Ex-post Evaluation Report

ITTO Project PD 306/04 Rev. 1 (I)
Improving Utilization and Value Adding of Plantation Timbers from Sustainable Sources in Malaysia

Prepared for the ITTO

By

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List of abbreviations

FDS	: Forest Department of Sabah
FFPRI	: Forestry and Forest Product Research Institute of Japan
FRC	: Forest Research Centre
FRIM	: Forest Research Institute Malaysia
GOM	: Government of Malaysia
ITTA:	International Tropical Timber Agreement
ITTC:	International Tropical Timber Council
ITTO:	International Tropical Timber Organization
JICA:	Japan International Cooperation Agency
LFM:	Logical Framework Matrix
MDF:	Medium Density Fibreboard
MTC:	Malaysian Timber Council
MTIB:	Malaysian Timber Industry Board
MWC:	Malaysian Working Committee
NATIP:	National Timber Industries Policy
POIC:	Palm Oil Industrial Cluster
PSC:	Project Steering Committee
R&D:	Research & Development
RMM:	Regional Managers Meeting
RPM:	Regional Programme Manager
SFC:	Sarawak Forestry Corporation
SFD:	Sarawak Forest Department
STA:	Sarawak Timber Association
STIA:	Sabah Timber Industries Association
TRTT:	Timber Research and Technical Training Centre
TWC:	Technical Working Committee
UNIMA:	University of Malaysia Sarawak
YPO:	Yearly Plan of Operation

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The Consultant

Executive Summary

Introduction

1. The Committee on Forest Industry during its forty-sixth session in November 2012 decided to carry out an ex-post evaluation of ITTO Project PD 306/04 Rev. 1 (I) which aims to provide an in-depth diagnosis of the project in order to point out the successful and unsuccessful outcomes, the reasons for success and failures, the contribution of the project towards the achievement of ITTO's objectives 2000, and to draw lessons that can be used to improve similar future project;
2. Project PD 306/04 Rev. 1 (I) had been implemented by the Government of Malaysia (GOM) with Forestry Research Institute Malaysia (FRIM) as the executing agency and Timber Research and Technical Training Centre (TRTTC) of Sarawak Forest Department (SFD) and Forest Research Centre of Forest Department Sabah (FDS) as the collaborating agencies; for forty-eight months starting August 2006 with a total sanctioned budget of US $ 1,446,001 comprising contributions of ITTO, GOM and the private forest sector of Malaysia;
3. The specific objectives of the project were to i) produce technical data on wood characteristics of selected grown species from Malaysia based on the harmonized set of procedures developed, and ii) develop suitable techniques for production of value added timber products from existing plantations and its technology transfer;

Evaluation scope, focus and approach

4. The primary purpose of the ex-post evaluation is to learn lessons from the project and to draw conclusion for future project that all aspects of the project, from its inception to its completion regarding administrative and financial matters, organizations, communication, consultation and cooperation need to be assessed;
5. The ex-post evaluation was carried out in May 2013, thirty-two months after project completion, and involved review of existing project documents and files, meetings with the executing agency and its collaborators, the formers PSC members and project key personnel and the main stakeholders, and visits to relevant forestry institutions and forest industries in three regions of Malaysia;
6. The key stages of the evaluation included in-depth analysis of the project design using the ITTO Manual for project formulation, second edition, as the framework with special attention to the problem tree and definition of the project elements, and assessment of project performance covering appropriateness of implementation process, achieved outputs and objectives, and impact as well as sustainability of the project;

Project facts

7. The project, stemmed from a few studies conducted in Malaysia, was urgently needed by GOM to help sustain its forestry and wood-based industry sector that had been contributing significantly to the Malaysian economy over the decades but was experiencing a growing threats to its future viability due mainly to the continuing shortfall in supply of natural timbers;
8. The establishment of forest plantations is one of the solutions to the observed growing threats but the properties and uses of the tree species that had been planted on a trial basis remained unclear, the problem that was addressed by the project through its interventions;
9. The specific objectives of the project were achieved through delivery of ten outputs for which 32 activities had been fully implemented within the sanctioned financial and time budget i.e. US $ 1,446,001 and 48 months, including 12 months of extension without additional funding, respectively;

Findings

10. The problems addressed by the project were inadequately analyzed that the consequences, main causes as well as sub causes of the problems were not clearly identified leading to a conceptually weak project design although in practice the design developed had greatly contributed to project achievements;
11. Ten defined outputs had been delivered through the full execution of 32 activities identified and achieved the specific objectives which have contributed to achievement of the development objective;
12. The visits made to and discussions held with the primary beneficiaries in three regions of Malaysia indicated that the project has generated significant positive impacts to the development of forest plantation and utilization of planted timbers in Malaysia;
13. Transfer of technology had been performed effectively through dissemination of the technical reports produced, conduct of the seminar and workshop attended by some 150 participants, execution of road-show program and technical training of primary beneficiaries at Forestry and Forest Product Research Institute of Japan (FFPRI) in Japan;
14. The overall post-project situation that prevails is encouraging in terms of raised awareness of target beneficiaries on potential economic benefits of planted timbers, strengthened policies and programmes on forest plantation development and enhanced capacity of forest research centres in utilizing the testing methodologies developed under the project;
15. Some major unexpected effects and impacts of the project found were the fast growing interest of the forest industries in forest plantation development, the restructuring of FDS organization by the Chief Minister of Sarawak to provide more emphasis on R & D of planted timbers, current wide use of the manual on harmonized testing methods and excellent support of FFPRI Japan to training on timber processing technologies;
16. The project had been effectively implemented in high compliance with the project agreement and ITTO rules and procedures and in a collaborative manner involving a multi-disciplinary group of national and foreign experts and the primary beneficiaries and forestry R & D centers with the full support of the ITTO and Project Steering Committee (PSC);
17. Among the prominent elements that are conducive to sustaining contribution of the project to a successful program on forest plantation development and future viability of the wood based industry sector are continued studies on properties and use of planted timbers using the harmonized testing methods by the forestry research centres, the formulation of a follow-up project that has been submitted to ITTO for funding consideration and enhanced communication between the primary beneficiaries;
18. Overall, the project can be rated as successful in delivering its planned outputs and achieving its intended objectives judged using the indicators defined in the logical framework of the project and the impacts that have been generated by the project;

Lessons learned

a. Project identification and design

19. In order to construct a conceptually and operationally sound project design, it is essential to perform and adequate problem analysis; relevance and effectiveness of project interventions to resolve the problems at hand are ensured only by knowing the consequence as well as direct and indirect causes of the key problem addressed by the project;
20. In order to minimize adjustments to planned project activities during the course of project implementation, full participation of project beneficiaries in project identification and problem analysis is indispensable;
21. In the identification of species used for the project, one common species could have been selected for the three regions instead of one for each region to facilitate more extensive studies on the species selected and comparisons between regions of wood properties of different age groups and planting sites; selecting one species would have resulted in greater efficiency, reduced cost and more added value;

22. Disparity in manpower, expertise and facilities of regional forest research institutions should have been identified during the project development stage to allow for proper allocation of load work, otherwise to put institutional safeguards in place to ensure equivalent roles of individual institutions involved in project implementation;

b. Project implementation

23. Any unforeseen circumstances for any reasons should be made known earlier by the project secretariat so that other members in the same team could render the necessary assistance;
24. Timely disbursement of funds is essential for the smooth running of any project; to this end, all parties involved in the project must be mindful of their responsibilities for smooth disbursement process and relevant procedures for disbursement must be clearly spelt out and understood by all parties concerned;
25. Instances whereby researchers assigned to the project were over-committed to other projects and/or other official duties such arrangement must be minimized to avoid any complications and unnecessary delays in operations;
26. Option for implementation mode is best to be put in place for critical processes in order to avoid unnecessary delay; this could have been done as in the case of log supply for research material and the refractory drying nature of *A. mangium* with affected the smooth flow of selected testing activities;
27. Members of the PSC should meet more than once a year and be kept informed of the progress in implementation that any delay could receive immediate and timely attention;
28. Frequent meetings among members of the Technical Working Committee (TWC) had facilitated updating of technical progress and exchanging of views in addressing any technical obstacle faced and proved contributing meaningfully to the smooth project implementation;

Conclusions

29. The problems addressed were consistent with the issues surrounding sustainable development of Malaysian forest industry but were inadequately analyzed that the project design constructed was somewhat weak because the main causes and sub-causes of the problems addressed were not well identified; conformity of the project interventions to the actual causes was conceptually lack of clarity;
30. Despite weaknesses of the project design, the project had been succesfully implemented and completed through full execution of all planed activities, delivery of the defined outputs and achievement of its defined specific objectives;
31. The project was implemented in an effective manner in full compliance with the project agreement and established ITTO rules and procedures; the required documents had been prepared in accordance with existing ITTO manuals and timely submitted to ITTO for scrutiny and endorsement;
32. The strategy pursued in implementing the project was employment of a multi-diciplinary group of national and foreign experts, agencies and stakeholders directly or indirectly involved in the project execution with Forest Research Institute Malaysia (FRIM) acted as the national coordinating agency and TRTTC of the SFD and Forest Research Centre (FRC) of the FDS acted as the regional collaborating agencies;
33. The project has generated significant favorable impacts: attitude of the primary beneficiaries towards commercial utilization of planted timbers cum development of forest plantations is changing and encouraging; enthusiasm of the forest industries for availability of appropriate processing technologies for planted timbers is growing while policies and programmes on forest plantation development are enhancing;
34. Technology transfer had been performed effectively through wide dissemination of the project outputs and publications, conduct of the workshop and seminar on improved utilization of tropical plantation timbers, execution of the road-show program throughout the regions and training of Malaysian researchers at FFPRI of Japan;

35. Overall, sustainability of the project is promising: the forest research institutions across the regions are carrying out studies and experiments relating to planted wood properties and processing techniques using the methods developed under the project and a follow-up project proposal has been sumitted to and approved by ITTO and is currently awaiting funding for its implementation;
36. Overall, the project can be categorically rated as a succesful undertaking in terms of the positive impacts on the environment of planted timber utilization it is generating and the promising sustainability of the project;
37. The project had been implemented in a cost effective manner; the sanctioned amount of ITTO budget was prudently expended to fully execute the 32 originally planned activities as well as the outreaching activities tasked by the PSC which was signified by the approval of the final financial audit report by ITTO;

Recommendations

38. In formulating future similar projects, strict adherence by proponent to existing ITTO Manual on project formulation and full participation of the primary beneficiaries must be assured in order to arrive at a sound and workable project design;
39. In convincing the forest industries on the commercialization of planted timbers, the regional R&D institutions should continue doing intensified research on wood properties and appropriate processing techniques, independent of external fincancial assistance, in close consultation with the forest industries;
40. In speeding up the development of forest plantations, it is strongly advisable to make use of the experience of other countries in order to economize use of needed resources;
41. The consultation held with Asiaprima Resources Sdn Bhd in Pahang revealed that it has documented vast information on properties of acacia timber and its suitable processing techniques through the research work it undertook for years in collaboration with an Multi National Company (MNC); exploring possibility of sharing this information is worth considering as this information would be very useful for purpose of developing effective R&D programs by concerned forestry research insitutions;
42. To ensure technical soundness of project design and relevance as well as effectiveness of project interventions, adherence by any proponent to existing manual on project formulation is to be fully observed by the Expert Panel in assessing any project proposal;
43. To provide funding for immediate implementation of proposed project PD 600/11 Rev. 1 (I) entitled “Life Cycle Assessment and Carbon Foot Print-Based Initiative for Process Improvement and Innovative Product Development of Sustainable Plantation-Grown *Acacia mangium* in Malaysia” that has been approved by the ITTA during its relevant Session as this project is a follow-up to the completed project that incorporates the issues on carbon emission relating to the process of value adding wood products development.

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1. Introduction

1.1. Background and rationale of the ex-post evaluation

The Committee on Forest Industry, during their forty-sixth Session in November 2012 decided to carry out an ex-post evaluation of ITTO Project PD 306/04 Rev. 1 (I) in order to establish how well the Project served its purposes and to draw up recommendations for future action. The decision of the Committee was based on the Council Decision ITTC (XXVIII)/20 of 30 May 2000 which specifies the criteria for selection of projects to be ex-post evaluated.

The ex-post evaluation aims to provide an in-depth diagnosis of the Project in order to point out the successful and unsuccessful outcomes, the reasons for successes and failures, the contribution of the Project towards the achievement of ITTO's Objective 2000; and to draw lessons that can be used to improve similar projects in the future.

1.2. Project identification

Project serial number	:	PD 306/04 Rev. 1 (I)	
Project title	:	Improving Utilization and Value Adding of Plantation Timbers from Sustainable Sources in Malaysia	
Host Government	:	The Government of Malaysia (GOM)	
Executing Agency	:	Forestry Research Institute Malaysia (FRIM)	
Collaborating Agencies	:	FRC of the Forest Department of Sabah (FDS)	
		TRTTC of the Sarawak Forest Department (SFD)	
Budget	:	Total	US$ 1,446,001
		ITTO	US$ 499,867
		GOM	US$ 830,134
		Private Sector	US$ 116,000
Duration	:	36 months, extended for 12 months without additional funding	

1.3. Project context

The specific objectives of ITTO Project PD 306/04 Rev. 1 (I) were to i) produce technical data on wood characteristics of selected grown species from Malaysia based on the harmonized set of procedures developed and ii) to develop suitable techniques for production of value-added timber products from existing plantations and its technology transfer. Its development objective was to improve end-uses and value adding of Malaysian forest plantation resources through systematic evaluation of their basic physical and mechanical properties in order to contribute to the development of sustainable wood-based industries. The Project's objectives were consistent with ITTA 1994, ITTO Action Plans, and ITTA 2006 as outlined below:

ITTA 1994

Objective (c): to contribute to the process of sustainable development
Objective (d): to enhance the capacity of members to implement a strategy for achieving exports of tropical timber and timber products from sustainable managed sources by the year 2000
Objective (f): to promote and support research and development with a view to improving forest management and efficiency of wood utilization as well as increasing the capacity to conserve and enhance other forest values in timber producing tropical forests
Objective (i): to promote increased and further processing of tropical timber from sustainable sources in producing member countries with a view to promoting their industrialization and thereby increasing their employment opportunities and export earnings.

ITTO Yokohama Action Plan 2002-2006

Based on the activities outlined in the proposal, it is clear that this project is in line with Para 3.3 (Forest Industry) of the ITTO's Action Plan, both under Goals number 1 and 2.

Goal 1. Promote increased and further processing of tropical timber from sustainable sources

The following actions under Goal 1 of ITTO's Action Plan were relevant to this project:

Action	Subject
5	Encourage members and assist them, where appropriate, to: • Promote investments in timber processing industry by taking steps to: clarify the benefits of downstream processing for creating or producing high-value, internationally competitive products; • Formulate research and development proposals which assist with the piloting and commercialization of new processing and manufacturing technologies; • Organize workshops/seminars on the use of new and/or improved techniques and technology, including increased further processing; • Undertake sector-wide training need analyses; development of training strategies, training facilities and course curricula; preparation of training manuals; and delivery of training courses; and • Improve institutional efficiency and effectiveness through sector-wide training need analyses; develop training strategies, training facilities and course curricula; prepare training materials; and deliver training courses.

Goal 2. Improve industry's efficiency of processing and utilization of tropical timber from sustainable sources

The following actions under Goal 2 of ITTO's Action Plan were relevant:

Action	Subject
1	Develop, publish and disseminate information on increasing utilization efficiency and the reduction of losses and waste through the production chain;
2	Facilitate and encourage industrial demonstration projects addressing increased production and utilization efficiency, and the competitiveness of the tropical timber industry;
3	Commission and publish analytical studies that identify critical knowledge and information gaps as a precursor to research and development activities on improved efficiency in processing;
7	Promote increased awareness and utilization of existing information on wood properties and end-use requirements; and

8	Encourage members and assist them, where appropriate, to: • Develop, publish and disseminate guidelines on increasing efficiency and reducing waste throughout the production chain while at the same time increasing the utilization of wood residues and recycling; • Formulate research and development proposals that assist with the piloting and commercialization of improved and/or innovative utilization methodologies, including the reduction of losses and increased use of residues and recycling; • Participate in international standards activities related to forest products; and • Undertake research into wood properties and end-use requirements, paying particular attention to the properties and availability of lesser-used species and timber plantation species and the potential markets for them.

ITTO Action Plan 2008-2011

The project was consistent with Expected Outcome 1 of the Forest Industry: increased production and further processing of tropical timber and other forest products from sustainably managed and legally harvested sources; it was also in agreement with Expected Outcome 2: increased efficiency in harvesting, processing and utilization of tropical timber from sustainably managed and legally harvested sources.

ITTA 2006

Objective (c): contributing to sustainable development and to poverty alleviation

Objective (d): enhancing the capacity of members to implement strategies for achieving exports of tropical timber and timber products from sustainably managed sources

Objective (f): promoting and supporting research and development with a view to improving forest management and efficiency of wood utilization and the competitiveness of wood products relative to other materials, as well as increasing the capacity to conserve and enhance other forest values in timber producing tropical forests

Objective (i): promoting increased and further processing of tropical timber from sustainable sources in producer member countries, with a view to promoting their industrialization and thereby increasing their employment opportunities and exports earnings.

2. Evaluation Scope, Focus and Approach

2.1 Scope and focus

The primary purpose of the ex-post evaluation is to learn lessons from the Project and to draw conclusions for future projects. The ex-post evaluation should establish to which the results of the Project intervention, in terms of outputs, objectives, impacts and sustainability have been achieved and draw conclusions and recommendations for similar interventions in the future. Therefore, the evaluation is collection of information, the on-the-spot assessment and in-depth analysis of the performance and impact of the Project after its completion, with the intent to establish how well it served its purposes, its degree of effectiveness and efficiency, and its sustainability.

The evaluator is to assess all aspects of Project PD 306/04 Rev. 1 (I), from its inception to its completion regarding administrative and financial matters, organizations, communication, consultation and cooperation. The specific terms of reference for the ex-post evaluation are presented in Annex 1.

2.2 Approach of evaluation

This ex-post evaluation was carried out 32 months after project completion, signified by the submission date of the project completion report. The evaluation involved:

- A review of the project document, yearly plans of operation (YPOs), minutes of the Project Steering Committee (PSC) meetings, bi-annual progress reports, completion report, technical reports, financial reports and other available documents;
- An entry meeting with the Executing Agency, former PSC members, main stakeholders, Project Key Personnel and representative of FFPRI of Japan to discuss on the various aspects of project implementation;
- Visits to forestry institutions and forest industries:

  - ✓ Asiaprima Resources Sdn Bhd in Pahang
  - ✓ Robin Resources Sdn Bhd in Pahang
  - ✓ Sabah Timber Industries Association (STIA) in Kota Kinabalu
  - ✓ FRC of the FDS in Kota Kinabalu
  - ✓ Worldtrend Garden Furniture Sdn Bhd in Kota Kinabalu
  - ✓ Sarawak Timber Association (STA) in Kuching
  - ✓ Sarawak Forestry Corporation (SFC) in Kuching
  - ✓ Forest plantations by Freshwood Sdn Bhd at Lundu near Kuching
  - ✓ Laboratory and gallery of plantation timber products of SFC in Kuching, and
  - ✓ Timber Research and Technical Training Centre (TRTTC) of the SFD in Kuching

Annex 2 shows the institutions and industries visited as well as the people met during the ex-post evaluation mission. The discussions held during the visits were organized in close consultation with the ITTO Manual for Project Monitoring, Review and Evaluation, third edition (2009). The visits were well organized by the Executing Agency (EA) that all planned visits were fully and smoothly realized.

The key stages of the evaluation included:

i) In depth analysis of the project design
   - The analysis was carried out with the former project key personnel in order to learn weaknesses and strengths of the design; and

- The project design was assessed using the ITTO Manual for project formulation, second edition, as the framework with special attention to the problem tree and definition of the project elements and interventions.

ii) Assessment of project performance
- Appropriateness of implementation process was assessed by studying the project operational plans against actual implementation, inputs applied, outputs and outcomes produced as well as compliance with the project agreement and established rules and procedures applying to ITTO Projects;
- Achieved outputs and objectives were assessed in light of the logical framework matrix (LFM) or its revision, as appropriate; and
- Impact and sustainability were evaluated using the information obtained through the discussions with representatives of the intended project beneficiaries namely government institutions particularly the forestry research centers, forest industry associations and forest industries.

3. Project Facts

3.1 Project origin

The project stemmed from a few studies conducted in Malaysia including:

- "Market prospects of fast-growing timber plantation in Peninsular Malaysia" carried out by the Japanese International Cooperation Agency (JICA) in 2002 in collaboration with the Forestry Department of Peninsula Malaysia, Perak Forestry Department and Forest Research Institute Malaysia (FRIM)
- "Study on forest plantation development in Peninsular Malaysia" implemented by the Malaysian Timber Council (MTC) in 2003
- "Planting high quality indigeneous species in Sarawak – What and where"

The project was judged as urgently needed by GOM to help sustain its forestry and wood-based industries sector that had been contributing significantly to the Malaysian economy over the decades but was experiencing a growing threats to its future viability due to two observed long-term trends:

- ✓ Declining natural forest areas and dwindling supply of natural timber
- ✓ Continuing shortfall in the supply of logs such that demand for logs by the wood-based industries could no longer be met

The project proponent argued that establishment of forest plantations is one of the solutions to the above mentioned threats. In view of the significance of plantation forest to the national economy, the state of Sabah had embarked on planting of *A. mangium* and other tree species since early 1990s. The effort to promote fast-growing species for forest plantations in Malaysia had been initiated since 2003 with the assistance of JICA through the "Small-scale fast-growing forest plantation" project by planting a total of 49 tree species on special trial plots. Although the species selected were generally commercially acceptable, it was unclear about the properties of such plantation grown species upon maturity, and how it would affect their and uses. Project PD 306/04 Rev. 1 (I) was a concrete response to the issues surrounding properties of selected plantation timber species and their end uses.

3.2 Development objective

As defined in the project proposal, the development objective of the Project was to improve end-uses and value adding of Malaysian forest plantation resources through systematic evaluation of their basic physical and mechanical properties in order to contribute to the development of sustainable wood-based industries.

3.3 The problems addressed

Two key problems addressed by the project were: i) lack of understanding on essential properties affecting end-uses of plantation species, and ii) unfavorable economic return from plantation grown species. It was argued by the project proponent that the key problems would impede development of Malaysian forest plantations and affect sustainable future supply of wood raw material to wood industries that their immediate removal was seen as imperative.

3.4 Specific objectives and outputs

The specific objectives of the project were: a) to produce technical data on wood characteristics of selected plantation grown species from Malaysia using harmonized procedures developed to evaluate the basic properties of plantation timbers , and b) to develop suitable techniques for the production of value-added timber products from the existing plantations and technology transfer.

The expected outputs, as defined in the project document, were:

Specific objective 1. To produce technical data on wood characteristics of selected plantation grown species from Malaysia using harmonized procedures developed to evaluate the basic properties of plantation timbers

Output 1.1: Harmonized procedures for evaluation of basic properties of plantation species
Output 1.2: Trained counterparts in new testing techniques
Output 1.3: Scientific data on anatomical, physical and mechanical properties of test timber species
Output 1.4: Technical data on sawing, machining, veneering, drying and bonding properties
Output 1.5: Technical information on bio-deterioration and preservataive treatment, and chemical properties of wood, tannins and sugars in bark of test timber species

Specific objective 2. To develop suitable techniques for the production of value-added timber products from the existing plantations and technology transfer

Output 2.1: An assessment report on the suitability of plantation species for doors and windows and bentwood
Output 2.2: Technical evaluation on the production of solid flooring boards for interior and exterior uses
Output 2.3: An assessment report on the suitability of plantation species for advanced composites
Output 2.4: Technical evaluation on the production of sliced and peeled veneers
Output 2.5: Website (containing project related materials including data, reports, manuals and personnel involved), training workshop/project ending seminar.

3.5 Starting date and duration

The project officially commenced in August 2006, originally planned for 36 months. All originally planned activities and the additional ones tasked by the PSC were actually implemented in 48 months through ITTO approved extension without additional funding. Financial closure of the project was made by ITTO by end of September 2011 based on the final financial audit report submitted by the Executing Agency and acceptable to ITTO.

3.6 Budget

Source	Approved, USD	Actual, USD
ITTO	499,867	498,708
GOM	830,134	830,134
Private Sector	116,000	116,000
Total	1,446,001	1,444,842

4. Findings and Lessons Learned

4.1. Findings

4.1.1 Project design and contribution to achievements

As presented in the project document, the key problems addressed were inadequately analyzed. Weaknesses of the project design can be outlined as follows:

- Main causes and sub-causes of the key problems addressed were not fully diagnosed and identified that the cause-effect relationship was somewhat vague
- Conseptually, the vertical logic was somewhat weak and the project interventions were not fully relevant or effective to solve the problems at hand; correspondence between the outputs defined to main causes as well as between the activities to sub-causes of the key problems was somewhat unclear
- A more sound project design could have been developed and applied to achieve the project objectives more effectively; such a design could be constructed only by performing a thorough problem analysis to identify the logical consequence (s) of the key problems addressed as well as main causes and sub-causes of the key problems. The soundness and relevance of the project design can be assessed without much difficulty using the rules below:

  - ✓ Development objective was defined correspond to the consequence (s) of the key problems
  - ✓ Specific objectives were defined correspond to the key problems addressed
  - ✓ Outputs were defined correspond to the main causes of the key problems, and
  - ✓ Activities were defined correspond to the sub-causes of the key problems

Despite the weaknesses of the applied project design, however, it has greatly contributed to achievement of the intended project objectives as they were defined in the project document attached to the project agreement.

4.1.2 Achievement of the outputs and objectives

a. The Outputs

Achievement of defined outputs was assessed using the indicators defined in the logical framework matrix presented in the project document or its revision thereof as follows:

- Output 1.1: Harmonized procedures for evaluation of basic properties of plantation species

  This output had been achieved: a technical report on the procedures was actually produced.

- Output 1.2: Trained counterparts in new testing techniques

  This output had been delivered: 18 counterparts were trained in two batches at FFPRI of Japan.

- Output 1.3: Scientific data on anatomical, physical and mechanical properties of test timber species

  This output had been achieved: a technical report on timber species was produced by mid of year 3.

- Output 1.4: Technical data on sawing, machining, veneering, drying and bonding properties

  This output had been delivered: a technical report on the properties was produced by mid of year 3.

- Output 1.5: Technical information on bio-deterioration and preservataive treatment, and chemical properties of wood, tannins and sugars in bark of test timber species

  The output had been realized: a technical report on the subject was completed by mid of year 3.

- Output 2.1: An assessment report on the suitability of plantation species for doors and windows and bentwood

  This output had been delivered: an assessment report was produced by mid of year 3

- Output 2.2: Technical evaluation on the production of solid flooring boards for interior and exterior uses

  The output had been realized: an evaluation report was produced by mid of year 3.

- Output 2.3: An assessment report on the suitability of plantation species for advanced composites

  The output had been achieved: an evaluation report was produced by mid of year 3.

- Output 2.4: Technical evaluation on the production of sliced and peeled veneers

  The output had been achieved: an evaluation report had been completed.

- Output 2.5: Website (containing project related materials including data, reports, manuals and personnel involved), training workshop/project ending seminar

  The output had been delivered: a website was created by end of year 3 and operational since then.

b. Specific objectives

By definition, delivery of the outputs pertinent to each specific objective means that that particular specific objective has been achieved. The achievement is also verifiable using the indicators defined in the logical framework matrix as illustrated below:

Specific objective 1: To produce technical data on wood characteristics of selected plantation grown species from Malaysia using harmonized procedures developed to evaluate the basic properties of plantation timbers

Indicators: i) harmonized set of procedures for testing developed, and ii) technical data on wood characteristics obtained.

This objective had been achieved by end of the project by developing a harmonized set of procedures for testing and by obtaining technical data on wood charateristics.

Specific objective 2: To develop suitable techniques for the production of value-added timber products from the existing plantations and technology transfer

Indicators: i) all value-added products identified developed, ii) techniques for the production of all value-added products developed, and iii) one workshop and one project-ending seminar organized.

This objective had been realized by end of the project: all value-added products identified were developed, techniques for the production of the value-added products were developed and one international workshop/seminar was organized.

c. Development objective

As the specific objectives had been achieved, they must have contributed to achieving the development objective. This contribution is evident by the increase in forest plantation area in Malaysia. Planted forest in Sarawak for instance had increased from 259,985 Ha in 2010 to 304,344 Ha in 2012 or a total increase of 44,359 Ha during the 2010-2012 period. Expansion of planted forest area in Peninsular and Sabah has also been reported but no exact figures were readily available to the consultant.

Indeed, progress in forest plantation program is influenced by political, institutional and technical forces. It is argued that the information on processing technologies and end uses of planted timbers generated under the project has, to some extent, favorably affected attitude of the main stakeholders towards development of forest plantations across the states of Malaysia.

4.1.3 Impact and relevance of the project

Below is the highlight of project impacts based on the information gathered during the visits paid to selected beneficiaries in the three regions of Malaysia:

i. Visit to Asiaprima Resources Sdn Bhd in Pahang

Asiaprima was aware of project PD 306 and obtained the project publications; but it has not used any of the project's outputs or findings.

- Asiaprima has accumulated experience in the utilization of *Acacia mangium* mainly for veneer-based and solid wood products. In 1997, Asiaprima and a Multi-National Company (MNC) worked very closely for a number of years on the research and development of *Acacia mangium* timber with the goal of developing a new wood species to produce beautiful and affordable furniture for the MNC furniture retail market.
- Among the main findings of the R&D were: kiln-drying of *A. mangium* timber was slow; its working properties were good for sawing, moulding, peeling, turning, sanding and staining. The R&D proved to be a big success as the MNC managed to commercially market acacia outdoor furniture worldwide.

Doors and windows made of *A. mangium* timber by Asiaprima

A wooden house constructed using *A. mangium* timber by Asiaprima

Veneer-based board of *A. mangium* timber by Asiaprima

- However, much R&D work remains to be done in order to obtain the highest return from acacia timber processing; this includes small log sawing technology to maximize recovery of sawn timber and integrated use of residual wood to improve overall returns.

ii. Visit to Robin Resources (Malaysia) Sdn Bhd

- Robin Resources (Malaysia) Sdn Bhd started producing MDF (Medium Density Fibreboard) in 1997 using mainly rubberwood as the raw material purchased from local markets. Its current operational production capacity has reached 650 m3 per day requiring about 2 million m3 of wood per annum.
- Its main concern is more on quantity than quality of wood as wood of any properties do not matter much to MDF quality. Its primary concern, therefore, is to secure sufficient volume of wood supply on a continual basis. It is understandable that the industry is not using any of the project's findings although it posseses the published technical reports of the project.
- To reduce dependence on open market, it has taken a giant step forward by investing in A. mangium plantation on 15,000 acres of state leased-land located at Kemasul of Pahang state territory.
- It is the view of the company that: i) planted timbers are one of the determining forces of future survival of the Malaysian forest; and ii) any inverstors should strive to develop quality plantation of fast growing species like acacia in order to facilitate manufacturing and marketing of certified value-added products which is among the requisites for improving market competitiveness and increasing sustainability of the wood industries.

iii. Visit to FRC of FDS

The research officer met furnished the information below.

- One plywood producer has consulted the FRC of FDS requesting for information on chemical contents of plantation timbers especially of Acacia mangium
- Research officer of the Palm Oil Industrial Cluster (POIC) has consulted FRC for manual on basic properties testing of plantation timber
- A particle board producer has been consulting for testing method of plantation timbers and also some information on properties of A. mangium
- The FRC of Sabah is using the manual produced under the project for anatomical research for plantation timbers in Sabah
- Implementation of project PD 306 has strengthened networking of researchers from FRIM, TRTTC of SFD, FRC of FDS and FFPRI of Japan

iv. Visit to Sabah Timber Industry Association (STIA)

- Sabah has embarked on tree planting program since decades ago using *A. mangium* and indigenous species as well. The program is to be further intensified in view of the government policy to conserve existing natural forest.
- R&D on appropriate proccessing technologies has to be scaled up to ensure efficient and commercial use of planted timbers.
- To ensure a quality plantation forest, there is a need also to embark on a tree breeding program focusing on production of genetically improved planting materials for selected species; it is the view of STIA that quality of planted trees is, to a larger extent, determined by genetic attributes of the planting material used.

v. Visit to the Worldtrend Garden Furniture Sdn Bhd

- The company is using only Acacia mangium in garden furniture making but at low profit margin due to the intense market competition. Its intention to produce high-end A. mangium products is very much dependent on availability of appropriate processing technologies at reasonable cost.

Kiln-dried lumber of *A. mangium* by Wolrdtrend

Computerized control of kiln-drying schedule by Worldtrend

- The company is aware of the processing techniques that already developed under the project but efficient processing of A. mangium remains problematic. The company therefore is expecting to see economic appropriate technology in near future and is supportive of R&D program on this area.

Samples of outdoor furniture products produced by Worldtrend

vi. Visit to Sarawak Timber Association (STA)

- The state government of Sarawak is promoting tree planting program for which over two million hectares of state land have been allocated for. As to date, A. mangium has been the primary species planted and timber is to be used mainly for MDF and plywood making. A project similar to completed project PD 306 is needed by Sarawak forest industries for purpose of developing appropriate processing technologies for acacia.
- In addition, the Chief Minister has also requested the forest licencees to embark on large-scale planting operations targeting one million hectares by 2020. The STA, SFC and SFD are currently developing a workable strategic plan for realizing this request. Among the priorities of the strategy is to embark in a program on production of quality planting material for which assistance from experienced country like Indonesia is to be sought for in immediate future.

vii. Visit to forest plantations

- Freshwood Sdn Bhd has embarked on tree planting program since years ago on a trial basis. At its Lundu project site, around 60 km west of Kuching, it has planted 200 Ha of Eucalyptus pellita and 100 Ha of Acacia mangium. Despite the poor soil fertility, the 50-month old eucalypt grow well reaching diameter between 15 to 20 cm and height of around 10 meters. The acacia grow fairly well too; at 30 months of age, the trees grown on flat lands have reached average diameter of 10 cm and height of 4-5 meters noting that the trees grown on sloping lands are developing faster and more vigorously.
- Based on results of the planting experiments, the company is now more confident of embarking on large-scale tree planting program. The plan is to produce quality pellet from planted wood. The company also aims to produce value-added products from prime quality acacia logs; by so doing, planted acacia timber can be utilized in an efficient manner. To this end, availability of low-cost processing technology is a requisite. The company was aware of the completed ITTO project and its findings but argued that further studies on properties and processing technologies of planted timbers including eucalypt and acacia are required by the forest industries of Sarawak.

4-year old *Eucalyptus pellita* planted on sandy soil

Palm oil interplanted with kelampayan aging 15 months

- In addition to planting eucalypt and acacia, the company is also experimenting on inter-planting kelampayan (Neolamarckia cadamba) between young palm-oil plants to maximize land productivity. The notion behind this experiment is that kelampayan grows very fast that it can be harvested at 4 to 5 years of age. To minimize interference with the palm plants, spacing needs to be carefully designed. The kelampayan timber will be used by the company for making veneer and handicrafts replicating the successful demonstration by TRTTC at laboratory scale.

30-month *A. mangium* planted on sloping (left) and flat lands (right)

viii. Visit to SFD and Sarawak Forestry Corporation (SFC)

- The Project produced the harmonized testing methodologies for plantation grown timber; it helps to identify the right species, age groups and other planting parameters that will lead to optimal production of right quality resources for future value adding applications from the wood-based sector.
- The manual “Testing Method for Plantation Grown Tropical Timbers” is now used by different institutions in their research works: it was used by TRTTC for the study on the determination and monitoring of moisture content and density of Acacia mangium, Acacia superbulk and Paraserianthes falcataria logs. The information is necessary to establish the weight to volume conversion constant for the purpose of assessing the cess and royalty for the plantation logs. The conversion constants derived under the study have been adopted or used by the industry in Sarawak.
- Using the knowledge and skill gained through the project, the book “Sarawak Planted Timber – Beyond Pulp and Paper” was published in October 2012; it depicts some value-added products which were fabricated using acacia and kelampayan (Neolamarckia cadamba). The book was launched by the Chief Minister of Sarawak indicating the strong interest of the state government in forest plantation development.

Dining sets made of *A. mangium* timber by TRTTC

Wooden handicrafts made of acacia and kelampayan by TRTTC

Kitchen set made of *A. mangium* timber by TRTTC

- The Chief Minister of Sarawak has requested SFC to restructure its organization to provide more emphasis on the R&D of high-quality tree planting materials in Sarawak. The restructuring is meant to expedite the establishment of better quality forest plantation particularly of acacia and kelampayan.
- The manual is also used as a guide for researchers at TRTTC to conduct their research on the basic and working properties of A. mangium timber; the information generated through the research will assist the timber industry in the value adding and improved utilization of acacia timber in Sarawak.
- The manual is also used as a reference for students from UNIMAS (University of Malaysia Sarawak) doing their research work at TRTTC.
- Various structural applications of plantation timbers have been put up in public locations such as national parks and golf courses with a view to show-case and promote the utilization of plantation timbers.

Considering the impacts that have been generated by the project as outlined above, it is not exaggerating to conclude that the project is relevant to supporting forest plantation development and planted timbers utilization. In fact, the project is manufacturing hope amongst the forest industries for planted timbers as the future source of income stream which is favorably responded to by the industries.

4.1.4 Effectiveness of technology transfer

Technology transfer has been performed through different means as follows:

i) Wide dissemination of the technical reports produced under the project, namely:

- Proceedings of the workshop and seminar on improved utilization of tropical plantation timbers
- Properties of *Acacia mangium* planted in Peninsular Malaysia
- Properties of *Shorea macrophylla* (engkabang jantong) planted in Sarawak
- Anatomical features quality and mechanical properties of 15 years old *Tectona grandis* planted in Sabah
- Testing methods for plantation grown tropical timbers (Technical Manual)
- Project PD 306/04 Rev.1 (I) Competion Report

ii) Conduct of the workshop and seminar on improved utilization of tropical plantation timbers

Some 150 participants attended the workshop and seminar in Kuala Lumpur. The participants included scientists, students, forest industries, academicians, plantation owners, trade association representatives, consultants and government agencies. The workshop was also attended by representatives from other ITTO member countries like China, India, Indonesia, Myanmar, Papua New Guinea, the Philippines and Thailand. The participants were exposed to the information on wood properties as well as appropriate processing technologies experimented and developed under the project.

iii) Execution of road-show program

- The purpose of the road-show was to communicate directly with target beneficiaries on the outputs and results of the project.
- The road-show was organized in Peninsular Malaysia, Sabah and Sarawak wherein stakeholders comprising private sectors, trade associations as well as professionals and government agencies took part in.
- Inputs provided by the stakeholders were essential for the planning of future R&D program on the forest plantation industry in the country.

iv) FFPRI training

A total of 18 research fellows from FRIM, TRTTC and FRC had been sent to FFPRI in Japan to further investigate the specific technical problems on processing techniques encountered under the project. Despite the limited project budget, the training was made possible and succesful through the kind assistance of the government of Japan.

4.1.5 Overall post-project situation

The prevailing situation after project completion can be summarized as follows:

i) Raised awareness of target beneficiaries

The target beneficiaries are now better aware of the potential economic benefits of planted timbers; the potential that can be fully captured through employement of appropriate processing technologies developed consistent with the wood properties. Raised awareness was evident by the fact that any beneficiaries visited and consulted were aware of the project and its activities. Awareness raising was acoomplished through wide distribution of the project publications and CDs containing information on project activities and findings and display of furniture, panelling, veneer laminated chair, wood turning and plywood. The products were displayed at strategic places included the seminar venue, exhibition halls of the respective forest research institutions and strategic public places such as national parks and golf courses.

ii) Strengthened policies and programmes on forest plantation development

A number of new policies have been formulated during the course of project implementation and are effected as to date. The main one being the National Timber Industries Policy (NATIP) and plantation policies in the three different regions of Malaysia. In the NATIP, the tangible targets are to transform the current focus of 60:40 ratio with respect to revenue generated from primary: secondary processing activities to the ratio 60:40, as well as to beef up the annual export revenue from wood-based sector of the nation to RM 56 billion by 2020. Among the strategies outlined were the need to address the current and future shortage in the supply of wood raw materials from forest plantations.

Although all regions in the country are aggresively promoting and implementing their respective plantation policies, the economic viability of the plantations has always been a

concern. Therefore, there is a need to strategize and strengthen the activities on plantation timber research to make future plantation industry a viable economic endeavor.

The overwhelming interest in the area of downstream plantation R&D was reflected by the active participation and interactions demonstrated by the large number of plantation industry players during the events held. Some suggestions, especially the technical gaps identified, were regarded essential to be addressed before products derived from current plantation activities could be brought up to a much higher value chain which will help to sustain the wood-based industry in Malaysia.

iii) Physical environment

In terms of physical environment, all the three implementing agencies have equipped themselves with the basic facilities and personnel to carry out the testing methodologies required, which was the main scope of the project.

The results obtained, to a certain extent, has also created a positive environment for the development of viable forest plantations and downstream industries which will provide subtantial jobs and revenue thereby reducing both the occurence and impact of activities that are environmentally unfriendly.

4.1.6 Unexpected effects and impacts

Some major unexpected effects and impacts of the project are presented below:

- The interest of the forest industries in forest plantation development and planted timber utilization appears to be growing faster than expected as noted during the consultations with the industries. Entusiasm of the forest industries to acquiring appropriate technologies for commercial production of value-added products of planted timbers is also spreading out as evident by the supportive attitude of the industries and concerned institutions noted during the meetings held.
- The executive decision made by the Chief Minister of Sarawak on the restructuring of SFC organization to provide more emphasis on the R&D of planted timbers is indeed a big surprise to both researchers and the forest industries. The decision is both an indirect incentive and a motivating factor for the industries to embark on large-scale forest plantation program in near future.
- Current use of the manual on harmonized testing methods produced under the project as a reference for student from UNIMAS in doing their research is also beyond the expectation of the project executing and collaborating agencies. Favorable impact of the project is spreading out to younger generation which will motivate young people to get involved in forest plantation development activities.
- In the dispatch of Malaysian scientists to FFPRI Japan, initialy only nine scientists was planned. However, with prudent arrangements of the training by FFPRI, a total of 18 scientists was eventually dispatched without any difficulty. This had allowed more scientists to be exposed to studies on wood properties and timber processing technologies in collaboration with their professional Japanesse counterparts.

4.1.7 Effectiveness of the project implementation

Four yearly plans of operation (YPOs) had been submitted by the executing agency to and endorsed by ITTO as the guiding documents of project operations; seven bi-annual progress reports had been also timely submitted to ITTO; six PSC meetings were organized with proper documentation; three yearly financial audit reports and one final audited report were produced with the assistance of independent, certified public accountant and the reports were duly endorsed by ITTO; a completion report was timely submitted to ITTO, and; five technical reports had been published and distributed to intended beneficiaries nation-wide.

In the implementation of the overall project, a tripartite strategy involving FRIM, TRTTC and FRC was adopted while FFPRI played an international technical advisory role. In the regional project implementation, assignment was made based on regional capacity and occasional teething problem encountered were tackled collectively. Different levels of meetings were also held, with or without the presence of stakeholders, to address both technical and strategic issues faced from time to time. The multi-level meeting included six PSC meetings chaired by Director General of FRIM, four TWC meetings chaired by the National Project Director (NPD), eight RM meetings chaired by the NPD, and a number of MWC meetings chaired by the NPD and attended by the project team to brief members on progress in implementation.

All the project documents examined were prepared in conformity to the existing relevant ITTO manuals, both in terms of format and content, with distinct consecutive time coverage, and in compliance with the project agreement as well as established rules and procedures applying to ITTO projects.

The approach used in the project implementation was employment of a multi-disciplinary group of national and foreign experts, agencies and stakeholders directly or indirectly involved in the project execution; the approach is briefly described below:

- FRIM acted as the national coordinating agency and carried out the tests and product development on the plantation species identified for Peninsular Malaysia. It also coordinated discussions on the harmonization of test methods and selected extension methods. The NPD and Regional Programme Manager (RPM) were appointed by FRIM.
- TRTTC of the SFD acted as the regional collaborating agency for the state of Sarawak; it coordinated and conducted necessary activities in the state in collaboration with partners. A Regional Project Manager and a Regional Programme Manager were appointed by TRTTC.
- FRC of the FDS acted as the collaborating agency for the state of Sabah. It coordinated and conducted necessary activities in the state in collaboration with partners. Only a Regional Project Manager was appointed by FRC due to the limited scope of study assigned to FRC.

To guide the project implementation in a collaborative manner, a project agreement establishing tasks and responsibilities of each collaborator with respect to management, technical and financial aspects was signed by FRIM, TRTTC and the state government of Sabah prior to commencing on project operations.

Above information on project operational management clearly indicates that, despite the one-year extension in time without additional funding, the project was implemented effectively. More importantly, the project was implemented in high compliance with the project agreement as well as established rules and procedures applying to ITTO projects.

Extension of the project implementation for one year without additional ITTO funding was due solely to technical reasons including slow pick-up caused by unfamiliarity with the format of ITTO procedures and lack of mutual understanding among team members, some team members were over-committed with other duties, delay in procurement of logs supply in Peninsular Malaysia, delay in air-dry test of acacia for mechanical testing, late arrival of chemicals to be used and in-availability of certain key equipment. The first semester of the extension was used for completing the originally planned activities while the second semester was used to implement outreaching activities requested by the PSC. The extension therefore was only justifiable.

4.1.8 Overall sustainability

There are several project elements that are conducive to sustaining contribution of the project to a successful program on forest plantation development and future viability of the wood-based industry sector in Malaysia; among the prominent ones are:

- FRIM has embarked, starting this year, on a project to conduct testing on planted jelutong and sentang timbers using the harmonized testing methods developed under the project. This

testing exercise is the expansion of similar activities initiated under the project but applied to different timber species.

- FRIM together with SFC have secured funding from the Ministry of Science, Technology and Innovation Malaysia to conduct further study on drying problem of A. mangium that remains unresolved on economic ground. The activity was carried out under the project and identified technically feasible solution to the problem yet at considerable cost. The primary objective of this study is therefore to identify an appropriate drying technique that is technically feasible and economically viable.
- The TRTTC in Sarawak has and will continue conducting studies on planted wood properties and development of value-added products using state funds and contribution of forest industries covering not only Shorea macrophylla species but also other timber species notably kelampayan.
- The FRC of Sabah is conducting studies similar to those in Sarawak at the request of some forest industries which are expansion and follow-up to the activities initiated under the project. The studies are financed with government funds and contribution of the private sector.
- The longer-term objective of the project is to promote a sustainable forest industry in Malaysia by ensuring the economic viability and marketability of the products developed. The completed project only provided the strong foundation needed; hence further up scaling of the results obtained is required taking into consideration the feedback gathered from the beneficiaries. This has been accomplished through formulation of a project proposal entitled “Life Cycle Assessment and Carbon Foot Print-Based Initiative for Process Improvement and Innovative Product Development of Sustainable Plantation-Grown Acacia mangium in Malaysia”. The specific objective of this project is to “enhance carbon foot print of selected products from plantation-grown Acacia mangium through process improvement and innovative products development”. Some activities of this project are continuation and expansion of selected activities initiated under completed project and deal with processing technology and innovative product development at minimum carbon emission.

Sustainability of the project is very much determined by its actual and potential contribution to intended primary beneficiaries, the forest industries and state governments. Applicability of the technologies identified and introduced by the forestry R&D institutions on economic ground is a strong incentive for the beneficiaries to technically, financially and politically support continuation and expansion of the activities that were initiated under the project.

4.1.9 Overall success/failure of the project

Overall, the project can be rated as successful in delivering its planned outputs and achieving its intended objectives. Judged using the indicators defined in the LFM, ten planned outputs had been fully delivered and the specific objectives achieved. Aside from the success, the project had also unsuccessful in identifying an economically viable drying technique for A. mangium; the technique identified was too costly that its practical application was not justifiable. Moreover, the project was not completed within the originally sanctioned time budget, i.e. 36 months, for technical reasons that were justifiable.

Judged by the impacts the project has created, the project is indeed a big success. The project is successful in raising awareness of beneficiaries on potential benefits of plantation timbers accruable to them through application of appropriate technologies developed based on properties of the timbers. The project has also favorably affected policies and programmes on forest plantation development across the states. In addition, project implementation has strengthened the capacity of individual R&D institutions across the states through provision of basic facilities and competent professionals to carry out future studies similar to those ones carried out under the project; at the same time, coordination amongst three regional research institutions has also been significantly improved through project implementation.

Another success of the project worth mentioning is its sustainability. The three regional forestry research institutions are carrying out research activities using the harmonized testing methods developed under the project; these activities are the continuation, expansion or modification of

particular activities that had been carried out under the project. In this manner, positive impacts of the project can be expected to be occurring in the long-run thus the project can be categorically stated as a successful investment with sustainable positive impacts.

4.1.10 The overall cost of the project

The sanctioned total amount of project budget was US $ 1,446,001 comprising contributions of ITTO, GOM and Private Sector in the amounts of US$ 499,867, US$ 830,134, and US$ 166,000, respectively. The unspent amount of ITTO contribution was US$ 1,195 at project completion which had been settled up in accordance with ITTO procedures.

Recall that the project had been awarded a one-year extension in time without additional funding by ITTO; the extension was justifiable due to the delay in completion of particular activities, simply for technical reasons. The extension, however, unavoidably entailed additional costs that had to be shouldered by GOM/Private Sector. Such costs, mainly for payment of key personnel, office space, utilities, etc., had been contributed by GOM without interfering with project operations indicating the strong GOM's ownership of the project and its convincing commitment to successful project operations.

4.2 Lessons learned

i. Project identification and design.

- In order to construct a conceptually and operationally sound project design, it is essential to perform and adequate problem analysis; relevance and effectiveness of project interventions to resolve the problems at hand are ensured only by knowing the consequence as well as direct and indirect causes of the key problem addressed by the project;
- In order to minimize adjustments to planned project activities during the course of project implementation, full participation of project beneficiaries in project identification and problem analysis is indispensable;
- In the identification of species used for the project, one common species could have been selected for the three regions instead of one for each region to facilitate more extensive studies on the species selected and comparisons between regions of wood properties of different age groups and planting sites; selecting one species would have resulted in greater efficiency, reduced cost and more added value;
- Disparity in manpower, expertise and facilities of regional forest research institutions should have been identified during the project development stage to allow for proper allocation of load work, otherwise to put institutional safeguards in place to ensure equivalent roles of individual institutions involved in project implementation.

ii. Project implementation

- Any unforeseen circumstances for any reasons should be made known earlier by the project secretariat so that other members in the same team could render the necessary assistance;
- Timely disbursement of funds is essential for the smooth running of any project; to this end, all parties involved in the project must be mindful of their responsibilities for smooth disbursement process and relevant procedures for disbursement must be clearly spelt out and understood by all parties concerned;
- Instances whereby researchers assigned to the project were over-committed to other projects and/or other official duties such arrangement must be minimized to avoid any complications and unnecessary delays in operations;
- Option for implementation mode is best to be put in place for critical processes in order to avoid unnecessary delay; this could have been done as in the case of log supply for

research material and the refractory drying nature of A. mangium with affected the smooth flow of selected testing activities;
- Members of the PSC should meet more than once a year and be kept informed of the progress in implementation that any delay could receive immediate and timely attention;
- Frequent meetings among members of the Technical Working Committee (TWC) had facilitated updating of technical progress and exchanging of views in addressing any technical obstacle faced and proved contributing meaningfully to the smooth project implementation.

5. Conclusions and Recommendations

5.1 Conclusions

Following are the conclusions drawn from the whole evaluation process of the project:

- The problems addressed were consistent with the issues surrounding sustainable development of Malaysian forest industry but were inadequately analyzed that the project design constructed was somewhat weak because the main causes and sub-causes of the problems addressed were not well identified; conformity of the project interventions to the actual causes was conceptually lack of clarity;
- Despite weaknesses of the project design, the project had been succesfully implemented and completed through full execution of all planed activities, delivery of the defined outputs and achievement of its defined specific objectives;
- The project was implemented in an effective manner in full compliance with the project agreement and established ITTO rules and procedures; the required documents had been prepared in accordance with existing ITTO manuals and timely submitted to ITTO for scrutiny and endorsement;
- The strategy pursued in implementing the project was employment of a multi-diciplinary group of national and foreign experts, agencies and stakeholders directly or indirectly involved in the project execution with Forest Research Institute Malaysia (FRIM) acted as the national coordinating agency and TRTTC of the SFD and Forest Research Centre (FRC) of the FDS acted as the regional collaborating agencies;
- The project has generated significant favorable impacts: attitude of the primary beneficiaries towards commercial utilization of planted timbers cum development of forest plantations is changing and encouraging; enthusiasm of the forest industries for availability of appropriate processing technologies for planted timbers is growing while policies and programmes on forest plantation development are enhancing;
- Technology transfer had been performed effectively through wide dissemination of the project outputs and publications, conduct of the workshop and seminar on improved utilization of tropical plantation timbers, execution of the road-show program throughout the regions and training of Malaysian researchers at FFPRI of Japan;
- Overall, sustainability of the project is promising: the forest research institutions across the regions are carrying out studies and experiments relating to planted wood properties and processing techniques using the methods developed under the project and a follow-up project proposal has been sumitted to and approved by ITTO and is currently awaiting funding for its implementation;
- Overall, the project can be categorically rated as a succesful undertaking in terms of the positive impacts on the environment of planted timber utilization it is generating and the promising sustainability of the project;
- The project had been implemented in a cost effective manner; the sanctioned amount of ITTO budget was prudently expended to fully execute the 32 originally planned activities as well as the outreaching activities tasked by the PSC which was signified by the approval of the final financial audit report by ITTO.

5.2 Recommendations

a. For the Executing Agency

- In formulating future similar projects, strict adherence by proponent to existing ITTO Manual on project formulation and full participation of the primary beneficiaries must be assured in order to arrive at a sound and workable project design;
- In convincing the forest industries on the commercialization of planted timbers, the regional R&D institutions should continue doing intensified research on wood properties and appropriate processing techniques, independent of external fincancial assistance, in close consultation with the forest industries;
- In speeding up the development of forest plantations, it is strongly advisable to make use of the experience of other countries in order to economize use of needed resources;
- The consultation held with Asiaprima Resources Sdn Bhd in Pahang revealed that it has documented vast information on properties of acacia timber and its suitable processing techniques through the research work it undertook for years in collaboration with an Multi National Company (MNC); exploring possibility of sharing this information is worth considering as this information would be very useful for purpose of developing effective R&D programs by concerned forestry research insitutions.

b. For ITTO

- To ensure technical soundness of project design and relevance as well as effectiveness of project interventions, adherence by any proponent to existing manual on project formulation is to be fully observed by the Expert Panel in assessing any project proposal;
- To provide funding for immediate implementation of proposed project PD 600/11 Rev. 1 (I) entitled “Life Cycle Assessment and Carbon Foot Print-Based Initiative for Process Improvement and Innovative Product Development of Sustainable Plantation-Grown *Acacia mangium* in Malaysia” that has been approved by the ITTA during its relevant Session as this project is a follow-up to the completed project that incorporates the issues on carbon emission relating to the process of value adding wood products development.

Annex 1. The terms of reference

Terms of Reference for the Ex-Post Evaluation

PD 306/04 Rev. 1 (I) **"**Improving Utilization and Value Adding of Plantation Timbers from Sustainable Sources in Malaysia"

i. To assess the project's design and contribution to the achievement of its respective objectives.
ii. To assess the achievement of the project's outputs and specific objectives.
iii. To evaluate the impact and relevance of the project, detailing its impact on development and specific objectives as stated in the project document.
iv. To determine the effectiveness of technology transfer to target groups if applicable.
v. To assess the overall post-project situation for the project, including the conditions of its intended direct or indirect beneficiaries.
vi. To define and assess unexpected effects and impacts, either harmful or beneficial, and present the reasons for their occurrences.
vii. To analyze and assess implementation efficiency, including the technical, financial and managerial aspects.
viii. To assess the overall sustainability of the project after completion, and include appropriate recommendations to safeguard the continuing of its positive impacts, and enhance utilization of the technologies (if applicable) and other results developed by the project.
ix. Taking into account the results of the evaluation, make an overall assessment of the project's relative success or failure, to summarize the key lessons learnt; and identify any issues or problems which should be taken into account in designing and implementing similar projects in future.
x. To assess the overall cost of the project with original budget provisions, and their respective linkage with the overall results.
xi. To prepare the evaluation report in accordance with the references for the Project Evaluation Report, as contained in the ITTO Manual for Project Monitoring, Review and Evaluation, third edition and the ITTO Manual on Standard Operating Procedures 2009.
xii. To assess the project's contribution to the relevant ITTA objectives (1994 and 2006) and relevant ITTO Strategic Action Plan.
xiii. To prepare one or more articles, for possible publication in the ITTO Tropical Forest Update (TFU) magazine, in consultation with the editor, containing an overview of the project and summarizing the lessons learned from the evaluation work. Appropriate photographs should be provided.

Annex 2. List of the organizations and persons visited

Date	Place/Site	Organization	Remarks
13 May 2013, Monday	Kuala Lumpur	FRIM	A.M.: Entry meeting with Reps. of EAs and main stakeholders presided by Deputy DG FRIM Attendees: 12 persons
			P.M.: Meeting with former Project Key Personnel chaired by Dr. Tan Yu Eng
14 May 2013, Tuesday	Kemasul, Pahang	Asiaprima Resources Sdn Bhd	Met with Mr. Lau Boon Chong, Executive Director, and 3 staffs
		Robin Resources Sdn Bhd	Met with Mr. Diong Cheu Ling, Plant Manager; and Dr. Au Khuan Chuen, General Manager
15 May 2013, Wednesday	Kota Kinabalu	FRC of the Forest Department of Sabah	Met with Mr. James Josue, FRC Officer
		STIA	Met with Mr. Fong Ming San, Asst. Sec-General; Mr. Peng Juan Tan, Rep. of Forest Industries; Ms. Brenda Wong, Sec. of STIA
		Worldtrend Garden Furniture Sdn Bhd	Met with Ms. Sharon Tsang Siu Lan, General Manager
16 May 2013, Thursday	Kuching	STA	Meeting with Management Board presided by Mr. K.H. Ling Attendees: 14 persons
17 May 2013, Friday	Kuching	Sarawak Forest Department & Sarawak Forestry Corp.	Courtesy call on Datu Haji Ali Bin Yusop, Director, SFD
			Visited gallery of plantation timber products
			Meeting with TRTTC researchers presided by Ms. Lucy Chong and Mr. Wong Ting Chung, Deputies General Manager Attendees: 13 persons
	Lundu west of Kuching	Freshwood Sdn Bhd	Met with Dato' Ngieng Ping Wei, Managing Director and staffs

ANNEX 3
Executing Agency's Views

The Executing Agency and its collaborating agencies:

- are proud of the accomplishments of ITTO Project PD 306/04 Rev. 1 (I) and the enthusiasm it has generated in the value-added utilization and efficient processing of plantation timbers in the three forestry regions in Malaysia;
- greatly acknowledge the invaluable contribution of ITTO, FFPRI, and not to forget, the donor country(ies) to this meaningful undertaking;
- is thankful to the ITTO project managers, Dr. Ma and Dr. Tetra, for providing the necessary support and guidance in making this project a real success;
- appreciates the professional evaluation made by the consultant within a very tight schedule, besides providing very constructive comments throughout;
- shall take note of the recommendations provided by the consultant particularly with regards to the following:
    - In formulating future similar projects, **strict adherence** to existing ITTO Manual on project formulation and assure full participation of the primary beneficiaries in order to arrive at a sound and workable project design;
    - In convincing the forest industries on the commercialization of planted timbers, the regional R&D institutions shall **continue** doing intensified research on wood properties and appropriate processing techniques, independent of external fincancial assistance, in close consultation with the forest industries;
    - In speeding up the development of forest plantations, **make use** of the experience of other countries in order to economize use of needed resources; and
    - explores gathering of more **industrial information and experience** such as those of Asiaprima Resources Sdn Bhd in Peninsular Malaysia and others in Sabah and Sarawak which would be very useful for purpose of developing effective R&D programs by concerned forestry research insitutions.

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