FORIG - ITTO PD 179/91 REV. 2(M.I)

Industrial Utilisation and Improved Marketing of some Ghanaian Lesser-Used Timber Species from Sustainably Managed Forests

PROJECT COMPLETION REPORT

Prepared for the : International Tropical Timber Organisation

By the: Forestry Research Institute of Ghana (FORIG)

Project Leader: Augustus G. Addae-Mensah

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PROJECT COMPLETION REPORT

Project Identification

(a) Title:	**Industrial Utilisation and Improved Marketing of some Ghanaian Lesser-Used Timber Species from Sustainably Managed Forests**
(b) Serial Number:	**PD 179/91 Rev. 2 (M.I)**
(c) Executing Agency:	**Forestry Research Institute of Ghana (FORIG)**
(d) Host Government:	**Ghana**
(e) Starting Date:	**1993**
(f) Actual Duration:	**48 Months**
(g) Actual Project Costs :	**US$ 985,273**

PART I : EXECUTIVE SUMMARY

1. Background Information about the Project

1.1. Key problems it intended to solve (pre-project situation)

The tropical hardwood resources of Ghana had once been considered as very rich. Past inventory studies have indicated that there are about 680 different species of trees in the forest reserves of Ghana. In it's recent inventory services, the Forestry Department of Ghana identified approximately 420 tree species which attain timber size and therefore, are of potential economic value. Further analysis of the inventory results indicated that 126 of these species occur in sufficient volume to be considered exploitable as a raw material base for the timber industry. Forest products exports coming from over 253 forest reserves covering about 15,913 sq. km ranked third in the country's foreign exchange earnings. Only exports of Gold and Cocoa has been exceeding timber exports in their ability to earn foreign exchange during the last decades. It is therefore clear that Ghana is dependent upon timber products to help meet some of the country's development goals.

A review of the forest product's export permits covering the past twenty five years indicated that 66 timber species have been exported from Ghana at least once. Currently there are about 30 timber species exported regularly from Ghana. however, these figures do not indicate the dependence of the Ghanaian forest industry on a very few established species, the so called primary species. In 1990 over 70% of log exports were from two species (Wawa, Koto). That same year over 70% of lumber exports consisted of three species (Wawa, Odum, Mahogany) and over 69% of veneer was from 4 species namely, Asamfona, Makore, Sapele, Mahogany(1990 Forest Product Inspection Bureau Export Permit Report). It is a known fact that foreign importers have been very reluctant to import Lesser-Known (LKS) or Lesser-Used (LUS) species. They preferred to concentrate their demand only on the few established species which were known to them. another important setback in the Ghana timber trade is the lack of readily available market strategies based on technical information regarding the properties and appropriate end-uses for most of the Lesser-Used Species. These and other setbacks made the primary species more preferable, thereby putting so much pressure on them with the result that they are now becoming depleted from the forest.

In recognisance of the need to maintain a sustainable supply of raw material for the timber industry and rationalise an effective utilisation of the Lesser-Used Species, FORIG found it necessary to carry out an extensive research into the means of establishing a permanent resource base, and promoting a proper industrial utilisation of the vast majority of LUS available in the Ghanaian forest. The project was therefore conceived and carried out with the aim of determining the possibility of utilising LUS to supplement the dwindling commercial species for the production of various industrial wood products.

1.2 Specific Objectives

The specific objectives of the project are:

(a) to select a number of LUS that are most promising from the point of view of their availability as well as silvicultural features and their technical properties.

(b) to determine the effect of harvesting the selected LUS on the ecology and forest management and study the influence on the life's of the forest dweller.

© to establish the basic technological properties and the machining characteristics of the selected Ghanaian LUS.

(d) to assess the properties and be able to identify and establish specific for particular end uses.

(e) to establish a product development mechanism to develop and promote traditional and non traditional value-added products.

(f) to establish effective marketing strategies for the intermediate products from LUS.

1.3 Specific Outputs

At the end of the project, the following outputs, must have been accomplished.

1. An awareness must have been created in the Ghanaian timber industry about the need for increased processing of Lesser Used Timber Species as a means of broadening the resource base of the industry so as to reduce the pressure on the dwindling primary species and thereby improve sustainability of the forest resource.

2. The basic working and technological properties of the selected species such as seasoning and preservation, machining, gluing peeling and slicing characteristics would have been tested.

3. Marketable high value-added end-use products that could be manufactured from the selected species must have been identified.

4. Prototype products in lumber, veneers, plywood, outdoor furniture must have been developed.

5. An identification of appropriate silvicultural system and improved forest management practices consistent with sustainable production must have been enumerated as a result of researching the effects of harvesting intensity on the forest ecosystem.

6. A description of the structure of the market would have been established for tropical timber in the consuming countries and also of the dominant market channels through which

existing wood products from LUS move; and those market channels with a high possibility of substitutability by products from LUS move.

7. Training workshops would have been conducted throughout the country for small and medium sized wood working artisans and supervisory staff in industrial establishments as part of a technology transfer programme.

1.4 Strategy Adopted in Carrying out the Project

The strategy adopted in carrying out the project was primarily to ensure that all activities under the three main components of the project.

i.e.: -Ecological studies, Product development studies, and Marketing studies are implemented smoothly in accordance with the work plan and time table for the project implementation.

Significant activities under the project were aimed at

investigating and evaluating the occurrence by volume of 14 selected Lesser-Used species, and whether adequate information exists on their mechanical properties, their machining, gluing, slicing, peeling characteristics, and possible end-use areas.

- implementation of product development research and carpentry and joinery work with the species selected. The product development research was a broad-based development programme which involved the industry.

- studying the ecological problems associated with the increased exploitation of the forest and bringing into main stream industrial utilisation of the selected LUS.

- conducting in-depth marketing research, and studying the consumer preferences and how to gain market acceptability from LUS.

- conducting seminars and training workshops to deal with the transfer of information developed out of the research work.

The Main Strategies and Measures included:

1.4.1 The Identification and Designation of Project Staff and Personnel namely:

Project Leader

Consultants for - Forest Ecology, Wood Technology, Further processing, Marketing and their local counterparts, supporting technical staff, supporting administrative staff and hired aides.

The Terms of Reference (TOR) for the project staff as specified in the project document were accordingly adhered to.

1.4.2 - The Project Leader made frequent dialogue with all Consultants and local staff of the project and reminded them of the objectives, work and time schedules and expected output after the project completion.

1.4.3 - The Project Leader and the local counterparts evaluated the implementation of the studies continuously. They gave suggestions and recommendations to the study groups on how to improve the conduct of the study in order to achieve the set results.

1.4.4 - A half-yearly project progress report including a statement of budget, expenditure and balances was submitted to ITTO every six months. The release of Project funds by ITTO usually depended on the submission of the half-yearly reports and application by the Project Leader.

1.4.5 - A Steering Committee with members drawn from the four basic interest areas of Research, Industry, Marketing and Ecology. The Director of FORIG served as chairman with other members being nominated from: the Ministry of Lands and Forestry, Forestry Department, Timber Export Development Board, Ghana Timber Millers Organisation, Ghana Furniture Association, The timber industry, The Water Resource Research Institute, FORIG and also a representative from ITTO.

1.4.6. - Procurement of equipment and supplies for the project followed the standard operating procedure of the Ghana Government Supply Commission and the ITTO Guidelines for procurement and payment of services. All disbursements, vouchers, and documents relating to project expenditure were signed by the director of FORIG, the project leader, and the project accountant.

1.4.7. - Project funds were deposited by ITTO into a recognised Bank in Takoradi, Ghana and supervised by the Managing Director and Accountant of TEDB. All funds required for the implementation of the project were then applied for by the project leader to TEDB which in turn released the funds in bits to FORIG.

1.5 - The Project Planned Duration and Planned Overall Costs and Highlight

1.5.1. - The Duration of the Project as planned in the project document was for three years. However as work advanced it was realised that the volume of work involved could not be accomplished within that period. An extension of one year was therefore granted by ITTO.

After completion of four years work, ITTO granted yet another year for contingency work solely for more ecological studies and training workshops. Topics covered during the period of contingency work were as follows:

1. In-depth studies on disturbance, tree damage and regeneration following logging.

2. Training Workshops for Small Scale Wood Working Industries on the Utilisation of Lesser-Used Species.

Training Workshops were conducted on the whole in the following centres

1. Ashanti Region - Kumasi
2. Greater Accra Region - Accra
3. Western Region - Takoradi
4. Eastern Region - Koforidua
5. Brong Ahafo Region - Sunyani

1.5.2. - The planned overall costs of the project was

- ITTO Contribution US$ 985,273
- Ghana Government Contribution US$ 148,907 in kind.

The specific sector in Ghana that the project relates is the wood-based industry sector. It is clear that Ghana is very much dependent upon timber products to help meet some of the country's development goals. The rapid depletion of the country's timber resources and the increasing demand for wood has therefore been a major concern of the wood-based industries sector.

2. PROJECT ACHIEVEMENTS

2.1 Outputs Achieved

2.1.1. Products: An awareness in the industry about the need for increased and further processing of selected LUS as a means of broadening the forest resource base on a sustainable basis had been created in the country.

2.1.2 The basic working and technological properties of the selected species such as seasoning and preservation, machining and gluing properties, peeling and slicing characteristics had been established.

2.1.3 Some high value-added end-use products that could be manufactured from the selected species were established.

2.1.4 Prototype products in lumber, veneers, plywood, flooring panels, furniture had been developed.

2.1.5. Ecology: Appropriate silvicultural systems through the creation of canopy openings to stimulate the regeneration of suitable seedlings had been identified.

2.1.6. A description of the modification of nutrient cycling in tropical forests as a result of different intensities of logging was made.

2.1.7. The level of destruction of residual trees at different intensities of logging were enumerated.

2.1.8. A description of the modification of climatic factors as a result of different sizes of canopy openings was made.

2.1.9. Marketing: The structure of the market for tropical timber in Europe and North America has been described.

2.1.10. A description of the dominant market channels through which existing wood products from LUS move, and those market channels with a high possibility of substitutability when products from LUS move, was published.

2.2. Specific Objectives Achieved

2.2.1 Products: Specifically the project was able to sell the idea that Outdoor/Garden furniture from the Ghana LUS could compete very well on the international market.
Specially designed garden chairs and tables, sun beds, beach recliners, deck boards for gardens, Pallets etc. were manufactured and displayed at International fairs and exhibitions. They were well received.

The anatomical and related properties of the 14 originally selected LUS belonging to 10 plant families were determined and established.

Relative densities and mechanical properties of the selected LUS were reviewed. Sawing tests were carried out to determine the sawing characteristics of all the selected LUS. Other machining characteristics like Boring, Turning and Shaping of the selected LUS were established.

The technology of using wooden dowels in furniture manufacture was introduced to the Ghanaian Carpenters and furniture producers.

Studies into the removal of the unpleasant odour in Essia (*Petersianthus macrocarpus*) were carried out. It was established that through steaming periods of 24 hours, 36 hours and 48 hours the odour could be well minimised. The degree of tolerance was best for the longer periods of 36 hours and 48 hours.

Control of sapstain in the selected LUS was established using 2% PCP and 3% Dieldrin NP-1 and Busan 1009.

A study of the reaction of the selected timber species with plain unprotected steel nails were carried out. Different magnitudes of nail bleeding in various species were established.

2.2.2. Ecology

An improved forest management practice consistent with sustainable production was enumerated as a result of researching the effects of harvesting intensities on the forest eco system.

Baseline data on the effects of logging on hydrological properties of the three forest zones where the selected LUS grow i.e. wet evergreen forest zone, moist evergreen forest zone and dry semi - deciduous forest zone were collected.

2.2.3. Marketing

The project has specifically also revealed the most important factors which influence the introduction and acceptance of LUS on the international market. These are:-

- The availability of an adequate resource supply.
- The availability of good technical and promotional information.
- The ability to export small trial volumes of LUS.
- Low introductory prices to encourage rapid market penetration.
- Win an influential firm to accept a particular LUS.

2.2.4. General

Skilled labourers and supervisory staff in industrial establishments have received relevant training through the project's training workshop as part of the technology transfer strategy. Furthermore, manuals containing relevant research and commercial information to enhance promotional activities have been published.

2.3 Contribution to the Achievement of the Development Objectives

Four years of research and development has really contributed a lot to the proper utilisation of LUS in the wood based industry. The possibility of processing and utilising Lesser Used timber species of Ghana to help augment the supply of industrial wood has been well established. The production of lumber for the wood industry has been demonstrated. Many of the project's outputs and achievements have produced direct and indirect benefits to the producers and consumers of wood and wood products and to the government's forest conservation programme.

The identification of a number of LUS which have the potentials of replacing the dwindling primary species by virtue of their adequate resource supply, their silvicultural features and their technical properties has been accomplished. Determination of their basic properties such as anatomical, physical and mechanical, have been accomplished. Tests and evaluation of the working properties such as sawmilling characteristics, seasoning, treatability, machining, gluing

and finishing i.e. sanding schedules lacquering and painting have been completed. Manufacture of prototype products such as outdoor furniture, parquet floor panels, pallets, veneer and plywood have been accomplished. A great awareness in the country for the need to conserve the forest and manage the forest sustainably has been established.

The market requirements and competitiveness have been better established than before. Appropriate processing technologies improving on previous know-how have been established. After the project completion we have been able to determine what training needs are necessary at the skilled manpower, supervisory and management levels for the different product development technologies than before.

Generally the situation after the completion of the project has been much different from the pre-project situation.

3. TARGET BENEFICIARIES INVOLVEMENT

The general framework for implementing the project was:

1. Selection of industrial processing units to participate as much as possible.

2. Concluding agreements with companies for using their facilities.

3. Implementing product development programmes in industrial establishments, since the industries will be the immediate beneficiaries of the results.

In order to make the research results utilizable immediately in industry, it was proposed to carry out the applied research in industrial firms. Selection of the Companies was based on

- their interest and willingness to get involved.

- ready to contribute managerial and technological suggestions in the manufacture of particular products.

The following firms were proposed to participate in one way or another:

Mim Timber Company	-	(Kiln drying, mouldings, sliced veneer)
Mim Scanstyle	-	(furniture, mouldings and floor panels)
Ehwia Sawmill	-	(Sawing, Air drying)
Western Veneer and Lumber Co.	-	(Veneer, lumber)
Ghana Primewoods Products	-	(Sliced Veneer)
Kumasi Furniture & Joinery	-	Furniture, mouldings & Pallets
Specialised Timber Products	-	Lumber
Akuaba Toys	-	Toys, furniture
FABI Timbers	-	Lumber, drying, Mouldings
A. E. Saoud	-	Lumber, Mouldings, Dowels

There was a harmonious relationship and co-operation between the research personnel and that of the beneficiaries. Although some of the firms listed in the project document were not able to participate very extensively, their umbrella organisations such as, The Ministry of Lands & Forestry, Ministry of Environment Science & Technology, the Timber Export Development Board, Forest Products Inspection Bureau, The Ghana Furniture Association (FAWAG), Ghana Timber Millers Organisation (GTMO) took part in most of our discussions and exhibitions. The officers of these associations committed their support and co-operation during the promotion activities. Special mention has to be made of FABI - timbers in Kumasi which at one point stopped it's production for 8 hours solely to give way for the project. It is hoped that the wood industry will utilise the technologies and all other information derived from the project.

4. LESSONS LEARNED

4.1.1. Development Lessons.

Aspects of Project design which contributed to the success of achieving the development objectives

After the approval of the project proposal by the ITTC and the release of funds by the ITTO Secretariat, the project management headed by the Project Leader convened a meeting with the project group leaders and all scientists involved to set out a working plan of the whole project programme. Local consultants and experts from the industry who had hitherto been constituted into the project's Steering Committee were also invited. At the meeting the working plan of the project and sub-projects were discussed, assessed and re-examined. After four years of implementation it has been clearly seen that the work plan has been carried out smoothly and successfully. Based on the outputs obtained, we can safely say that the development objectives have been fully attained indicating the effectiveness of the design.

4.1.2 Changes in Intersectoral links which affected the project's success

During the period of the project's implementation there remained a strong linkage between FORIG and ITTO and also between FORIG, TEDB, FPIB, and the timber industries. Also a very good relationship with the University of Washington Department of Wood Science has been established. Co-operation with these institutions and the general public was so good that there was no need for any changes in intersectoral links and the project went on very successfully.

4.1.3 Additional arrangements that could improve co-operation between the relevant parties interested in the Project

One cardinal aim of the project was to make the project results and the technology know-how immediately useful to the industry and the forest concession owners as well as the end users of the products. In addition to the usual co-operation with ITTO, TEDB, FPIB etc. the executing agency FORIG worked out close co-operation with the Ministry of Lands and Forestry as far as concession owners were concerned. Also very close connections were

established with firms like FABI Timbers, Ghana Prime Woods and others with facilities for Sawmilling of logs, drying and veneering of LUS. By so doing the Industry acquired first hand information on the introduction of LUS into the system. The Furniture Association of Ghana was also kept in constant knowledge of the possibility of using certain LUS for specific furniture components.

4.1.4 Factors which will most likely affect project sustainability after completion

It is important that after the completion of the project the results and recommendations made by the project remain sustained to enable a successful utilisation of the residual forest in the country. Some of the factors which may however affect the project sustainability may include the sort of regulations which the Government may enact to protect an economical harvesting of LUS and a general sustainable management of the forest as a whole. For example, the activities of the chain-saw operators must be very wisely controlled.

Another important factor will be the export price of LUS. A proper marketing strategy must be put in place to ensure a continuos market sustainability.

The availability of an adequate long term resource supply is also very important. Occasional promotional activities and training workshops to highlight the processing technologies and technical properties may also add a lot to sustain the project well after completion.

4.2. Operational Lessons

4.2.1 Project Organisation and Management

The project organisational system was as follows:

- Project Manager of ITTO
- Project Steering Committee.
- Project Leader
- Project Study Groups, Consultants and Staff for Ecology, Wood Technology & Product Development, Marketing.

The Project Office was at the Forestry Research Institute of Ghana, P. O. Box 63, University, Kumasi, Ghana.

The management procedures were followed in the following manner.

- Project activities implementation

- Project financial management - by TEDB and FORIG Accounts Departments

- Project Monitoring and evaluation - by Steering Committee

The very effective and critical guidance and review offered by the Project Steering Committee were most useful to the successful implementation of the project. Also the critical review and regular suggestions and guidelines offered by local industry reviewers as well as the Project manager of ITTO Dr. Douglas Pattie were most useful. The dedicated services, efforts and patience showed by the Project Leader in the face of unworkable contra ideas sometimes from some Steering Committee members finally created an atmosphere of objectiveness and open mindedness which finally led to the attainment of the established goals and objectives. The full co-operation of the individual study groups contributed very significantly to the success of the project.

4.2.2. Project Documentation

The project is documented through the Project Proposal with the serial No. PD 179/91 Rev. 2 (M,I) titled : **"Industrial Utilisation and Improved Marketing of some Ghanaian Lesser-Used Timber Species from Sustainably Managed Forests".** For a successful implementation of the project, the Project Management adopted specific guidelines in the supervision of the project personnel, in the management of the project funds and in the monitoring of project activities. All project documents, reports and correspondence were retained at FORIG.

4.2.3 Monitoring and Evaluation

Monitoring reviews were carried out by the project members every quarter under the supervision of the project leader. These reviews provided an opportunity to identify problems and implement solutions to ensure that progress is maintained towards achieving the project goals.

Furthermore the Project Steering Committee conducted half yearly meetings to check project work, review and examine project's progress and discuss important issues and make decisions on important matters. During the Steering Committee meetings, the Project Leader reported on the various activities accomplished by the project for the period under review.

Apart from all the reviewing and evaluations the project team with it's consultants held daily or weekly meetings and made various recommendations to ensure the successful implementation of the project.

4.2.4. Quality of Project Planning

For the achievement of the project objectives a project plan was formulated after careful review and analysis of the various activities to be carried out. A performance chart for every 1/2 year stating planned activities and targets was prepared. After every ½ year the actual performance output of each study was compared with the planned targets. From the chart the project management was able to detect what percentages of the planned targets were

accomplished, which portions of the project were on tract and which were short of target. A half yearly report was then prepared and sent to ITTO.

Travel of Project personnel, procurement of supplies and equipment were properly planned and co-ordinated by the project management. Where necessary approval was sought from the ITTO secretariat. On the whole the project planning was satisfactory to the success of the project work.

4.2.5 Definition of the roles and responsibilities of the Institutions involved in the project implementation

The main activists of the project were:

(i) The ITTO. This provided an amount not exceeding US$ 985,273 for the purpose of implementing the project. It also saw to it that the project was properly accomplished and that the objectives and expected outputs were satisfactorily attained.

(ii) The Ghana Government provided in kind support not exceeding the value of US$ 148,907. The Government represented by the Ministry of Lands and Forestry made it possible for the project to be carried out at all at FORIG, at various forest Concessions at a number of timber industries at the Timber Export Development Board (TEDB) and also provided facilities which made it possible for the project team to participate in various Trade Fairs and Exhibitions.

(iii) FORIG:- Council for Scientific & Industrial Research

FORIG was the main implementing Institution of the project. It carried out the day to day running of the project under the supervision of the Project Steering Committee in accordance with ITTC regulations. FORIG provided the local staff for the project as well as office and laboratory facilities, and also necessary accommodation for all project activities. It also provided ITTO with budget statements, expenditure and balances as well as progress reports, completion reports and various publications from the project. FORIG worked at various points in close co-operation with TEDB, FPIB, Water Resource Research Institute and the Timber Industries.

4.2.6 . Actions Taken to avoid Variation between planned and Actual Implementation (Schedule, Cost etc)

The Project implementation group saw to it that unnecessary deviation of the actual from the planned target activities was avoided. Release of funds by the ITTO was channelled through the TEDB after the necessary requirements had been fulfilled. The project team then requested from TEDB as and when funds were needed at FORIG, this was then promptly released to the accountant at FORIG. The request for timber species for research from the Concession owners in the forest zones were made with the assistance of the Forestry Department in order to avoid disappointment and delays. Order of research equipment, vehicles etc. were made with the assistance of TEDB.

Factory facilities had been long arranged for before the project started, and laboratory facilities necessary for the implementation of various activities were available so that on the whole deviation of the actual from the planned targets was minimal.

4.2.7. External Factors that influenced the project implementation that could have been foreseen

It was already to be anticipated that co-operation with certain companies to offer factory time and space could present some difficulties. Also it was evident that an immediate acceptance of products from LUS without misgivings could not be expected. A pre-project orientation Seminar was therefore held to brief the timber industry of the aims and objectives of the project and to raise the awareness of the general public of the dangers of forest depletion and the need for everybody to contribute in the sustainable management of the forest and the promotion of LUS. The Timber Export Development Board, The Forest Products Inspection Bureau, Ghana Timber Association, Ghana Timber Millers Organisation, Ghana Furniture Association, Industrialists, Wood Industry Managers, Representatives in Ghana of Overseas agents, End users, local architects and engineers etc. were all duly briefed.

4.2.8. External factors that influenced the project implementation and that could NOT have been foreseen

The unforeseen constant depreciation of the Ghanaian currency as against the US dollar, and the increase in prices of supplies and materials affected the project to some extent.

A strict prioritisation in the procurement of supplies and materials and in travelling schedules of project staff was therefore undertaken.

5. RECOMMENDATIONS

For the efficiency of future similar projects it would be recommended that:

1. Ecology:
   Forest environmental impact research be made to tie up with the programmes and regulations of the Environmental Protection Agency (EPA), and the Forestry Department. It will also be useful to draw in the private wood industries and the Millers Association.

2. Marketing
   Within the framework of the present socio-economic context it is necessary that all future research should stress the need for an extensive and professional marketing campaigning. Research must at every point in time find out consumer demand whiles at the same time attempts are made to promote the promotables. Future work should stress the need for co-operation between the producing countries especially at the regional level in such areas as joint research and outreach programmes.

3. Processing and Products Development

Studies in the conversion technologies, machining characteristics, physical and mechanical properties of various LUS must be intensified. The present project concentrated on only a few species from which some prototype products were developed. The consensus is that the experiences gained from the present project should be extended to other LUS.

Generally, the following points are specifically recommended

- The need for updating information on distribution and abundance of LUS in the forest
- The need for information on regeneration and plantation characteristics of LUS
- Studies to improve recovery during logging and milling
- Enhancement studies and information on natural durability
- Regulatory mechanisms to ensure that more LUS get to the market by reviewing the annual allowable cut for marketable species
- Involvement of the Government of Ghana to promote marketing and utilisation of LUS through tax relief, low royalties and incentives for plantation development
- Public education on the state of Ghana's timber resource with emphasis on the over-exploitation of prime species

PART II MAIN TEXT

1. Project Content

The project document was prepared in accordance with Article 1 and 23 of the International Tropical Timber Agreement (ITTA), and aims at achieving objectives (c) and (e) as laid down in Article 1 of the agreement,

viz.:- - to promote and support research and development with a view to improving forest management and wood utilisation, and

- to encourage increased and further processing of tropical timber in production member countries with the view of promoting their industrialisation and thereby increase their export earnings.

In addition, the project conforms to priorities specified in the resolutions and meets the requirements of article 23.

- paragraph 5 of the ITTA: wood utilisation, including the processing and utilisation of Lesser-Known and Lesser-Used species.

- paragraph 6: which states that the project should

    a) be related to the production and utilisation of industrial tropical timber

    b) yield benefits to the tropical timber economy and be relevant to producing as well as consuming members

    c) be related to the maintenance and expansion of the international tropical timber trade

    d) offer reasonable prospects for positive economic returns in relation to costs

    e) make maximum use of existing research institutions and to the greatest extent possible avoid duplication of efforts.

The project has as it's ultimate goal the marketing of products from Lesser Known/Lesser Used species to meet the development needs of the Ghanaian society while also attaining the forest environmental needs embodied in ITTO's target 2000. The project's general objectives are the successful promotion and marketing of higher value added timber products where the wood sources are Lesser Used Species and the harvest of the trees has a positive impact on forestry sustainable management practices. The project aims to improve the research and development technology in the manufacture of export items such as sawn timber, veneer, plywood, joinery, wood-craft and furniture from the LUS under review. It will link this technology with specific market segments within the principal importing countries of Europe and America and at some later date, other potential markets in the West African sub-region and the Arabic-Middle East countries and Southeast Asia. The project aims to upgrade the existing manufacturing methods and export-promotion techniques in order to make the products more price competitive on the world market. The project further aims to improve product acceptance by ensuring it's sustainable production by making available the research findings on the effects of harvesting LUS on elements of the ecosystem important for maintaining the habitat within which LUS and primary economic species regenerate and grow naturally. It attempts to improve existing harvest and silvicultural practices to increase sustainable management practices in the production forest reserves as better information becomes available. A linkage will be achieved by engaging in studies aimed at analysing the utilisation and marketing of tropical hardwood products in Europe and America and through the implementation of a product-development research and ecosystem studies in close association with the timber industries and export and marketing agencies and others interested in forest management. The desire is to involve this range of non-governmental firms and organisations in finding solutions to forest management, product processing and marketing problems which will be identified during the ecological monitoring, industrial trial production and market activities.

2. Project Context

From the export statistics of Ghana, it is clear that the forest resources of the country are being inefficiently utilised. The few species which represent the vast majority of timber exports are being seriously over-exploited considering the established species for which growth/extraction data indicate that extraction rates substantially exceed their rate of annual growth it becomes clear that with the exception of very few of the established species most of the others can be projected to be depleted within 25 years.

Cognisant of the need to conserve the remaining forest and the forest based industries' contribution to the national economy, the sector Ministry - Ministry of Lands and Forestry has adopted some policies to promote the development and utilisation of LUS and LKS as alternative raw materials for the forest based industries.

It was in this context that FORIG in it's capacity as a research institute for forestry and timber utilisation planned and conceived this research and development project on the utilisation and marketing of LUS and to conduct a technical assistance programme to disseminate and transfer (a) the LUS product development technologies, (b) the environmental impacts of different LUS harvest patterns and practices and (c) product market channels and consumer preferences of LUS to those who comprise the various segments of the wood industry and all other target clientele and beneficiaries.

The technical assistance programme is to be accomplished through seminars, Training Workshops and publications. It will focus in helping the clients solve technological problems encountered in their production system. This will include technical advice, testing of materials and products, conduct of training courses and transfer of commerciable technologies. In this regard a completely new Laboratory - The furniture testing Laboratory and an INSTRON testing device were set up at FORIG under the project: Thanks to ITTO's support and contribution. These facilities are supposed to eventually help augment sustainable raw material requirements and contribute towards the conservation of the country's forest resources.

This development is supposed to be closely linked and co-ordinated with the relevant sectors of the local economy such as the Ghana Furniture Manufacturers Association, Producers of Mouldings, Wooden doors, pallets, veneer and plywood, wooden toys etc.

3. Project Design and Organisation

■ Adequacy of the Results of the Identification Phase:

The main issue to be solved under the project was how to increase the supply and utilisation of industrial wood by increasing the use of Lesser-used species in Ghana. The various activities under the work plan included, sustainable forest management, product development and improved marketing strategies. The work plan and strategy were strictly followed to come up with the specified output contributed to the adequacy of the results of the identification phase.

■ **Sound Conceptual Foundation of the Project:**

The main concept of the project was to increase the supply of industrial wood materials by increasing the utilisation of the Lesser-Used species available in the forests. The work plan under this concept included.

(a) Selection of a number of LUS that are most promising from the point of view of sustainable occurrence, silvicultural features and technical properties.

(b) Determination of the effect of harvesting LUS on the ecology of the forest.

(c) Extraction, identification and Authentication of the LUS in question

(d) Determination of the basic properties, like the physical and mechanical properties, drying properties, treatability etc.

(e) Assessment of the working properties like sawing and machining characteristics, nailing, gluing, peeling etc.

(f) Identification of specific possible end uses.

(g) Development and promotion of high value-added products

(h) Develop effective marketing channels.

The proper and effective conduct of the above activities and the support and co-operation of the Government and all stakeholders and private institutions helped the project to achieve its objectives successfully.

■ **Adequacy of time and other resources for project formulation**

The project proposal was conceptualised and formulated by the Project Leader and later edited and revised by a team consisting of the Project Leader and two ITTO consultants, one local and the other foreign.

It was then submitted to the Ministry of Lands and Forestry for inclusion in their project proposal list on LUS for foreign funding. The Ministry of Lands and Forestry then submitted the proposal to the ITTO Secretariat for consideration by ITTC during it's Session held in Yaounde, Cameroon in May 1991. After a critical perusal and evaluation by the expert panel and after all their comments and recommendations have been duly adhered to, the project was finally approved and funded by the ITTC.

The execution of the project then started officially in early 1993 after the 1st instalment of funds from ITTO had arrived, so that the time between the project formulation, reformulation, approval, arrival of funds and execution starting date was sufficient enough to make the project plan and schedules practicable.

■ **Understanding and appropriateness of the roles and responsibilities of the institutions involved with the project implementation**

The execution of the project was carried out by FORIG. FORIG was also responsible for the management, administration and technical aspects of the work during the period of implementation. With the approval of ITTO, FORIG designated the Project Leader to manage and supervise the implementation. FORIG also recommended to ITTO for it's approval of the local and foreign consultants to assist and guide the project personnel in the implementation.

The ITTO on it's part provided the necessary funds for the work. It made periodic transfers to the executing agency through the Timber Export Development Board. ITTO approved the assignment of the Consultants to the project and designated a representative to the project Steering Committee. It required the executing agency to submit a periodic report of the statement of Budget, expenditure and balances of the project funds, a report of project steering committee meetings, a regular bi-annual project performance report and a completion report. The roles and responsibilities of the institutions involved as stated in the proposal were properly understood, recognised and strictly adhered to by all concerned.

■ **Beneficiary involvement with the project's efforts and actions**

It must be emphasised that the involvement of the beneficiaries with regard to the project's efforts and actions especially the involvement of concessions owners, the Millers associations, TED, the Ghana furniture and wood workers association, the private and wood workers association, the private woodworking companies were very supportive. Their support and active involvement significantly led to the successful implementation and completion of the project.

4. Project implementation

■ **The most critical differences between planned and actual project implementation**

The most critical differences between planned and actual project implementation programmes were:

(i) The time lapse between the date of approval of the project and the date of the release of the first trunch of funds. However the time was cleverly used to prepare for the activity plan and schedules. It was for example during this period that the Literature review, Industrial survey and the pre-project Seminar were held.

(ii) The rainy seasons which sometimes affected logging in the moist and wet evergreen forest zones.

(iii) Fire outbreak in the dry semi-deciduous forest zone just before the time our activities there were to start.

(iv) The late arrival of the furniture testing machine.

All these and various other minor setbacks led to the request to ITTO for a one year extension. With the requisite adjustments having been made, it can be safely said that the final completion was not seriously hampered.

- **Measures and actions which could have avoided these variations:**

- (a) Less bureaucracy
- (b) Quick transfer of funds and interchange of correspondence.

- (c) Avoid large crowd of steering committee members, they only bring confusion.

- With reference to heavy rains and fire outbreaks which are natural disasters, not much can be done against them other than rescheduling the programmes.

- **Appropriateness of the assumptions made and correct identification of the risks involved.**

- The transfer of funds from ITTO through TEDB to FORIG was a bit cumbersome, but was very helpful in bringing transparency into the disbursement of funds by the two concerned institutions FORIG and TEDB. The timely release of funds in batches in relation to the work plan was very helpful in minimising risks that could have been encountered.

- **Project sustainability after project completion as a result of project implementation conditions.**

The implementation conditions of the project stipulate that after the completion of the project, the technologies developed out of the LUS product development research, knowledge of the environmental impacts of the different LUS harvest patterns and practices, and the marketing strategies should be transferred to those who comprise the various segments of the wood industry, the forest management community and all other interested parties. This exercise is to take place in three ways: (a) Through a seminar, (b) Training workshops and (c) through various types of publications. The seminar will attempt to integrate information and the audience. The training workshops will be directed at specific segments of the audience and publications will be targeted in both directions. After the completion of the whole exercise the sustainability of the project will therefore be strong and dynamic.

Even before the complete end of the project it has already been observed that some of the LUS and the technologies recommended by the project are being applied by some of the Companies who worked closely with the project group during the implementation. The continued utilisation of the LUS and the adoption of the technologies derived will therefore ultimately support the project sustainability.

- **Appropriateness of Project inputs (Quality and Quantity)**

The quality and quantity of project inputs were most appropriate. The ITTO provided the required funds, FORIG provided the technical and supporting staff and also provided the

necessary equipment and laboratory facilities. Furthermore an additional testing equipment - the INSTRON - A FURNITURE TESTING MACHINE as well as service vehicles were procured from ITTO funds. Some dedicated industries also generously provided logs, factory space, and machine time. Imputes for the project were therefore very commendable.

5. Project Results

■ Situation existing at project completion as compared to the pre-project situation

At the pre-project stage there was a lot of scepsis as to the quality and eventual acceptability of certain LUS on the market. Knowledge about certain technical properties were lacking. The assessment of demand for industrial tropical timber in Ghana, the silvicultural potential of the selected LUS that met the availability, quality, market requirement and competitiveness for industrial utilisation were not very adequate. On the other hand, as stated under Part I, 2.3 above, the situation after the completion of the project has among others created a great awareness in the country for the need to conserve the forest and manage the forest sustainably. Also the market requirements and competitiveness have been better established than before. Processing technologies have been improved. The necessary training and manpower needs have been well defined. The project has indeed made a significant contribution towards the wood working industry of Ghana.

■ Extent to which the project specific objectives were achieved

In the opinion of the implementing team, it can safely be said that the specific objectives as set out in the project proposal and summarised under "Part I, 1.3 Specific Outputs" above have been fully achieved. (Ref. points 1-7 under 1.3 above).

■ Impact of the project results on the sectoral programmes; i.e. On physical environment, on the social environment and on the target beneficiaries

The results of the project have definitely had some impact on the sectoral programmes of the government. For example policy decisions of the sector Ministry of Lands and Forestry on forest management, the marketing strategies of LUS by the Timber Export Development Board and the industrial utilisation of LUS by the wood working industry would be greatly influenced.

Jobs in the wood based industries may also be created. The socio-economic environment of the forest dwellers may not be greatly affected due to the small percentage of LUS exploitation as compared to that of the primary species. On the target beneficiaries, it is expected that manufacturers of wood products, exporters and end users would be assured of sustainable supply of raw materials.

5.4 Project Sustainability after project completion as a result of project conceptualisation, assumptions made and conditions prevailing at completion.

Shortly after the completion of the project it has been realised in the wood processing industries of Ghana, that some of the technology introduced by the project are already being applied in the industry. Some foreign contracts have been obtained by certain particular companies who use some of the projects technology know-how and business seem to be moving in some areas. Such results are indicative that the conceptualisation and assumptions made are bearing fruits and will continue to contribute to the project sustainability after completion.

6. Synthesis of the Analysis

(a) Specific objectives: Achievement - Realised
(b) Outputs - Realised
(c) Schedule - On time
(d) Actual Expenditures - As planned

PART III Conclusions and Recommendations

(a) Development Lessons:

The project was very complex, covering the three areas of Ecology, Products development and marketing. Such a multi-disciplinary project costing about 1 million US$ to implement and supported by a big international organisation like the ITTO needed a clear and accurate planning of project activities, project aims, objectives and outputs and strategies for achieving success. It was also necessary to work out a strict financial management plan. These aspects were well recognised and built into the work plan. As a result, the work plan worked out smoothly and brought out very encouraging results and experience.

(b) Operational Lessons

Lessons have been learnt in the co-ordination of multi-disciplinary projects. Lessons have been learnt in working with policy makers in Government, lessons have been learnt in working with difficult industrial managers, lessons have been learnt in managing big sums of project funds.

Support and guidance by the project management to the technical and supporting staff, working in a team with internationally renowned consultants and big timber companies was a big experience and a contributing factor to the successful completion of the project.

The complex nature of the project, rightly needed a good organisational system. This was well laid out in the management plan, which strictly defined the functions of the project leader, the research group leaders, the consultants, the auditing and financial managers, and the very important advisory functions of the project steering committee.

In all of these undertakings, the skilful management of the Project Leader and his group leaders led to the smooth implementation and successful completion of the project.

(c) Recommendations for future projects, regarding: - *Identification, Design, Implementation, Organisation & Management and others.*

- **Identification**: For the identification of future projects which would be useful to society, there is the need to update information on the state of the forest e.g. distribution and abundance, the needs of the society and the economic situation of the market.

- **Design**: The project at hand: PD179/91 is a good example of a good project design. It laid out the project aims, activities and expected outputs, and spelled out the necessary manpower and financial resources needed to bring out the expected results.

- **Implementation**: Implementation strategies can always be modified in future projects to suit the state of affairs at any particular point in time. The procedure adopted in the project at hand was pretty successful and can be used as a model.

- **Organisation & Management:** The organisation and management of such a big project by a research institution was quite appropriate. The co-ordination of academic expertise in research and the practical approach of participating industrial processing companies was in the right direction and could be recommended.

Others: At the project closing conference, a panel of experts was constituted to synthesise the salient issues and problems which came out, and to make recommendations for future action. After thorough examination of the issues the major recommendation of the expert panel was that all relevant institutions would need to work harder towards improved utilisation of LUS consistent with sustainable forest management.
To give effectiveness to the above recommendation the following requirements were identified.

- Wide distribution and application of currently available information.
- More international collaboration must be sought.
- Appropriate measures must always be taken to assure regular supply of timber.
- The market situation must be under constant review.
- Conservation technologies must be made to meet the unusual difficulties of certain LUS.
- Enough support to be given to the small-scale industries

Responsible for the Report:

Name: Dr. Augustus G. Addae-Mensah

Position Held: Project Leader
Principal Research Officer & Head
Timber Engineering & Mechanical Processing Dept. FORIG.

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