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## REPORT ON COMPLETED PRE-PROJECT

This document reports the work carried out under completed pre-project PPD 24/99 (I):

1. PPD 24/99 (I) Increasing Utilization Efficiency and the Reduction of Losses and Waste Throughout the Production Chain (Global)

Budget and Funding Sources (US\$):

Total Budget:	\$110,500.00
Pre-Project Sub-Account	\$110,500.00

Implementing Agency: ITTO

Starting Date: April 2000

Duration: Planned: 6 months  
Actual: 12 months

The Forest Industry Committee at its Twenty-fifth Session decided to implement a pre-project study to support the development of draft guidelines on increasing utilization efficiency and the reduction of losses and waste throughout the tropical timber production chain. Substantial work was carried out by an international consultant (Dr. John Zerbe, U.S.A.) and included a comprehensive review of previous work related to increasing timber utilization efficiency with a focus on sawmilling and plywood manufacturing processes and products. This literature review covered a study and abstracting of 179 publications.

A field survey of mills in Ghana, Malaysia and Brazil was carried out to determine conversion efficiency in a representative sample of producers' tropical timber-based export sawmilling and veneer/plywood industries. The survey revealed that mills and manufacturing plants which have been operating for ten years or more tend to be encumbered with disadvantages from obsolescence that include shortage of spare parts, high waste factors and poor product quality. Many production and maintenance problems at sawmills result, at least partially, from a scarcity of skilled personnel at all levels.

An analysis of the producers' efficiency compared to countries with more advanced processing in log conversion and utilization of main products and waste was also undertaken. This work included the compilation and assessment of information and data on policies, measures and technologies which contribute to increasing utilization efficiency and reduction of losses and waste throughout the production chain. One of the most apparent shortcomings in sawmills in developing countries in comparison to practices in developed countries is the lack in application of computer technology to enhance recovery. It was also noted that saw configuration and maintenance are very important as excessive saw kerf can waste valuable product while causing accumulation of more sawdust. Sawdust is of far lower value at best or, as in many situations, it causes disposal problems. The final report noted that saw doctoring expertise and performance is important to combat problems and inefficiencies from dull saws, gullet burn in the sharpening process, incorrect and uneven tension, burrs left in the gullet from sharpening, and saw vibration. It was recommended that with smaller logs and logs having crook and sweep being more common, curve sawing and end dogging may result in better recovery factors.

Major factors considered for influencing efficiency in sawmilling were breakdown of equipment; shortage of spare parts; land use planning; controlling personnel performance; cooperative ownership of logging and sawmilling operations; national, regional, or local harvesting codes; reduced impact timber harvesting; control of insect infestations; increasing demand for lesser-used species; integrated forest products manufacturing; and training.

Based on data from the literature search and the survey, an analysis was conducted to determine the efficiencies in veneer and plywood production; technologies to reduce and use waste in the lumber industry; technologies to reduce and use waste in the veneer and plywood industries; policies, practices, measures, and technologies which influence utilization in veneer and plywood manufacture; and advanced technologies and practices in developed countries which may not be as prevalent in sawmills and veneer and plywood manufacturing plants in developing countries.

Major factors considered for influencing efficiencies in veneer and plywood manufacture were some of the same as those in sawmilling, i.e., obsolescence, breakdown of equipment, and shortage of spare parts; timber cutting regulations, land use planning, and enforcement; taxes and subsidies; national, regional, or local harvesting codes; prohibition of log exports; reduced impact timber harvesting; plantations; infrastructure; increasing demand for lesser-used species; and integrated forest products manufacturing. Also considered, as influencing plywood manufacture, was the shift from plywood to structural flakeboard production.

A number of policy and legislative implications related to utilization efficiency were studied and include the establishment and implementation of policies to increase efficiencies and reduce wastage in sawmilling and plywood manufacture. Initiatives of this type will require cooperation of industries, governments, research institutions and universities with international organizations to mitigate adverse impacts of timber harvesting, set up and enforce land use planning, enhance utilization and marketing of secondary species, reward efficient plant operation, and reduce carbon emissions.

The operational strategies for influencing efficiency include the possible computerization of bucking, log breakdown, and defect sensing operations which are not commonly used in developing countries, but are essential to improving product yield. Important factors are accurately controlling target size of lumber to prevent wastage from unnecessary over-sizing and bucking logs to minimal needed lengths for the same reason. Other applications of computers include controlling dry kiln and molder operations. Inventory control is also a factor that could be improved to the advantage of many tropical country sawmills and plywood manufacturing plants. Often barcoding would be an improvement in record keeping of inventories of input materials, and product output through the production and distribution chain, but barcoding is seldom utilized. Communication between producers and customers might be improved through Electronic Data Interchange. It would be necessary to affix barcodes on every piece of lumber and plywood and on veneer flitches and to maintain a self-replenishment stock of product at the reload site of the customer. In return a long-term agreement involving the delivery of large volumes of product could be anticipated.

The consultant's report also noted that the pretreatment of logs or veneer bolts for plywood manufacture can make them more valuable. In order to facilitate peeling to plywood veneer, it is often necessary to pre-treat by heating and soaking some timbers while others, such as mahogany, can be peeled cold. Where pretreatment is required, the manufacturer has the choice to crosscut the plywood log into bolts prior to treatment or to pre-treat the whole log and then crosscut. It may be advantageous to pre-treat all tropical hardwoods in the log form and then to crosscut to minimize degrade during the crosscutting process.

At its Twenty-seventh Session the Forest Industry Committee reviewed the draft final report and suggested some amendments. The final document is contained in CFI(XXVIII)/5b. The Committee also encouraged the consultant to develop draft guidelines which are annexed to the final report. The principles and recommended actions of the draft guidelines represent the two broad areas – policy and legislative implications; and strategies for factors influencing efficiency – and incorporate all of the major factors as noted above.