Both sides agreed that the items described in **Annex-3** would not be intended for the further survey.

7. Japan's Grant Aid Scheme

7-1. The Pakistani side has shown a full understanding to the Japan's Grant Aid Scheme explained by the Team, as described in **Annex-4**.

7-2. The Pakistani side will take the necessary measures, as described in **Annex-5**, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

8. Schedule of the Preparatory Survey

The Preparatory Survey is divided into five (5) stages which consist of

1. Field Survey-1,
2. Study in Japan-1,
3. Field Survey-2,
4. Study in Japan-2, and
5. Explanation of Outline Design and Draft Report.

The Team explained the details of each stage in the Inception Report.

8-1. The Field Survey-1 will continue in Pakistan until October 2, 2012.

8-2. Based on the result of the Field Survey-1, JICA will prepare the draft layout and design of the facilities and equipment which will be incorporated to the scope of the Project.

8-3. JICA will dispatch the team of Field Survey-2 in order to explain the draft layout and design and

agree the contents with the Pakistani side. The team of Field Survey-2 will conduct the further study in November, 2012.

8-4. Based on the result of the Field Survey-2, JICA will conduct the analytical work on design of the facilities and equipment and cost estimation from December 2012 to April 2013, in Japan.

8-5. JICA will prepare the Draft Final Report and provide cost estimation for the preparation of the PC-1 in English and dispatch a team to Pakistan in order to explain and agree its contents around April, 2013.

8-6. If the contents of the Draft Final Report are accepted in principle by the Government of Pakistan, JICA will complete the Final Report and send it to the Government of Pakistan by August, 2013.

8-7 The above schedule is tentative and subject to change.

9. Other relevant issues

9-1. Security arrangement

The Government of Pakistan will take all possible measures to secure the safety for the concerned people during the Survey and implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.

9-2. Approval of PC-I

The Team explained that the Project would be sent to the Japanese Cabinet for approval only after approval of the PC-I by the Government of Pakistan.

The Pakistani side assured that all the effort shall be made for the approval of the PC-I from the competent fora by August, 2013. JICA will provide necessary information acquired through the Survey to Pakistani side for preparation of the PC-I.

9-3. Soft Component

The Team explained that the initial guidance for operation and maintenance of the equipment and machineries could be included in the Project to support smooth operation. Necessity and contents of the support will be examined during the Field Survey-2 in detail.

9-4. Tax Exemption

The tax exemption including Value Added Tax (VAT), custom duty, and any other taxes and fiscal levies in Pakistan which is to be arisen from the Project activities shall be ensured by the Government of Pakistan. The Government of Pakistan shall take necessary procedures for tax exemption.

9-5. Clearance of Existing Facilities

Both sides confirmed that procedure of clearance of existing facilities is to be discussed during the Field Survey-2.

9-6. Assessment for Environmental and Social Impacts and Disaster Risk Reduction

Both sides agreed that the Pakistani side would complete necessary procedures relating to environmental and social impact assessment and disaster risk reduction in accordance with the regulations in Pakistan.

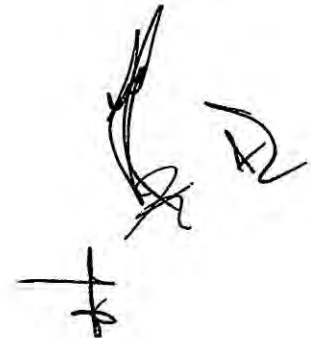
9-7. Visibility of the Project

The Pakistani side affirmed the following measures to be taken in order to enhance publicity of the Project:

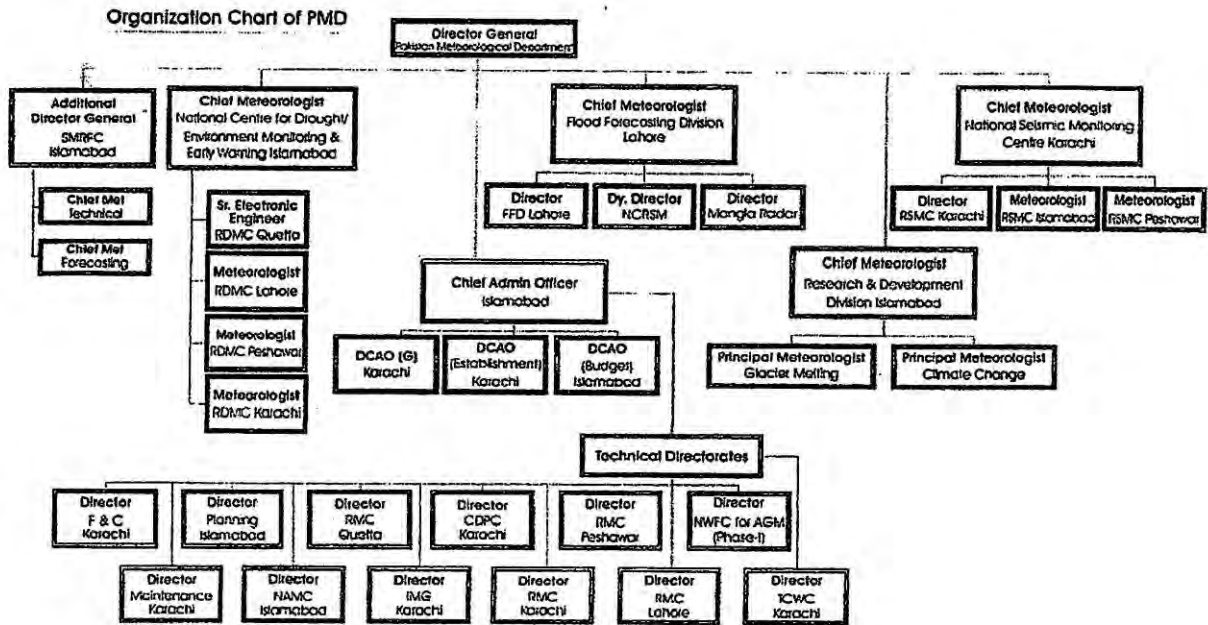
- (a) Mass media sources
- (b) Brochures
- (c) Commemoration panels

9-8. The Team explained that the preparatory survey report to be prepared at the end of the survey would be disclosed to the public in principle in Japan. However, the Team also explained that a confidential part which might affect bidding process such as cost estimation should be kept undisclosed until the bidding has completed.

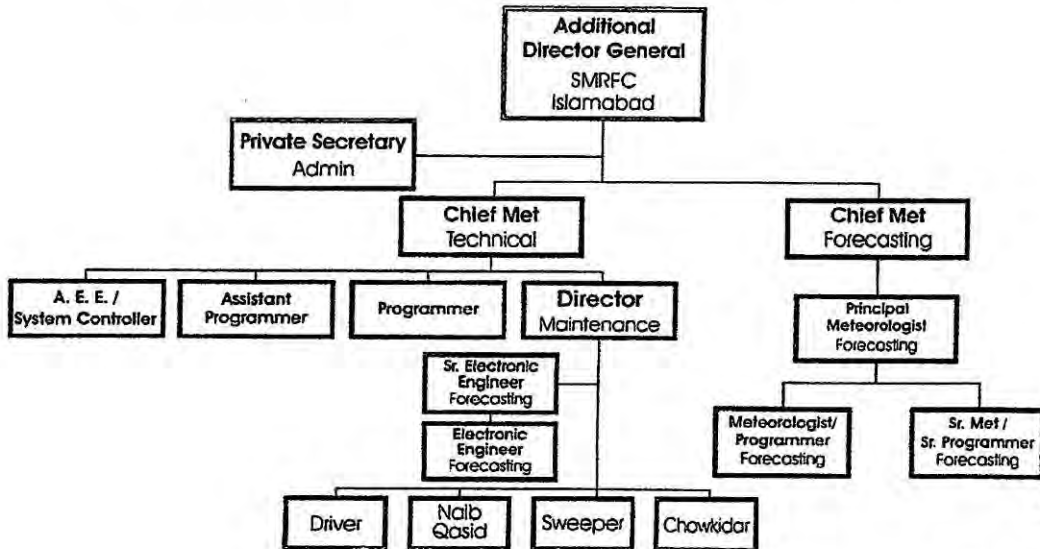
- Annex-1 Organization Chart (Pakistan Meteorological Department & Specialized Medium Range Forecasting Centre)
- Annex-2 Items Requested by the Pakistani Side
- Annex-3 Items to be procured by the Pakistani Side
- Annex-4 Japan's Grant Aid Scheme
- Annex-5 Major Undertakings to be taken by each Government

Handwritten signature and initials in black ink, located in the bottom right corner of the page. The signature is a stylized, cursive name, and the initials are 'AR'.

Annex-1 Organization Chart (Pakistan Meteorological Department & Specialized Medium Range Forecasting Centre)



Proposed staff for "SMRFC and Strengthening of Early Warning & Dissemination Network"



Annex-2 Items Requested by the Pakistani Side

No.	Component	Q'ty	Description of the Request (PMD)	Purpose of the Component (PMD)
1	<i>SMRFC (Specialized Medium Range Forecasting Centre)</i>			
1-1	Meteorological Data Processing, Analyzing & Forecasting System with High Speed Computer including Agro meteorological Data Processing & Analysis Unit	1	Enhancement of the existing PC clustering system from 2T flops/sec to 20T flops/sec for operating Regional NWP Model with resolution of 5km grid size Model operation round the clock producing the output on 3 hourly bases	High accuracy weather forecasts up to 3 days will be produced by the enhanced computing system. For extended period to cover middle range up to 10 days weather forecasts to charter the needs of additional outlooks (weather guidance). Severe weather phenomena such as heavy rainfall can be predicted. For future climate prediction, regional climate model can be leaned on the enhanced computing system.
		1	Decision support system for farming community using output of the NWP model	Decision support system using output of the NWP Model: advisory on crop water requirement, timing of pest control, sowing/harvesting and field operation for agriculture sector. Issuance of 5 days or 7 days advance agro meteorological information to the farmers on periodical bases for all the agro-climatic zones of Pakistan using the existing Mass media and SMS.
1-2	Meteorological Information Dissemination System and Weather Information Broadcasting Program Production System	1	Simplified radio broadcast transmission system (30 transmitters on local weather observatories) for regional area and radio programme production system (radio booth, recorder and data transfer equipment).	For timely dissemination of accurately severe weather forecasts and warnings to vulnerable districts of the Pakistan. To educate communities for response and adaptation.
1-3	NOAA HRPT System	1	Direct Receiving System of NOAA Polar Orbit Meteorological Satellite.	Monitoring of dense fog, sea surface temperature, soil moisture, outgoing long radiation (OLR), snow cover, NDVI, land use products and global precipitation estimates from Polar Orbit Meteorological Satellite.

1-4	GTS Message Switch System	1	Replacement of the existing GTS Message Switching System at Karachi to a New GTS Message Switching System to be installed in PMD Islamabad.	The New GTS Message Switching System to be installed in PMD Islamabad for switching over the existing GTS Message Switching System in Karachi.
1-5	Meteorological Data Trunk Communication System including Network Management System (VPN)	8	Communication Network for the data exchange among PMD offices, and publication and dissemination of weather forecasts and warnings to the government organizations related to disaster management. Network Management System for the Meteorological Data Trunk Communication System (VPN).	Designed to reduce risks from a cyber-assault etc. utilizing VPN (virtual private network) technology. For stable data exchange, publication and dissemination, even when the internet situation of PMD HP is crowded at the time of a heavy rain and a flood, etc. For stable communication traffic on the data trunk communication system with network management.
1-6	Lightning Protection for SMRFC SMRFC Power Supply System - Power Backup System (UPS) - Isolation Transformer for the Equipment - Isolation Transformer for the Building Facility - Automatic Voltage Regulator Engine Generator	1	Same as description of the Component.	For the protection of equipment and systems for SMRFC from lightning and surge and provision of stable power.
1-7	Necessary Spare Parts and Test Equipment for SMRFC	1	Spare parts and test instruments required for the equipment and systems for SMRFC supplied under the Project.	For maintenance of the equipment and systems for SMRFC supplied under the Project.
2	Meteorological Radar			
2-1	Meteorological Radar - Meteorological Radar System - Meteorological Radar Data Display System - Necessary Spare Parts and Test Equipment for Meteorological Radar Construction of Radar Tower Building including Power Supply System mentioned below; - Power Backup System (UPS) - Isolation Transformer for the Equipment - Isolation Transformer for the Building Facility	1	Same as description of the Component.	For continued radar observation. For stable and highly accurate radar observation.

	- Automatic Voltage Regulator Engine Generator			
2-2	Meteorological Radar Data Composite Picture System Existing Meteorological Radar 8 bit Modification System	1	The equipment to describe and display the Radar Composite Pictures among newly established Islamabad radar data and other existing radar data. Data modification system to convert the existing radar data into 8 bit data.	In order to obtain highly accurate rainfall intensity and to detect accurate weather situation by utilizing radar composite pictures.
3	<i>Upper-air Observation System</i>			
3-1	Upper-air Observation System (Wind Profiler) with Meteorological Data Satellite Communication System (VSAT)	5	The equipment for recording upper-air meteorological parameter.	Currently PMD cannot carry out periodical upper air observation using radio sonde due to lack of the financial resources. With the help of 5 radio sonde stations, the upper air data will be produced and will be consumed by the local forecasting system. In addition, the upper air data will be shared with the Global Communities.
4	<i>Mobile-type Micro Weather Radar System</i>			
4-1	Mobile-type Micro Weather Radar System with Power Supply Apparatus	1	The required mobile radar system (X band) enables PMD to monitor severe weather events (small and local scale phenomena) in the disaster prone areas in Pakistan.	The radar system will be moved to the vicinity of heavy rainfall to monitor the event continuously conveying the information to main forecasting centre. Based upon the conditions, the early warning will be issued to save the lives of the people living in vulnerable areas.

Annex-3 Items to be procured by the Pakistani side

No.	Component	Q'ty	Description of the Request (PMD)	Purpose of the Component (PMD)
<i>1</i>	<i>Others</i>			
1-1	Forecast Support System with Plotting Apparatus	1	The equipment which can printout (or plot) some kinds of weather charts, drawn by the free software, on one sheet of larger paper such as 1.3 m × 1m.	Some kinds of weather charts on one larger sheet of paper is used for transfer of the routine work results to the next routine forecast team.
1-2	Meteorological Product Display System	3	Three (3) large size (52 inches) LCD Displays.	Each display is installed at (1) Forecast room for forecasting work, (2) the entrance lobby of PMD for the reference and viewing of visitors and (3) airport lobby for displaying the weather information to general airport users.
1-3	Vehicle	1	Government of Pakistan has already purchased for the Project.	For daily works.
1-4	Environmental Monitoring System with Spread Spectrum Data Transmission System with Power Supply Apparatus	2	The system which has the similar functions of the existing one in Multan provided by the Government of Italy for monitoring the environmental conditions	Monitoring environmental conditions such as aerosol and carbon emissions from industrial and transportation sectors in Karachi and Lahore. Supporting research activities on cloud physics by the recorded data which is useful in high impact weather phenomena forecast.

資料 4-1-10

Annex-4 Japan's Grant Aid Scheme

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as part of this realignment, a new JICA law was entered into effect on October 1, 2008. Following this law and the decision of the GOJ, Grant Aid for General Project, for Fisheries and for Cultural Cooperation, etc. are extended by JICA.

Grant Aid is non-reimbursable fund to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures (Attachment 1)

Japanese Grant Aid is conducted as follows-

- Preparatory Survey (hereinafter referred to as "the Survey")
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Determination of Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid Project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures are necessary to

ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed, JICA recommends the GOJ to appraise the implementation of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the E/N will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consultant firm(s) which conducted the Survey will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A.

(3) Eligible Source Country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Attachment.

(6) Proper Use

The Government of recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

(7) Export and Re-export

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

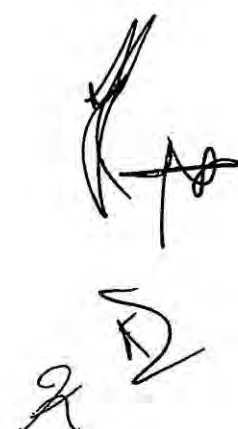
- a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

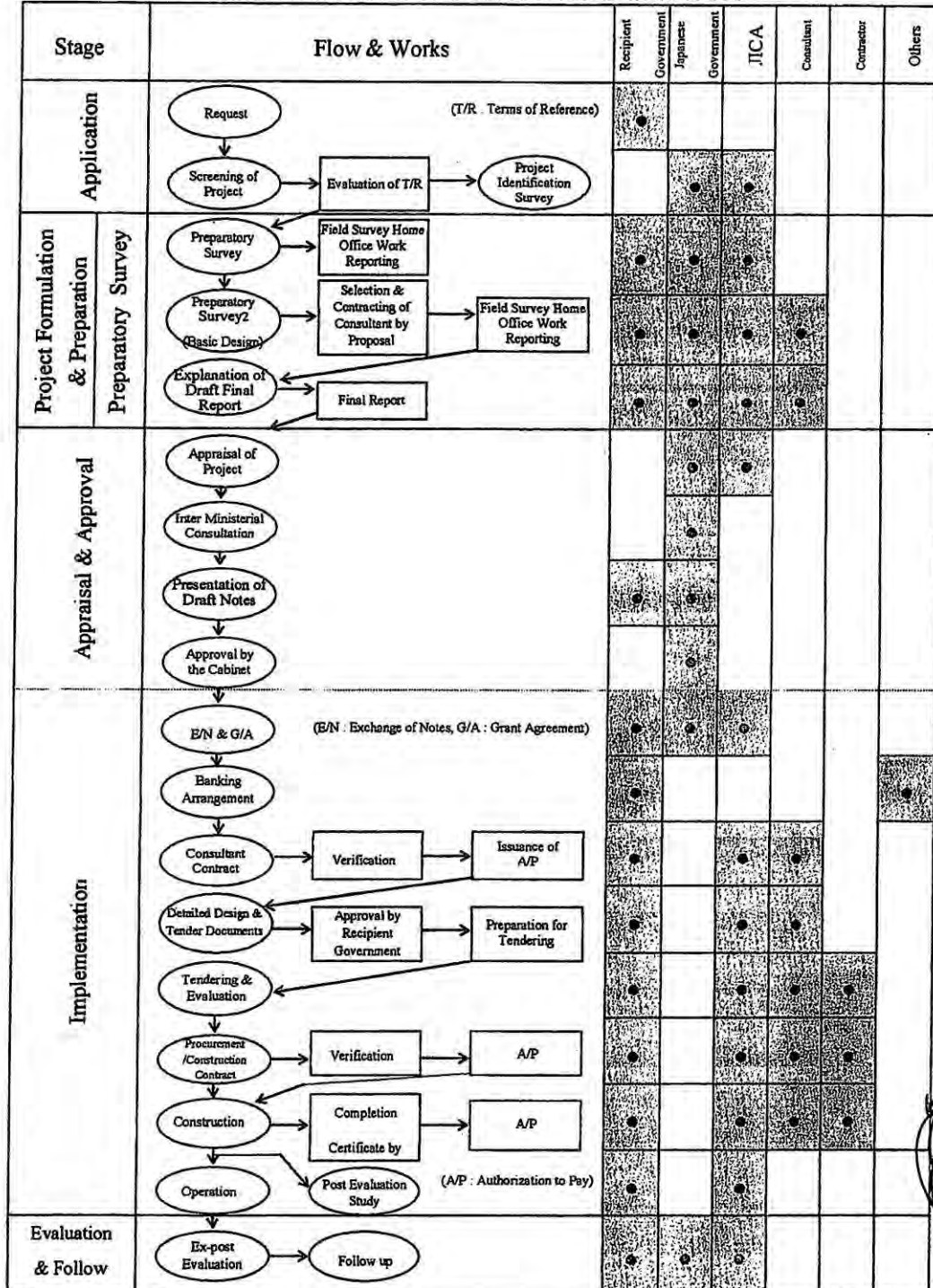
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(10) Considerations for Environmental and Social Impacts and Disaster Risk Reduction

A recipient country must ensure DRR and the social and environmental considerations for the Project and must follow the regulations concerned of the recipient country and JICA socio-environmental guideline.

Handwritten signature and initials in black ink, located in the bottom right corner of the page.

FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



Annex-5: Major Undertakings to be taken by each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure land necessary for the implementation of the Project and to clear the sites		○
2	To construct the following facilities		
	1) The building	○	
	2) The gates and fences in and around the site		○
	3) The parking lot	○	
	4) The road within the site	○	
3	5) The road outside the site		○
	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the sites		
	1) Electricity		
	a. The distributing power line to the site		○
	b. The drop wiring and internal wiring within the site	○	
	c. The main circuit breaker and transformer	○	
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	○	
	3) Drainage		
	a. The city drainage main (for storm sewer and others to the site)		○
	b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site	○	
	4) Gas Supply		
	a. The city gas main to the site		○
	b. The gas supply system within the site	○	
5) Telephone System			
a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●	
b. The MDF and the extension after the frame/panel	○		
6) Furniture and Equipment			
a. General furniture		○	
b. Project equipment	○		
4	To ensure prompt unloading and customs clearance of the products at the port of disembarkation in the recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the products from Japan to the recipient country	○	
	2) Tax exemption and custom clearance of the products at the port of disembarkation		○
5	3) Internal transportation from the port of disembarkation to the project site	○	(●)*
	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
6	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
7	To ensure that the facilities and the products be maintained and used properly and effectively for the implementation of the Project		●
8	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
9	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
10	2) Payment commission		●
	To give due environmental, social consideration and Disaster Risk Reduction during the planning and the implementation of the Project		●

(B/A: Banking Arrangement, A/P: Authorization to Pay)

* Internal transportation to the sites where Japanese nationals cannot enter due to the security situation would be covered by the Pakistani Side.

**MINUTES OF DISCUSSIONS
OF
THE PREPARATORY SURVEY (FIELD SURVEY-2)
ON
THE PROJECT TITLED
“ESTABLISHMENT OF SPECIALIZED MEDIUM RANGE WEATHER
FORECASTING CENTRE (SMRFC) AND
STRENGTHENING OF WEATHER FORECASTING SYSTEM
IN
THE ISLAMIC REPUBLIC OF PAKISTAN”**

In response to the request from the Government of the Islamic Republic of Pakistan (hereinafter referred to as “Pakistan”), the Government of Japan decided to conduct a Preparatory Survey on the Project originally titled “Establishment of Specialized Medium Range Weather Forecasting Centre (SMRFC) and Strengthening of Early Warning and Dissemination Network” and entrusted the Preparatory Survey to Japan International Cooperation Agency (hereinafter referred to as "JICA").


Following the Field Survey-1 conducted from September 17 to 26th, 2012, JICA sent to Pakistan the second Preparatory Survey Team (hereinafter referred to as "the Team") to undertake the Field Survey-2, which is headed by Mr. Toshiya Sato, Senior Representative of JICA Pakistan Office from November 19 to 23rd, 2012.

The Team explained the result of the Field Survey-1 and the Study in Japan-1 to the officials concerned of the Government of Pakistan (Pakistan Meteorological Department (hereinafter referred to as “PMD”)), and the Pakistani side agreed to the scope of the Project as well as relevant details as described as attached. The Team will proceed to further works and prepare the Outline Design and Draft Report based on the result of Field Survey-1 and Field Survey-2.

Islamabad, November 22nd, 2012



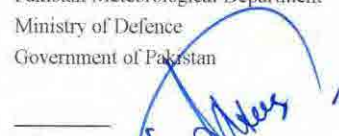
Mr. Toshiya Sato
Head of the Mission
Preparatory Survey Team
Japan International Cooperation Agency
Government of Japan



Mr. Syed Zain Gillani
Deputy Secretary
Economic Affairs Division
Ministry of Economic Affairs & Statistics
Government of Pakistan



Mr. Arif Mahmood
Director General
Pakistan Meteorological Department
Ministry of Defence
Government of Pakistan



Mr. Muhammad Idrees Mahsud
Member Disaster Risk Reduction
National Disaster Management Authority
Ministry of Climate Change
Government of Pakistan

ATTACHMENT

1. Result of discussions for Draft Layout and design of the facilities and equipment of the Project

Based on the result of Field Survey-1 and Study in Japan-1, Japanese side proposed the Draft Layout and design of the facilities and equipment of the Project.

Through series of meetings, both sides undertook discussions to reach a common understanding on what items to focus for this Project, considering its purpose, necessity, benefit, relevance and urgency. As a result, both sides reached an agreement as described in Annex-1.

2. Title of the Project

Although the title of the Project was pending in the discussion of the Field Survey-1, both sides understood in principle that the title of the Project should reflect the content of the Project. Thus, as a result of agreement as in Annex-1, pending on the finalization of the Project detail, both sides agreed to set the title, "Establishment of Specialized Medium Range Weather Forecasting Centre (SMRFC) and Strengthening of Weather Forecasting System in the Islamic Republic of Pakistan".

3. Final layout with priority and site

Both sides agreed that the final layout with priority and sites are as described in Annex-2.

JICA committed to recommend to the Government of Japan for the approval of each item agreed described in Annex-2. Pakistani side understood that according to the overall cost of the Project, there may be possibility that not all agreed items could be approved.

Also, Pakistani side understood that Draft Final outline of the Project with project cost will be discussed by both sides in the Field Survey-3.

4. Schedule of the Preparatory Survey

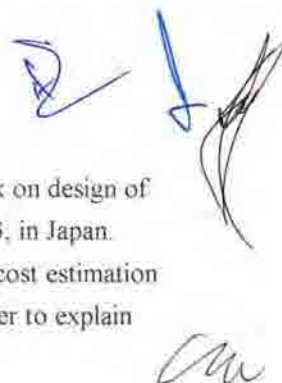
The Preparatory Survey is divided into five (5) stages which consist of

1. Field Survey-1 (Completed)
2. Study in Japan-1 (Completed)
3. Field Survey-2. (On-going)
4. Study in Japan-2.
5. Field Survey-3.

4-1. The Field Survey-2 will continue in Pakistan until 24 December, 2012.

4-2. Based on the result of the Field Survey-2, JICA will conduct the analytical work on design of the facilities, equipment and cost estimation from December 2012 to April 2013, in Japan.

4-3. JICA will prepare the Draft Final Report including Outline Design and provide cost estimation for the preparation of the PC-1 in English and dispatch a team to Pakistan in order to explain and agree its contents around April, 2013 as the Field Survey-3.



4-4. If the contents of the Draft Final Report are accepted in principle by the Government of Pakistan, JICA will complete the Final Report and send it to the Government of Pakistan by August, 2013.

The above schedule is tentative and subject to change.

5. Other relevant issues

5-1. Security arrangement

The Government of Pakistan shall take all possible and necessary measures to ensure the safety of the concerned Japanese people during the implementation of the Project at the Projects sites and movement to the Project sites from their accommodations, if Japanese side requests. The Project sites are as described in Annex-2.

5-2. Approval of PC-1 (Revised)

The Team explained that the Project would be sent to the Japanese Cabinet for approval only after approval of the PC-1 (Revised) by the Government of Pakistan.

The Pakistani side assured that all the effort shall be made for the approval of the PC-1 (Revised) from the competent authority by the end of August, 2013. JICA will provide necessary information acquired through the Survey to Pakistani side for preparation of the PC-1 (Revised) by the end of April.

5-3. Soft Component

Both sides agreed that initial guidance for operation and maintenance of the equipment and machineries should be included in the Project to support smooth operation.

5-4. Clearance of Existing Facilities

The Pakistani side agreed that all expense that derives from clearing the existing residential building shall be covered by PMD. The Pakistani side committed that clearance will be commenced immediately after signing of Exchange of Notes of the Projects by both sides, and completed within 2 months.

5-5. Provision of internet facilities

The Pakistani side agreed to provide reliable and high-speed internet facilities at all proposed sites for the Project.

5-6. Provision of No Objection Certificate (NOC)

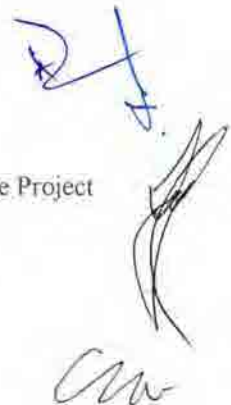
The Pakistani side agreed to take necessary measures to get NOC for Japanese people involved in the Project whenever required.

Annex-1:

Result of discussions for Draft Layout and design of the facilities and equipment of the Project

Annex-2:

Final layout with priority and site



Annex-1 Result of discussions for Draft Layout and design of the facilities and equipment of the Project

No.	Component	Q'ty	Description of the Request (PMD)	Purpose of the Component (PMD)	Include/Omit	Remarks
1 SMRFC (Specialized Medium Range Forecasting Centre)						
1-1	Meteorological Data Processing, Analyzing & Forecasting System with High Speed Computer including Agro meteorological Data Processing & Analysis Unit	1	Enhancement of the existing PC clustering system from 2T flops/sec to 20T flops/sec for operating Regional NWP Model with resolution of 5km grid size Model operation round the clock producing the output on 3 hourly bases	High accuracy weather forecasts up to 3 days will be produced by the enhanced computing system. For extended period to cover middle range up to 10 days weather forecasts to cater the needs of additional outlooks (weather guidance). Severe weather phenomena such as heavy rainfall can be predicted. For future climate prediction, regional climate model can be leaned on the enhanced computing system.	Partially include	Computing system and spare parts requested by PMD for operation/development of weather products utilizing the existing global model outputs was agreed to be included. PMD requested capacity building of their staffs on NWP in form of a series of short-term training courses in Japan to support developing their Regional NWP Model. PMD also requested to provide NWP model at a later stage. JICA understood the relevance and importance of such capacity building needs and took note of the request.
		1	Decision support system for farming community using output of the NWP model	Decision support system using output of the NWP Model: advisory on crop water requirement, timing of pest control, sowing/harvesting and field operation for agriculture sector. Issuance of 5 days or 7 days advance agro meteorological information to the farmers on periodical bases for all the agro-climatic zones of Pakistan using the existing Mass media and SMS.		
1-2	Meteorological Information Dissemination System and Weather Information Broadcasting Program Production System	1	Simplified radio broadcast transmission system (30 transmitters on local weather observatories) for regional area and radio programme production system (radio booth, recorder	For timely dissemination of accurately severe weather forecasts and warnings to vulnerable districts of the Pakistan. To educate communities for response and adaptation.	Omit	It was agreed that mechanism and framework of timely dissemination of accurate severe weather forecasts and warnings should be considered at the national level. It was recommended that PMD

資料 4-2-4

			and data transfer equipment).			should work together with other relevant stakeholders, such as the media, for dissemination of weather information, forecast and warning.
1-3	NOAA HRPT System	1	Direct Receiving System of NOAA Polar Orbit Meteorological Satellite.	Monitoring of dense fog, sea surface temperature, soil moisture, outgoing long radiation (OLR), snow cover, NDVI, land use products and global precipitation estimates from Polar Orbit Meteorological Satellite.	Include	It was agreed not to prioritize the NOAA HRPT System in terms of its urgency, with a recognition that the system will be of benefit to PMD. JICA noted that equivalent data could be obtained via internet, while PMD insisted that NOAA system is essential for their operational activity.
1-4	GTS Message Switch System	1	Replacement of the existing GTS Message Switching System at Karachi to a New GTS Message Switching System to be installed in PMD Islamabad.	The New GTS Message Switching System to be installed in PMD Islamabad for switching over the existing GTS Message Switching System in Karachi.	Include	It was agreed to include GTS message switch system.
1-5	Meteorological Data Trunk Communication System including Network Management System (VPN)	8	Communication Network for the data exchange among PMD offices, and publication and dissemination of weather forecasts and warnings to the government organizations related to disaster management. Network Management System for the Meteorological Data Trunk Communication System (VPN).	Designed to reduce risks from a cyber-assault etc. utilizing VPN (virtual private network) technology. For stable data exchange, publication and dissemination, even when the internet situation of PMD HP is crowded at the time of a heavy rain and a flood, etc. For stable communication traffic on the data trunk communication system with network management.	Include	It was agreed to include VPN. It was also agreed that all VPN should be installed where Japanese experts have access, by following security measures for regulation of the Japanese side.
1-6	Lightning Protection for SMRFC SMRFC Power Supply System - Power Backup System (UPS) - Isolation Transformer for the	1	Same as description of the Component.	For the protection of equipment and systems for SMRFC from lightning and surge and provision of stable power.	Include	It was agreed to include Lightning Protection and Power Supply System.

	Equipment - Isolation Transformer for the Building Facility - Automatic Voltage Regulator Engine Generator					
1-7	Necessary Spare Parts and Test Equipment for SMRFC	1	Spare parts and test instruments required for the equipment and systems for SMRFC supplied under the Project.	For maintenance of the equipment and systems for SMRFC supplied under the Project.	Include	It was agreed to include necessary spare parts and test equipment in relation to equipment agreed in 1-1.
2	Meteorological Radar					
2-1	Meteorological Radar - Meteorological Radar System - Meteorological Radar Data Display System - Necessary Spare Parts and Test Equipment for Meteorological Radar Construction of Radar Tower Building including Power Supply System mentioned below: - Power Backup System (UPS) - Isolation Transformer for the Equipment - Isolation Transformer for the Building Facility - Automatic Voltage Regulator Engine Generator	1	Same as description of the Component.	For continued radar observation. For stable and highly accurate radar observation.	Include	It was agreed to include Meteorological Radar (S-band radar). It was also agreed to consider installing one Radar Display System in the New Benazir Bhutto International Airport (NBBIA). In case NBBIA is not completed till the installation of Radar System, the Radar Display System was agreed to be installed in the MET Office in the existing Islamabad International Airport, and PMD will shift it to its new setup within their own resources.
2-2	Meteorological Radar Data Composite Picture System Existing Meteorological Radar 8 bit Modification System	1	The equipment to describe and display the Radar Composite Pictures among newly established Islamabad radar data and other existing radar data. Data modification system to convert the existing radar data into 8 bit data.	In order to obtain highly accurate rainfall intensity and to detect accurate weather situation by utilizing radar composite pictures.	Omit	It was agreed that since other radar systems are not digitalized, it is not functional to utilize this system for the time being.

3 Upper-air Observation System						
3-1	Upper-air Observation System (Wind Profiler) with Meteorological Data Satellite Communication System (VSAT)	5	The equipment for recording upper-air meteorological parameter.	Currently PMD cannot carry out periodical upper air observation using radio sonde due to lack of the financial resources. With the help of 5 radio sonde stations, the upper air data will be produced and will be consumed by the local forecasting system. In addition, the upper air data will be shared with the Global Communities.	Include	It was agreed to provide 2 radio wave wind profiling systems (wind profiler) at Islamabad and Multan for upper air observation. PMD committed to share all data obtained from the wind profilers via GTS. PMD requested Nawab Shah to be considered as the third site if budget permits.
4 Mobile-type Micro Weather Radar System						
4-1	Mobile-type Micro Weather Radar System with Power Supply Apparatus	1	The required mobile radar system (X band) enables PMD to monitor severe weather events (small and local scale phenomena) in the disaster prone areas in Pakistan.	The radar system will be moved to the vicinity of heavy rainfall to monitor the event continuously conveying the information to main forecasting centre. Based upon the conditions, the early warning will be issued to save the lives of the people living in vulnerable areas.	Omit	Both sides agreed that this item is utilized as research purpose and thus not suitable to the Project at this stage.



Annex-2 Final layout with priority and site

No.	Component	Q'ty	Priority	Site
1	<i>SMRFC (Specialized Medium Range Forecasting Centre)</i>			
1-1 & 1-7	Computing system and spare parts for operation/development of weather products utilizing the existing global model outputs	1	A	Pakistan Meteorological Department, Headquarters Office, Islamabad
1-3	NOAA HRPT System	1	B	Pakistan Meteorological Department, Headquarters Office, Islamabad
1-4	GTS Message Switch System	1	A	Pakistan Meteorological Department, Headquarters Office, Islamabad
1-5	Meteorological Data Trunk Communication System including Network Management System (VPN)	6	A	Islamabad Lahore (2) Multan Karachi Gilgit
1-6	Lightning Protection for SMRFC SMRFC Power Supply System - Power Backup System - Isolation Transformer for the Equipment - Isolation Transformer for the Building Facility - Automatic Voltage Regulator Engine Generator	1	A	Pakistan Meteorological Department, Headquarters Office, Islamabad
2	<i>Meteorological Radar</i>			
2-1	Meteorological Radar - Meteorological Radar System - Meteorological Radar Data Display System - Necessary Spare Parts and Test Equipment for Meteorological Radar Construction of Radar Tower Building including Power Supply System mentioned below: - Power Backup System - Isolation Transformer for the Equipment - Isolation Transformer for the Building Facility - Automatic Voltage Regulator Engine Generator	1	A	Pakistan Meteorological Department, Headquarters Office, Islamabad, including one Radar Display System in the New Benazir Bhutto International Airport (NBBIA). In case NBBIA is not completed till the installation of Radar System, the Radar Display System was agreed to be installed in the MET Office in the existing Islamabad International Airport, and PMD will shift it to its new setup within their own resources.
3	<i>Upper-air Observation System</i>			
3-1	Upper-air Observation System (Wind Profiler)	2 (3)	A A B	Islamabad Multan (Nawab Shah)

MINUTES OF DISCUSSIONS
OF
THE PREPARATORY SURVEY (FIELD SURVEY-3)
ON
THE PROJECT FOR
ESTABLISHMENT OF SPECIALIZED MEDIUM RANGE WEATHER
FORECASTING CENTER (SMRFC) AND STRENGTHENING OF WEATHER
FORECASTING SYSTEM
IN
THE ISLAMIC REPUBLIC OF PAKISTAN
(Explanation of Draft Preparatory Survey Report)

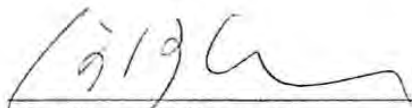
In response to a request from the Islamic Republic of Pakistan (hereinafter referred to as "Pakistan"), the Government of Japan decided to conduct the Preparatory Survey (hereinafter referred to as "the Survey") on "the Project for Establishment of Specialized Medium Range Weather Forecasting Center (SMRFC) and Strengthening of Weather Forecasting System in the Islamic Republic of Pakistan" (hereinafter referred to as "the Project") and entrusted the survey to Japan International Cooperation Agency (hereinafter referred to as "JICA"). JICA sent the Preparatory Survey Team in September and November 2012. The said Preparatory Survey Team held discussions with the officials concerned of the Government of Pakistan (hereinafter referred to as "GoP") and Pakistan Meteorological Department (hereinafter referred to as "PMD") and conducted a field survey at the survey area. In the course of discussions and field survey, both parties confirmed the main items and signed on the Minutes of Discussions on 26th September, 2012 and 22nd November, 2012.

According to the Minutes of Discussions above, JICA finally prepared the Draft Preparatory Survey Report. In order to explain and consult with PMD on the components of the draft report, JICA has sent the Draft Preparatory Survey Report Explanation Team (hereinafter referred to as "the Team"), headed by Mr. Mitsuyoshi Kawasaki, Chief Representative, JICA Pakistan Office from 29th June to 7th July, 2013.

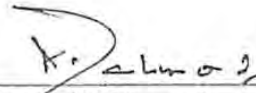
As a result of the discussions, both parties confirmed the items described on the attached sheets.

Islamabad, 5th July, 2013


The block contains four handwritten signatures. The first signature is at the top left, followed by a second signature below it. To the right of these two, there are two more signatures, one smaller and one larger, positioned horizontally.



Mr. Mitsuyoshi Kawasaki
Leader
Chief Representative
JICA Pakistan Office



Mr. Arif Mahmood
Director General
Pakistan Meteorological Department
Aviation Division
Government of Pakistan



Mr. Zafar Nasrullah Khan
Joint Secretary (ADB/Japan)
Economic Affairs Division
Government of Pakistan



Mr. Idrees Mahsud
Member Disaster Risk Reduction
National Disaster Management Authority
Climate Change Division
Government of Pakistan

ATTACHMENT


1. Components of the Draft Preparatory Survey Report

PMD agreed and accepted in principle the components of the Draft Preparatory Survey Report explained by the Team. The components of the Project are shown in Annex-1. JICA will finalize the Final Report as per comments of PMD.

2. Tentative Schedule of the Project

2-1 The Team explained the Project Implementation Schedule (Detailed Design & Tendering Procedures, Construction of Islamabad Meteorological Radar Tower Building, Equipment Procurement and Soft Components) starting expectedly from June, 2014 (after signing of the Grant Agreement) to August, 2017 for approximately 39 months as shown in Annex 2 and PMD agreed on it.

2-2 Both sides confirmed the timetable of the following key actions for the Project;

- 1) Initial Environmental Examination (IEE) on the Project shall be completed by the beginning of November, 2013.
- 2) In order to submit the Project to the Japanese Cabinet, the PC-I (Revised) shall be approved by Central Development Working Party (CDWP)/ Executive Committee of the National Economic Council (ECNEC) by the beginning of November, 2013.
- 3) The required procedures for the Building Construction Permit to be issued by the Capital Development Authority (CDA) shall be commenced immediately after signing of the Exchange of Notes of the Project and shall be completed before the commencement of the tendering procedures (by the end of September, 2014).
- 4) The required procedures for the Frequency Permit for Meteorological Radar System and Wind Profiler Systems to be issued by the Pakistan Telecommunication Authority (PTA)/Frequency Allocation Board (FAB) shall be commenced immediately after signing of the Exchange of Notes of the Project and shall be completed before the commencement of the tendering procedures (by the end of September, 2014).
- 5) In order to secure and allocate ample space for the construction of a new Radar Tower Building, demolition of the existing residential quarter in the premises of PMD Islamabad Head Office shall be completed by the end of September, 2014. 
- 6) PC-IV shall be submitted right after the completion of the Project.



1



3. Confidentiality of the Project

3-1 Detailed Specification

Both sides confirmed all the information related to the Project including technical specifications, drawings and other technical information shall not be released to any other party(ies) before the signing of all the Contract(s) for the Project.

3-2 Project Cost Estimate

The Team explained the estimated project cost to be borne by the Government of Japan as attached in Annex-3

PMD agreed to allocate necessary budget in order to bear requested undertakings as shown in Annex-3 and Annex-4. The Team also explained that these cost estimations are subject to change since they are provisional. In order to conduct re-examination of these cost estimations, the team will be dispatched to Pakistan around October 2013 as the Field Survey-4.

Both sides agreed that the Project Cost Estimate should never be duplicated in any form nor disclosed to any other part(ies) before the signing of all the Contract(s) for the Project. This confidentiality of the estimated project cost is necessary to ensure fairness of the tender procedure.

4. Actions to be taken by GoP/PMD

Both sides confirmed that GoP/PMD would carry out the items indicated in the table in Annex-5 for the implementation of the Project in accordance with the Project Implementation Schedule.

5. Gilgit Meteorological Office

The Team explained that the Team could not visit one of the site of the Project i.e. Gilgit Meteorological Office, due to the restriction of traveling to Gilgit-Baltistan as prescribed in JICA and the Government of Japan regulation. PMD agreed to conduct the site survey for the proposed equipment installation by August 2013 in accordance with the technical instructions and the drawings attached in the Draft Preparatory Survey Report provided by the Team. Both sides also agreed that in case Japanese consultants and contractors are still restricted to travel to Gilgit based on the above restriction during the implementation of the Project, Japanese Consultants will provide the required technical guidance to PMD for proper installation of the equipment.



6. Existing Facilities in PMD Islamabad

PMD agreed to secure ample and strategically located space/s at the existing facilities for the installation of the equipment to be supplied under the Project such as PC terminals & peripherals, solar panels, furniture, etc. indicated in the drawings attached in the Draft Preparatory Survey Report provided by the Team.

7. High-speed Internet Environment

For the establishment of a Virtual Private Network (VPN), PMD agreed to make reliable & high-speed Internet connection at the Specialized Medium Range Forecasting Center (SMRFC) Building: at least 3Mbps and at each Project site: at least 1Mbps.

8. New Organization chart of PMD

PMD informed that it now lies under the Aviation Division of Cabinet Secretariat instead of the Ministry of Defence as shown in Annex-6.

9. Reallocation of the existing data communication antennae at the roof top of the existing Islamabad Radar Tower Building

PMD agreed to reallocate the existing data communication antennae installed under the Lai Nullah Flood Forecasting and Warning System Project to maintain appropriate data communication according to the Consultant's assistance during the construction work of a new Radar Tower Building in PMD Islamabad under the Project.

- Annex-1: Components of the Project
- Annex-2: Tentative Implementation Schedule
- Annex-3: Project Cost Estimation
- Annex-4: Project Annual Recurrent Cost to be borne by GoP/PMD
- Annex-5: Major Undertakings to be taken by GoP/PMD
- Annex-6: New Organization chart of PMD

Annex-1: Components of the Project

Component	Islamabad		Lahore		Karachi	Multan	Gilgit
	PMD Islamabad Head Office	Meteorological Office in New Benazir Bhutto International Airport (NBBIA)	PMD Lahore Regional Meteorological Center	PMD Lahore Flood Forecasting Division	PMD Karachi Tropical Cyclone Warning Center	PMD Multan Meteorological Office	PMD Gilgit Meteorological Office
I Procurement and Installation of Equipment							
SMRFC (Specialized Medium Range Forecasting Center) Weather Forecasting & Development System (including Lightning System, Power Back-up System, Isolation Transformer, Auto Voltage Regulator, Power Supply Capacitor and Test Instruments, Spare Parts and Ancillary Facility)	1	-	-	-	-	-	-
Meteorological Data Trunk Communication System	1	-	1	1	1	1	1
GTS Message Switch System	1	-	-	-	-	-	-
S-Band Doppler Pulse Compression Solid State Radar System (including Power Back-up System, Isolation Transformer, Auto Voltage regulator, Power Supply Capacitor and Test Instruments and Spare Parts)	1	-	-	-	-	-	-
Meteorological Rader Data Display System	2	1	-	-	-	-	-
Wind Profiler System (including Ancillary Facility)	1	-	-	-	-	1	-
II Construction of Radar Tower Building							
Construction of Radar Tower Building	1	-	-	-	-	-	-
III Soft components							
1. Meteorological Doppler Rader Inspection, Adjustment, Minor Fault Finding, Remedy and Recovery 2. Meteorological Doppler Rader Operation and Maintenance utilizing the System Manual and Maintenance & Management Record Book 3. Meteorological Rader Observation in accordance with the Sequence & Schedule for intensity Mode and Doppler Mode 4. Preparation of Weather Guidance							

Annex-2 Tentative Implementation Schedule

The Project for Establishment of Specialized Medium Range Weather Forecasting Center and Strengthening of Weather Forecasting System

	2014				2015				2016				2017															
	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8
E.N, G.A and Consulting Agreement																												
Exchange of Notes (E.N)	■																											
Grant Agreement (G.A)		■																										
Consulting Agreement			■																									
Detailed Design & Tendering Procedures																												
Detailed Design			■	■																								
Internal Work in Japan				■	■	■	■																					
Tendering Procedures					■	■	■	■	■																			
Construction of Specialized Meteorological Radar Tower Building																												
Preparation Work								■	■																			
Temporary/Filing Earth Works									■	■	■	■	■															
Structure Work										■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Finishing Works																						■	■	■	■	■	■	■
Building Equipment																												
External Work																												■
Equipment Procurement																												
Equipment Manufacturing																												
Equipment Transportation																												
Equipment Installation/Adjustment																												
Soft Component																												
Soft Component (Activity No. 1)																												■
Soft Component (Activity No. 2)																												■
Soft Component (Activity No. 3)																												■
Soft Component (Activity No. 4)																												■

資料 4-3-7

A
07/25

A K

Annex-3: Project Cost Estimation

Total Project Cost:

(Project Cost to be borne by Japan's Grant Aid) + (Project Capital Cost already incurred by GoP/PMD) + (Project Capital Cost to be borne by GoP/PMD)=Approx. 2,502 Million JP Yen

Annex-3-1: Project Cost to be borne by Japan's Grant Aid

Approx. 2,441 Million JP Yen

Category	Cost Million JPY
Equipment Procurement, Installation and Trainings Cost	1,532
Construction Cost	767
Consultant's Supervision Fee (including Soft Component)	142
Total	2,441

Annex-3-2: Project Capital Cost already incurred by GoP/PMD

Approx. 27,649,000 PKR (approx. 27 Million JP Yen)

No.	Items	Capital Cost (PKR)
1	To construct 2-Storey Building (SMRFC: Specialized Medium Range Forecasting Center)	15,938,000
2	To procure PC terminals and peripherals for SMRFC	7,687,000
3	To shoulder the miscellaneous cost (electricity, petrol, etc.)	1,613,000
4	To shoulder the manpower cost (staff salary, allowance, etc.)	881,000
5	To procure a vehicle	1,400,000
6	To procure library book	40,000
7	To shoulder other items	90,000
	Total	27,649,000

Annex-3-3: Project Capital Cost to be borne by GoP/PMD

Approx. 33,883,000 PKR (approx. 34 Million JP Yen)

No.	Items	Capital Cost (PKR)
1.	To pay bank commission for issuance of the Authorization to Pay (A/P) and FED etc. to the Consultant and the Contractor.	10,750,000
2.	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) for the Islamabad Radar Tower Building in the PMD Islamabad Head Office.	300,000
3.	To install the required step-down transformers as well as service entrance connections for the commercial power supply at the PMD Islamabad Head Office for the Radar Tower Building.	1,800,000
4.	To provide water supply for the Radar Tower Building in the PMD Islamabad Head Office.	100,000
5.	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) for the Specialized Medium Range Forecasting Center (SMRFC) in the PMD Islamabad Head Office.	300,000
6.	To provide reliable and high-speed Internet environment at the Specialized Medium Range Forecasting Center (SMRFC) and at each Project site for the establishment of a Virtual Private Network (VPN).	1,000,000
7.	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply for the wind profiler system in the PMD Islamabad Head Office.	300,000
8.	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply for the wind profiler system in the PMD Multan Meteorological Office.	300,000

9.	To shoulder the dispatching cost of the trainees to the training sites, such as daily allowance, transportation fee, accommodation, etc.	500,000
10.	To shoulder the miscellaneous expenditures such as library books, petrol, telephone, application fee (obtaining the required frequencies for the meteorological radar system & the wind profiler systems, and the construction permissions of a new Radar Tower Building).	2,500,000
11.	To shoulder manpower cost (staff salary, allowance, etc.)	16,033,000
Total		33,883,000

Applied Exchange Rate: US\$ 1 = 80.18 JP Yen, 1 PKR= 0.989 JP Yen as of December 2012

(S)

(D)

Ar

JTS

Annex-4 Project Annual Recurrent Cost to be borne by GoP/PMD

Approx. 17,335,000 PKR (approx. 17 Million JP Yen)

Sr. No	Description	Rs. In Million		
		Local	FEC	Total
1	Pay & Allowance of Staff	10,700	0,000	10,700
2	Electricity Charges	1,950	0,000	1,950
3	Water and Gas Charges	0,400	0,000	0,400
4	Telephone, Fax, Leased Lines, Internet Connections	1,500	0,000	1,500
5	Spare Parts, Consumables and Special Maintenance of the Systems	0,900	0,000	0,900
6	Radar Radome caulking repair and exterminating vermination for the facilities	0,450	0,000	0,450
7	Consumables, Stationary, etc.	0,100	0,000	0,100
8	Books & Journals	0,035	0,000	0,035
9	Contingencies	0,300	0,000	0,300
10	P.O.L. Charges (for engine generators, vehicles, etc.)	1,000	0,000	1,000
	Total	17,335	0,000	17,335

(1)

Ar

PTW

✓

Annex5: Major Undertakings to be taken by GoP/PMD

No	Items
General Items	
1	To undertake all necessary institutional and juridical procedures in Pakistan.
2	To undertake Initial Environmental Examination (IEE) procedures in Pakistan.
3	To handle duty (Tax) exemption procedures and to take necessary measures as well as provide requisite legal and/or administrative documentations for customs clearance to customs broker/forwarder to be employed by Contractor at the port of disembarkation for the materials and equipment imported for the Project.
4	To provide necessary working spaces with Internet Connection at the PMD Islamabad Head Office for the Consultant and the Contractor for the implementation of the Project.
5	To accord Japanese and other foreign nationals including their dependent/s (if any), whose services may be required in connection with the supply of products and services under the signed contracts, such facilities as may be necessary for their entry into Pakistan and stay therein for the smooth and uninterrupted performance of their work (i.e. to secure the appropriate Visa including its extension/s required by the recipient country in connection thereof).
6	To exempt Japanese and other foreign nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the signed contracts.
7	To pay bank commission for the issuance of the Authorization to Pay (A/P) and amendments of A/P, if required, for the Consultant and the Contractor.
8	To bear all the expenses, other than those to be borne by the Japan's Grant Aid, necessary for the implementation of the Project
9	To ensure the security of the whole Project site/s and of the Japanese and other foreign nationals assigned to the Project prior to the commencement of and during Project implementation.
For the Construction of the Radar Tower Building	
10	To clear, level and reclaim the land prior to the commencement of construction work.
11	To secure sufficient spaces at the respective Project sites for temporary facilities such as a contractor's office, workshop, building materials storage, etc. for the construction work.
12	To demolish the existing building in premises of the PMD Islamabad Head Office in order to secure and allocate ample space for the construction of a new Radar Tower Building
13	To obtain necessary permissions for the construction of the Radar Tower Building in the PMD Islamabad Head Office.
14	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) for the Radar Tower Building in the PMD Islamabad Head Office.
15	To install the required step-down transformers as well as service entrance connections for the commercial power supply at the PMD Islamabad Head Office for the Radar Tower Building.
16	To provide incidental facilities, such as water supply, telephone line and internet provision, for the Radar Tower Building in the PMD Islamabad Head Office.
17	To provide temporary facilities for the availability or accessibility of electricity, water, etc. for the construction work.
18	To undertake incidental outdoor works such as gardening, fencing, constructing gates, boundary walls and exterior lighting in and around the sites, if necessary.
19	To shoulder dispatching cost of the trainees to the training sites, such as daily allowance,

(Handwritten mark)

(Handwritten mark)

(Handwritten mark)

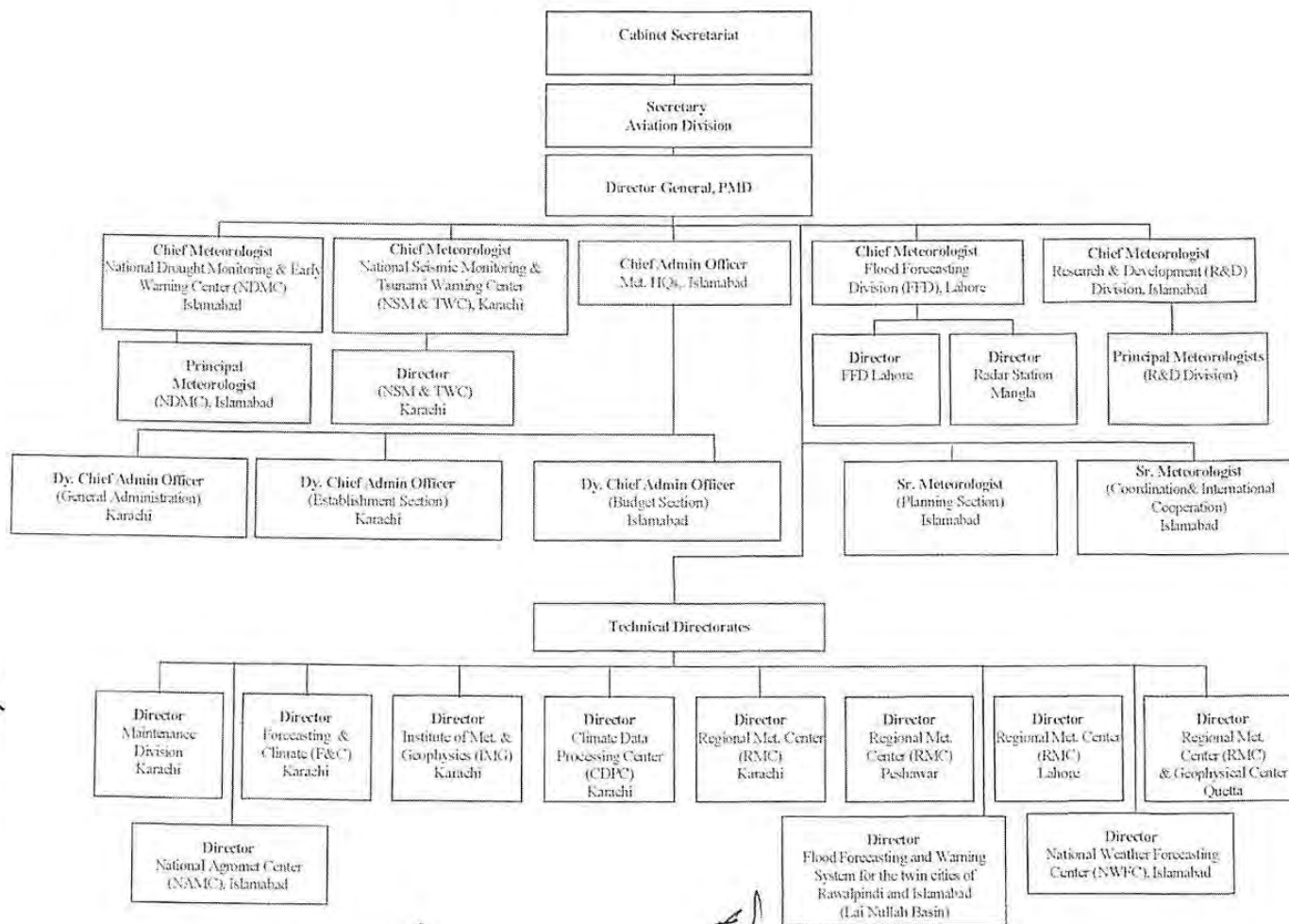
	transportation fee, accommodation, if any.
For Installation Work of the Equipment	
20	To remove and relocate the existing facilities, if available, for the installation of the equipment, if necessary.
21	To provide and allocate secure temporary storage area/room for the materials, tools and equipment needed during the installation process.
22	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) for the Specialized Medium Range Forecasting Center (SMRFC) in the PMD Islamabad Head Office.
23	To provide reliable and high-speed Internet environment at the Specialized Medium Range Forecasting Center (SMRFC) and at each Project site for the establishment of a Virtual Private Network (VPN).
24	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply for the wind profiler system in the PMD Islamabad Head Office and the PMD Multan Meteorological Office.
25	To obtain the required frequency(s) for the meteorological radar system and the wind profiler system(s).
26	To set up new assigned IP addresses under the Project in the existing computing equipment in the Specialized Medium Range Forecasting Center (SMRFC).
27	To migrate the PMD's own data to the computing equipment to be procured under the Project, if necessary.
28	To install software(s) procured/to be procured by the PMD on the computing equipment to be procured under the Project, if required.
29	To secure ample and strategically located space/s at the existing facilities for the installation of the equipment (PC terminals and peripherals) to be supplied under the Project.
30	To shift and adjust the existing computing equipment, if required.
31	To shoulder dispatching cost of the trainees to the training sites, such as daily allowance, transportation fee, accommodation, if any.
After the completion of the Project	
32	To renovate the existing gates, boundary walls and exterior lighting in and around the sites, if required.
33	To assign staff necessary for the smooth operation and maintenance of the Equipment.
34	To procure the required spare parts and consumables for the smooth operation and maintenance of the Equipment.
35	To provide adequate maintenance of the Radar Tower Building constructed under the Project, so that they can function effectively.
36	To operate and maintain, and properly and effectively utilize the facilities constructed and the Equipment procured under the Project.
37	To allocate the necessary budget and personnel for appropriate meteorological radar observation and forecasting works.
38	To periodically update all the operation/antivirus/application software.

Ø

A

PTA

Annex-6: New Organization chart of PMD



資料 4-3-13

Handwritten initials/signature

Handwritten mark

Handwritten mark

資料 5. ソフトコンポーネント計画書

ソフトコンポーネント計画書

(1) ソフトコンポーネントを計画する背景

「パ」国は、地震、洪水、土砂災害、サイクロン、旱魃等様々な自然災害に見舞われる災害多発国である。「パ」国における自然災害は、特にモンスーン期に多く発生する。これは熱帯収束帯の積乱雲群や熱帯性低気圧が、集中的な豪雨、降雹、強風等の現象を引き起こしているためである。毎年のように起こる災害は、洪水や田畑の冠水、家屋の倒壊、送電線の切断、土砂崩れ、道路の斜面崩壊等の被害ばかりでなく、尊い人命を多数奪っており、国家経済にも影響を及ぼしている。自然災害は、人命や財産の損失及び社会経済活動の停滞を生み出すだけでなく、自然災害に対して極めて脆弱である貧困層への影響が極めて大きく、「パ」国政府の開発戦略の一つである貧困削減への弊害ともなっている。また地球規模の気候変動が、中長期的に自然災害の頻度及び規模を増大させる可能性があり、特に自然災害多発国である「パ」国への影響は大きく現れると想定されることから、気象災害に対する早期警戒を含む災害管理体制の整備が喫緊の課題となっている。本プロジェクトにおいて、気象レーダーシステムの更新、高層気象観測システム、気象予報・開発システム、気象データ用基幹通信システム及び GTS メッセージスイッチシステムの整備を行い、特別中期気象予報センター (SMRFC) を PMD イスラマバード本局に構築する。これらの我が国の支援により、PMD の 1) 気象観測能力の強化、2) 既設の 24~48 時間以内の短期予報の更なる精度向上、3) 48 時間を超える中期予報 (3-10 日後まで) を作成することができる能力の付帯、4) 予警報の迅速な発信能力の強化、を行い自然災害による被害の軽減に寄与することを本プロジェクトの目標としている。

既設イスラマバード気象レーダーシステムは、アナログ気象レーダーシステムであるため、PMD イスラマバード技術職員はコンピューターを含むデジタル機材には習熟しているものの、本プロジェクトで導入予定のデジタル固体化電力増幅式気象ドップラーレーダーシステムの運用維持管理の経験を有していない。また、特別中期気象予報センター (SMRFC) に導入される気象予報・開発システム (気象予報ガイダンス) により全球数値予報モデルのプロダクトを活用した気象予報ガイダンス (雨量、気温、湿度、風速) を実施するための経験と技術も不足している。そのため、導入される気象レーダーシステムの円滑な運用維持管理及び「パ」国民への気象予報ガイダンスによる精度の高い中期気象予報の提供、そしてプロジェクト成果の持続性を最低限確保するため、本プロジェクト実施中において、本計画書に記載したソフトコンポーネントを投入することが必要であると判断した。

(2) ソフトコンポーネントの目標

以下の4項目をソフトコンポーネントの目標とする。

- PMD 独自による点検、調整、軽微な故障の探究・処置・復旧（スペアパーツや消耗品の交換等）及び重大な故障発生時の適切な対応（コンサルタント及び製造メーカーへの情報伝達、技術アドバイス受領等）が実施される。
- 気象ドップラーレーダーシステムマニュアル概要及びレーダーシステム保守管理台帳を活用した、迅速且つ適切な気象レーダー運用・管理が実施される。
- 気象現象を的確に把握し、気象レーダー観測データを予報業務に活用するため、雨量強度及びドップラー速度観測のシーケンス・スケジュールに従った気象レーダー観測が実施される。
- 予報要素の気象学的特性を考慮し、要素別ガイダンスの作成が実施される。

(3) ソフトコンポーネントの成果

ソフトコンポーネントの成果は下表の通りである。

表 ソフトコンポーネントの成果

No.	活動（技術移転）項目	成果
1	気象ドップラーレーダー点検、調整、軽微な故障の探究・処置・復旧（スペアパーツや消耗品の交換等）及び重大な故障発生時の対応	PMD 独自による点検、調整、軽微な故障の探究・処理・復旧（a. 測定器類を用いた定期保守点検、b. 予備品の実機への組入れ（交換）及び動作確認、c. 故障探求・処置（スペアパーツや消耗品の交換等）・復旧確認作業及び重大な故障発生時の対応（コンサルタント及び製造メーカーへの情報伝達、技術アドバイス受領等）を PMD 技術者が習得する
2	気象ドップラーレーダーシステムマニュアル概要及びレーダーシステム保守管理台帳を活用した迅速且つ適切な気象レーダー運用・管理	気象ドップラーレーダーシステムマニュアル概要及びレーダーシステム保守管理台帳を活用した、迅速且つ適切な運用・管理技術を PMD 技術者が習得する
3	雨量強度及びドップラー速度観測のシーケンス・スケジュールに従った気象レーダー観測	気象現象を的確に把握し、気象レーダー観測データを予報業務に活用するため、雨量強度及びドップラー速度観測のシーケンス・スケジュールに従った気象レーダー観測が開始される
4	観測値と数値予報結果を用いた気象予報ガイダンスの作成	予報要素の気象学的特性を考慮し、要素別ガイダンスの作成技術を PMD 技術者が習得する

(4) 成果達成度の確認方法

ソフトコンポーネントの成果達成度の確認方法は以下の通りである。

表 ソフトコンポーネントの成果達成度と測定方法

No.	活動項目	成果指標	確認方法
1	気象ドップラーレーダーの点検、調整、軽微な故障の探究・処置・復旧及び重大な故障発生時の対応	PMD 独自による点検、調整、軽微な故障の探究・処置・復旧及び重大な故障発生時の適切な対応が実施される	1) 測定器類を用いた定期保守点検、2) 予備品の実機への組入れ（交換）及び動作確認、3) 軽微な故障の探求・処置・復旧確認作業、4) 重大な故障発生時の対応に関する習熟度を確認する

パキスタン・イスラム共和国
 中期気象予報センター設立及び気象予報システム
 強化計画準備調査

2	気象ドップラーレーダーシステムマニュアル概要及びレーダーシステム保守管理台帳を活用した迅速且つ適切な気象レーダー運用・管理	気象ドップラーレーダーシステムマニュアル概要及びレーダーシステム保守管理台帳を活用した、迅速且つ適切な運用・管理が実施される	気象ドップラーレーダーシステムマニュアル概要の利用頻度及びレーダーシステム保守管理台帳の記載内容（各日、週、月）を確認する
3	雨量強度及びドップラー速度観測のシークエンス・スケジュールに従った気象レーダー観測	気象現象を的確に把握し、気象レーダー観測データを予報業務に活用するため、雨量強度及びドップラー速度観測のシークエンス・スケジュールに従った気象レーダー観測が実施される	雨量強度及びドップラー速度観測データより、観測シークエンス・スケジュールに沿った気象レーダー観測の実施を確認する
4	観測値と数値予報結果を用いた気象予報ガイドランスの作成	予報要素の気象学的特性を考慮し、要素別ガイドランスの作成が実施される。	ガイドランス式の作成により、数値予報結果の系統的誤差が除去され、予測精度の向上（RMSEの減少等）を確認する。

(5) ソフトコンポーネントの活動（投入計画）

ソフトコンポーネントの活動（投入計画）は以下の通りである。

表 ソフトコンポーネントの活動(投入計画)

成果	必要とされる技術・業種	現況の技術と必要とされる技術レベル	ターゲットグループ	実施方法	実施リソース	成果品
成果1：気象ドップラーレーダー点検、調整、軽微な故障の探究・処置・復旧及び重大な故障発生時の対応	気象レーダー調整・故障探求を行える技術者を有する技術者	PMDには、デジタル気象レーダーシステムの調整・故障探求を実施した経験を有する技術者がいないことから、独自に調整・故障探求が実施できるレベルの技術が必要。	次表に示した通り	測定器類を用いた定期保守点検研修 納入された予備品の実機への組入れ（交換）及び動作確認研修 故障状態を想定し、故障探求・処置・復旧確認研修 重大な故障発生時の対応研修 実施手順書の作成	気象レーダー調整・故障探求技術担当コンサルタント：1.17人月（現地技術移転期間：35日） 直接支援型	測定器類を用いた定期保守点検実施手順書 予備品の実機への組入れ（交換）及び動作確認手順書 故障探求・処置・復旧確認手順書 重大な故障発生時の対応手順書
成果2：気象ドップラーレーダーシステムマニュアル概要及びレーダーシステム保守管理台帳作成	気象レーダー運用・管理を行える技術者を有する技術者	PMDには、デジタル気象レーダーシステムの運用・管理を行った経験を有する技術者がいないことから、気象ドップラーレーダーシステムマニュアル概要及びレーダーシステム保守管理台帳に沿った運用・管理が実施できるレベルの技術が必要。	次表に示した通り	PMD 技術者との技術ディスカッション 気象ドップラーレーダーシステムマニュアルから最重要部分の選出 気象ドップラーレーダーシステムマニュアル概要の作成 レーダーシステム保守管理台帳の作成 PMD 技術者による気象ドップラーレーダーシステムマニュアル概要及びレーダーシステム保守管理台帳の使用	気象レーダー運用・管理技術担当コンサルタント：1.17人月（現地技術移転期間：35日） 直接支援型	気象ドップラーレーダーシステムマニュアル概要 レーダーシステム保守管理台帳・システム障害/トラブルの発生日時 システム障害/トラブルの原因（異音、部分的な劣化、その他） 実施した復旧手順 交換した部品の名称及び数量 復旧/トラブルシューティングを行ったエンジニアの氏名

パキスタン・イスラム共和国
 中期気象予報センター設立及び気象予報システム
 強化計画準備調査

<p>成果3：雨量強度及びドップラー速度観測のシーケンス・スケジュール作成</p>	<p>気象レーダー観測データよりクラッター及びブラインドエリアの特定が行え且つパキスタンの気象現象に即した観測のシーケンス・スケジュールの作成を行える技術者を有する技術者</p>	<p>PMDには、デジタル気象ドップラーレーダーシステムによりCAPPI観測を実施した経験を有する技術者がいないことから、雨量強度及びドップラー速度観測のシーケンス・スケジュールに関する技術を有していない。そのためレーダー観測シーケンス・スケジュールの重要性を認識し、作成ができる技術が必要。</p>	<p>次表に示した通り</p>	<p>PMD 予報官及び技術者との技術ディスカッション及び座学 気象ドップラーレーダーシステムのクラッター及び各アンテナ仰角時（0.5度間隔、1～3度間）のブラインドエリアの特定 各アンテナ仰角時（0.5度間隔、1～3度間）のブラインドエリア図の作成 雨量強度及びドップラー速度観測のシーケンス・スケジュールの作成 雨量強度及びドップラー速度観測のシーケンス・スケジュールに従った気象レーダー観測の実施</p>	<p>気象レーダー観測技術担当コンサルタント：1.0人月（現地技術移転期間：30日） 直接支援型</p>	<p>雨量強度及びドップラー速度観測のシーケンス・スケジュール</p>
<p>成果4：気象予報ガイダンスの作成</p>	<p>数値予報および気象予報ガイダンス作成技術を有する技術者</p>	<p>現地気象観測値、数値予報データの統計解析プログラムの作成・実行が出来ること。 Linuxの基本的な操作が出来ること。</p>	<p>次表に示した通り</p>	<p>予測要素について、気象特性理解のための解析およびディスカッション ガイダンスについての座学 ガイダンスプログラムの作成（研修および実習） 試験的運用及び精度検証（実習およびディスカッション） 精度結果の検討とガイダンスのチューニングの必要性についての検討</p>	<p>ガイダンス技術担当コンサルタント：0.53人月（現地技術移転期間：16日） 直接支援型</p>	<p>ガイダンスプログラム、精度検証資料</p>

成果1及び2のターゲットグループ		成果3及び4のターゲットグループ	
	人数		人数
主任技師	1	気象予報センター職員	15
電子技師	1	数値予報局	5
電子技師補	1		
機械工	4		
電子及び機械技師補助	8		
専門工補助	2		
プログラム補助	1		

パキスタン・イスラム共和国
 中期気象予報センター設立及び気象予報システム
 強化計画準備調査

活動日程詳細計画は以下の通りである。

	活動 No. 1	活動 No. 2	活動 No. 3
日	気象ドップラーレーダー点検、調整、軽微な故障の探究・処置・復旧及び重大な故障発生時の対応	気象ドップラーレーダーシステムマニュアル概要及びレーダーシステム保守管理台帳作成	雨量強度及びドップラー速度観測のシークエンス・スケジュール
1	日本発-イスラマバード着	日本発-イスラマバード着	日本発-イスラマバード着
2	事前準備	事前準備	事前準備
3	気象レーダー塔施設において準備作業		PMD 予報官及び技術者との技術ディスカッション及び座学 気象ドップラーレーダーシステムのクラッター及び各アンテナ仰角時 (0.5 度間隔、1~3 度間) のブラインドエリアの特定
4	測定器類を用いた定期保守点検の実施研修及び実施手順書の作成	PMD 技術者との技術ディスカッション及び気象ドップラーレーダーシステムマニュアルから最重要部分の選出	
5			
6			
7			
8	土 (休日)	土 (休日)	土 (休日)
9	日 (休日)	日 (休日)	日 (休日)
10	実施手順書の作成	気象ドップラーレーダーシステムマニュアル概要 (案) の作成 レーダーシステム保守管理台帳 (案) の作成	各アンテナ仰角時 (0.5 度間隔、1~3 度間) のブラインドエリア図の作成 雨量強度及びドップラー速度観測のシークエンス・スケジュール (案) 作成 PMD 予報官及び技術者との技術ディスカッション
11	納入された予備品の実機への組入れ (交換) 及び動作確認研修及び実施手順書の作成		
12			
13			
14			
15	土 (休日)	土 (休日)	土 (休日)
16	日 (休日)	日 (休日)	日 (休日)
17	実施手順書の作成	気象ドップラーレーダーシステムマニュアル概要 (案) の作成	雨量強度及びドップラー速度観測のシークエンス・スケジュール (案) 見直し
18	故障状態を想定し、故障探求・処置・復旧確認研修及び実施手順書の作成	PMD 技術者による気象ドップラーレーダーシステムマニュアル概要 (案) 及びレーダーシステム保守管理台帳 (案) の使用	雨量強度及びドップラー速度観測のシークエンス・スケジュールに従った気象レーダー観測の実施
19			
20			
21			
22	土 (休日)	土 (休日)	土 (休日)
23	日 (休日)	日 (休日)	日 (休日)
24	実施手順書の作成	気象ドップラーレーダーシステムマニュアル概要 (案) 及びレーダーシステム保守管理台帳 (案) 見直し	雨量強度及びドップラー速度観測のシークエンス・スケジュールの完成
25	重大な故障発生時の対応研修	PMD 技術者による気象ドップラーレーダーシステムマニュアル概要及びレーダーシステム保守管理台帳の使用	完了報告書の作成 PMD との技術ディスカッション
26	PMD による研修復習		
27	実施手順書の作成		
28			
29	土 (休日)	土 (休日)	イスラマバード発
30	日 (休日)	日 (休日)	日本帰国
31	完了報告書の作成	完了報告書の作成	
32			
33	PMD との技術ディスカッション	PMD との技術ディスカッション	
34	イスラマバード発	イスラマバード発	
35	日本帰国	日本帰国	

	活動 No. 4
日	気象予報ガイドンスの作成
1	日本発-イスラマバード着
2	事前準備
3	現地気象データの特性調査
4	ガイドンス研修 (理論)
5	ガイドンス研修 (実習)
6	使用ガイドンスの選定
7	ガイドンス式の作成
8	土 (休日)
9	日 (休日)
10	ガイドンス式の適用計算
11	ガイドンス式の適用計算
12	精度検証および結果報告

13	完了報告書の作成
14	完了報告書の作成
15	イスラマバード発
16	日本帰国

(6) ソフトコンポーネントの実施リソースの調達方法

実施リソースは、本プロジェクトの機材調達に関わる本邦コンサルタントによる直接支援型とする。その理由は以下の通りである。

- 気象業務及び導入される気象レーダーシステムに関する高度な技術及び知識を有している人材が不可欠であること。
- 通常、上述のような技術や知識を豊富に有している人材は、気象コンサルティング業務を実際に行っている組織に在籍していること。
- 計画されている技術移転と同様の経験を有する人材が必要であること。

これより、本邦コンサルタントの直接支援型とする。

(7) ソフトコンポーネントの実施工程

プロジェクト全体工程及びソフトコンポーネント実施工程を以下に示した。ソフトコンポーネントは、気象レーダーシステムの据付が完了して、調整段階となる、本プロジェクトの完了時前に実施する計画としている。

表 ソフトコンポーネント実施工程表

	月	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32							
イスラマバード気象レーダー塔施設建設工事	計：17.0ヶ月																																							
工事準備	■																																							
仮設・枕・土工事		■																																						
躯体工事						■																																		
仕上工事											■																													
電気・空調・衛生設備工事					■																																			
外構工事																	■																							
機材調達	計：18.0ヶ月																																							
機材製作						■																																		
機材輸送																	■																							
機材据付／調整																			■																					
ソフトコンポーネント																																								
ソフトコンポーネント（活動 No.1）																																						1.17人月	■	
ソフトコンポーネント（活動 No.2）																																						1.17人月	■	
ソフトコンポーネント（活動 No.3）																																						1.00人月	■	
ソフトコンポーネント（活動 No.4）																																						0.53人月	■	

(8) ソフトコンポーネントの成果品

ソフトコンポーネントの成果品は以下の通り。

表 ソフトコンポーネントの成果品(アウトプット)

資料名		提出時期	ページ数
1)測定器類を用いた定期保守点検、2)予備品の実機への組入れ(交換)及び動作確認、3)故障探求・処置・復旧確認作業実施手順書、4)重大な故障発生時の対応手順書		技術移転実施後	20
気象ドップラーレーダーシステムマニュアル概要			30
レーダーシステム保守管理台帳			10
雨量強度及びドップラー速度観測のシーケンス・スケジュール			10
ガイダンスプログラム、精度検証資料			10
資料名	内容	提出時期	ページ数
ソフトコンポーネント実施完了報告書	<ul style="list-style-type: none"> ● 活動計画と実績 ● 計画した成果と成果の達成度 ● 成果の達成度に影響を与えた要因 ● 効果の持続・発展のための今後の課題・提言等 ● 成果品一式 	ソフトコンポーネント実施完了時	50

(9) ソフトコンポーネントの概略事業費

ソフトコンポーネントの概略事業費は以下の通り。

項目	総額 (千円)
直接人件費	3,010
直接経費	2,886
間接費 (諸経費+技術費)	3,854
合計	9,750

(10) 相手国側の責務

ソフトコンポーネントの実施に関して PMD 側の責務は、以下の通りである。

- 1) 人的資源開発
 - a) 継続的に次世代を担う人材を雇用する。
 - b) 研修と人的資源開発計画を通じて、より優れた人材の育成を行う。
- 2) プロジェクトにおいて調達された機材の長期運用
 - a) 定期的にシステム運用維持管理に必要な予算を確保し、プロジェクトで供給された全ての気象機材の交換部品、消耗品の調達を計画的に行う。
 - b) 盗難や破損から機材を保護する。

上述に記述した PMD 側の責務に関しては、PMD の組織的且つ人的能力を鑑みると、十分に実

施可能であると考えている。特に「継続的に次世代を担う人材を雇用」に関しては、気象レーダーの維持管理面において PMD が自立的発展するためには、電子関連技術者を継続的に補充し、補助業務を行う職員から電子技師に至る全てのスタッフに気象レーダーの維持管理能力を継承していくことが必要不可欠である。PMD も、有能な電子関連技術者を補充し、技術セクションを強化することの必要性を深く認識している。

資料 6. 参考資料

番号	名 称	形態 図書・ビデオ 地図・写真等	オリジナル ／コピー／ 電子ファイル	発行機関	発行年
1	National Climate Change Policy	図書	電子ファイル	Ministry of Climate Change	2012年
2	Pakistan Climate Change Action Plan	図書	電子ファイル	Ministry of Climate Change United Nations Pakistan	2011年
3	High Performance Computing Cluster (HPCC) Facility	図書	電子ファイル	Research & Development Division, Pakistan Meteorological Department	2012年
4	Pakistan Map	地図	オリジナル	Nelles Map	2009年
5	Islamabad Street Map	地図	オリジナル	Saeed Book Bank	-