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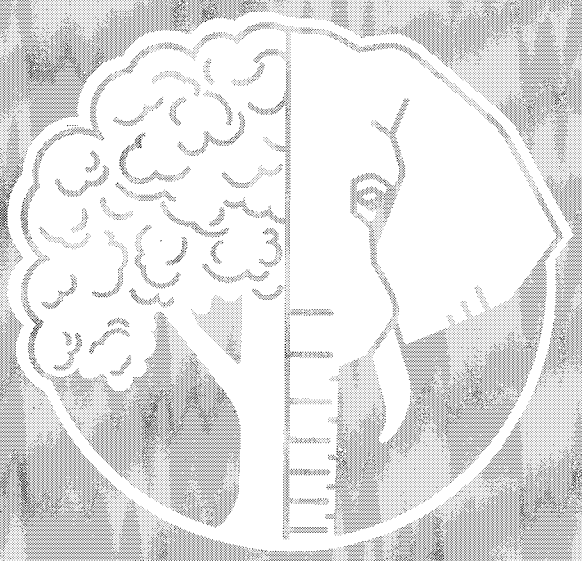
General Woods & Veneers Consultants International Ltd

FOREST INDUSTRIES DEVELOPMENT STUDIES

Core Report:
Summary, Conclusions and Recommendations



FOREST INDUSTRIES DEVELOPMENT STUDIES

Core Report:
Summary, Conclusions and Recommendations

Prepared for the

Papua New Guinea Forest Authority
National Forest Service

and

The International Tropical Timber Organization
Project PD 108/90 Rev. I (I)

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1. INTRODUCTION

1.1 Background

The Forest Industries Development Studies Project (FIDS) has been conducted in PNG since July 1992, within the new National Forest Service of PNG (NFS), under the new National Forest Authority (NFA) and Forest Act. These new institutions, and plans for the FIDS Project were developed within the 1991 National Forestry and Conservation Action Plan (NFCAP) for PNG, led by the World Bank and a broad group of international donors.

Direct funding for the FIDS Project has been provided by the International Tropical Timber Organization (ITTO - Project PD 108/90 Rev. I (1) Yokahama) under the International Tropical Timber Agreement (ITTA). The Government of Papua New Guinea has also been a major contributor, through both direct project budget support and inputs from NFS staff.

Following an early situation report and detailed project plan, (Inception Report - September 1992), the project developed a detailed review of the status and trends of forest sector development in PNG (Sector Review - April 1993). This report included an outline strategy for the Government of PNG, together with the private sector timber owners and forest industry, to move towards government objectives of sustainable sector development, with enhanced domestic economic impact.

Since April 1992, more detailed case studies have been analyzed in forest revenue collection/distribution; domestic and international markets for PNG forest products; and potential small- to medium-scale, decentralized forest industry developments. These reconnaissance studies have provided background for more detailed forest sector policies and development strategies.

In May 1993, the new National Forest Authority drafted the National Forestry Development Guidelines, which have fundamentally re-oriented PNG forest policy. The FIDS team fully supports the new Guidelines.

The report presents the findings of the study team, and does not represent official policy of the Government of PNG, International Tropical Timber Organization, or other official national or international agency.

Background data and reasoning behind the conclusions and recommendations is provided in a series of Project Working Documents.

1.2 Objectives and Terms of Reference

The objectives and Terms of Reference for the Forest Industry Development Studies (FIDS) have undergone modifications since the original call for tenders. The resulting changes were necessary as new information became available in the form of sector working papers and the urgent timetable set by Government to establish a new Forest Authority and National Forestry Development Guidelines.

The Terms of Reference which covered this study can be found in the following documents:

- ITTO Call for tender documents - December 1991
- General Woods & Veneers/Nawitka Technical Proposal - January 1992
- Inception Report - September 26, 1992

1.3 Report Structure and Content

The overall study report is composed of:

i) the core report which crystallizes salient points of each of the FIDS sub-sector technical field reports. The information is intended for use by decision makers in drafting forest policy and national forestry development guidelines.

ii) Six separate working documents which provide technical details and analyses based on field studies which provide the detailed supporting information for the final report. They are:

Working Document no. 1	:	ITTO Terms of Reference FIDS Project Inception Report Sector Background Working Papers Forest Sector Review
Working Document no. 2	:	Industrial Processing Sector - Case Studies
Working Document no. 3	:	Harvesting and Transportation Review and Projection
Working Document no. 4	:	Financial and Economic Incentives in the Management of PNG's Forest Resources
Working Document no. 5[1]	:	Domestic Market Study
Working Document no. 6	:	International Market Study

This document is the Core Report. This study report provides a summary of the conclusions and recommendations of the FIDS team to the National Forest Service of PNG, for operational follow-up action to achieve the newly defined sustainable development objectives within the forest sector.

[1] It is to be noted that WD 5 is not a study conducted by GWV or Nawitka Resources. It was a separate contract with Mr. M.N. Amin, Marketing Branch, PNG. It is however included in the overall study as the domestic compenent of the marketing analyses.

2. FIDS CONCLUSIONS - BY SUBSECTOR

2.1 Forest Resources

The historic importance of forests to community life across PNG is self-evident. During the 1990's the forest resources of the nation have become increasingly valuable economic assets, at the local level and in total, mainly through log exports.

Conservation of the natural wealth of these forest assets, while developing sustainable forest-based economic activities, is the principal goal of forest policy.

Economic pressure on these forests was in fact limited until the 1980's, due to inaccessibility and lack of knowledge of local species. The emerging economic value presents real opportunities for sustainable economic development, as well as significant risks to diverse natural systems and traditional uses.

Sustenance of forest ecology in PNG can no longer be assured by benign neglect and remoteness - it must become assured through explicit management systems.

Current forest information systems are clearly inadequate for modern forest management - inventory, growth and yield, and silvic systems are not defined at an operational level.

For purposes of the study, the FIDS team has accepted the initial CSIRO Rapid Resource Assessment (RRA) of 7.2 million hectares of production forest in the national forest estate. Using a conservative mean annual increment of commercial species of 0.5 m^3/ha provides an estimate of sustainable yield of 3.6 million m^3/annum. FIDS industry strategies have been limited to reaching this level, until adequate resource information becomes available.
The team believes that both the economic production forest area and the average mean annual increment can ultimately be increased (on a sustainable basis) through enhanced technologies of logging and silviculture.

2.2 Forest Ownership and Tenure

The dominant forest ownership pattern of PNG - through traditional Clan structures - presents important challenges in economic, social and environmental dimensions. This form of local ownership can closely approximate the efficiency and flexibility of private ownerships, while serving to nurture traditional family and community relationships during a period of tumultuous development and change.

The historic record is not too encouraging, however, as misunderstandings and exploitation by outsiders have tended to dominate over local control and equitable partnerships.

The FIDS team believes that improved systems of allocation to forest industries can and must be made more socially effective and economically efficient.

Three critical conditions have been identified for the achievement of improved tenurial relationships:

- enhanced local participation, training and control
- enhanced planning, programming and management systems (including trained staff) within the National Forest Service for this purpose
- reputable private sector partners with forest industry experience, equity capital and international market contacts.

The traditional approach of the Timber Rights Purchase (TRP) by the government, with subsequent issue of Timber permits (TP) to the industry minimized local (landowner) knowledge and participation, did not provide control or financing for forest management, and did not lead to development of sound partnerships or agreements with industry.

Further, the TRP approach tended to fragment timber holdings into units of uneconomic size, in relation to the scale requirements of factories in the forest industry and to the area needed for sustained forest yield.

The TRP-TP system definitely needed to be changed on grounds of effectiveness in achieving sector objectives, even without the extra impetus of the findings of the Barnett Commission - that there had been serious irregularities in the granting and monitoring processes.

The Forest Management Area (FMA) system proposed in the new National Forest Guidelines offers an improved approach to each of these problems:

- locally run partnerships/contracts with industries
- allowable harvest set at sustainable level
- current and new forest holdings consolidated into economic-sized units

2.3 Forest Revenue Systems

The forest tenure and forest revenue systems are the basic pillars of both conservation and economics in the forest sector of PNG. At the moment they resemble a tangle of impeding vines more than a solid foundation on which to build.

The forest revenue systems currently in place in PNG have also played a major role in the ineffectiveness of the forest sector in:

- achieving efficient/effective industrial development partnerships or other relationships for economic development of the sector
- achieving sustainable forms of forest management

Details are provided in the background documents, but the main resource revenue conclusions of the FIDS team are:

- a central stumpage system based on available resource rent should replace the current confusing mixture of royalties, export taxes and stumpage;
- an increased share of net forest revenue must be made available to landowner groups for investment (see below: Sec. 3.2 Forest Ownership and Tenure; Sec. 3.4 Forest Management for Sustained Production; Sec. 3.5 Forest Industries);
- the revenue system must also provide adequate support for sustenance of the National Forest Authority and National Forest Service to assure socially effective forest operations, sustained for the long term.

The recommendations of the FIDS team have been incorporated in National Forestry Guidelines for PNG, the contemporary blueprint of forest policy. Details are still under discussion with the Finance Department.

2.4 Forest Management for Sustained Production

A separate component of the National Forestry and Conservation Action Plan is dealing with detailed forest management prescriptions and definition of the basic new forest tenure - Forest Management Area (FMA) - for each local forest area.

However it is worth saying here that something over 80% of species and ecosystem conservation in most developed countries takes place in the production forest estate (that is where controlled harvesting takes place). The ratio may ultimately be different in PNG, but the principal is the same: genetic and ecosystem conservation can simply not be achieved through "lock-ups" of natural areas.

Socio-economic forces will ultimately dictate some human use for most lands in PNG - only appropriate forest management in production forest areas can establish forest values and assure their sustenance.

The FIDS project has focused its concern on particular areas of interaction with forest industry development, where sustainability of economic production may be at stake, and where industry practices may damage the sustainable productive capacity of the forest.

One of the primary areas of concern is in defining FMA's in terms of economically viable units, as well as ecologically sustainable units. The team believes that a close congruence between the rural processing centres and FMA's (in roundwood supply and ultimate ownership) will be essential.

The team also concluded that significantly increased care in harvesting can and should be exercised in PNG forest industry operations. This will require definition of improved harvest practices, formation of operational regulations, and monitoring of implementation.

The sustainable economic rate of harvesting needs better definition in all forest regions of PNG. The variables in need of improved definition include commercial volume per hectare, commercial size limits, and the sustainable ecological rate of harvest. Improved forest inventories and growth and yield information is a clear prerequisite.

The economics and the ecology of current residual stands need detailed study.

The FIDS team concluded that a relatively small area of industrial plantations would be economically viable and environmentally useful at widely disbursed locations in PNG. These plantations would serve the dual purpose of providing a sort of insurance policy on the production of valuable hardwood species, while offering an alternate supply to harvesting on steeper slopes and less ecologically desirable harvest zones, by about 2030 AD. (See below: Sec. 3.1 Forest Resources).

2.5 Forest Products Marketing

2.5.1 Domestic Markets - PNG

The total market for sawn and surfaced lumber in PNG is estimated to be 146,356 m^3. Plywood sales are estimated at 12,595 m^3, all of which is produced by PNG Forest Products of Bulolo. Particle board volume for 1993 is 9,027 m^3, imported from New Zealand and Australia.

The major markets are in the Central Province and the National Capital District (25%) mainly in Port Moresby - Morobe Province centered at Lae accounts for 25%. The Western Highlands Province centered at Mount Hagen accounts for 12%, West New Britain Province centered at Kimbe 8% and East New Britain, centered at Rabaul, 5%. Thus, about 75% of the local market will be in the major centers of these five provinces. Volumes are considered to be conservative because of the lack of an assured log supply by local producers resulting in irregular supplies and high internal costs. the local timber industry is protected by high import tariffs, e.g. sawntimber - 50%, plywood - 200%, furniture - 50% and fibreboard - 30%. The result, with few exceptions, has been high consumer prices and little incentive to modernize plants.

In terms of quality control, there is no national grading rule, although major producers do have their own in-house standards. Most producers offer unseasoned mixed species of "acceptable" quality with no official approval. Special species such as Kwila, Rosewood and Walnut are sold at premium prices.

The significance of the domestic market study is that when new modern plants are established in PNG, the local market is very limited. For detailed plant feasibility studies, special attention should be given to remanufacture of falldown items into exportable value-added products, such as solid door core panels, parquetry flooring, furniture components, pulp chips and as feedstock for a particle board plant.

2.5.2 International Markets

International trade in forest products by PNG is now virtually all in the form of log exports to Japan and to draw on for other forest products, the strategy should be to examine world markets and identify "target markets" best suited to PNG.

As a result of discussions with industry and trade officials in Australia, Singapore, Thailand and Japan, it has been concluded that extensive potential markets exist in Pacific Rim countries. The outlook is positive with regard to prices and growth potential in volumes which far exceed future PNG supply capabilities. Initially, target markets have been identified as Australia, Japan and California in the United States.

A) Australia

Annual imports of tropical sawn and surfaced timber are within the order of 170,000 m^3 and plywood of 70,000 m^3. The majority of these imports are sourced from Malaysia, the Philippines and Indonesia. Because of historical ties, Australian buyers have full knowledge and acceptance of over 20 PNG species. Very favourable bilateral trade agreements are in place and the market would be receptive to substantial contracts when steady assured supplies become available. Initially, the demand will be for rough and surfaced lumber in break bulk shipments. In value-added products, the most attractive products will be container shipments of mouldings, window frames and door stiles for housing construction.

B) **Japan**

In international terms, the world's largest importer and consumer of tropical timber is Japan, accounting for 50% of all tropical timber imports by industrialized countries and over 20% of world trade in tropical timber products. Wood consumption is directly correlated with housing starts. Tropical hardwood lumber imports in 1990 were 1,371,000 m^3 and plywood, 2,718,000 m^3. In 1989, 3.5 million m^3 of wood products was used in the furniture industry with a value of $ U.S. 9,600 million.

The diminishing supply of tropical hardwood logs will seriously impact on the timber industry in Japan. this will open the door to substitute materials, increased imports of temperate softwoods and replacements in value-added form. Value-added products will increase substantially, particularly in building products such as mouldings and joinery. The value of this category is expected to rise from $ U.S. 10 million in 1989 to $ U.S. 100 million by the year 2000. For the same period, imports of furniture parts will go from $ U.S. 100 million to $ U.S. 200 million by the turn of the century.

In summary, Japan is a huge and highly competitive market with demanding quality standards. The major PNG species are known and there will be a continuing strong demand for tropical hardwood forest products.

C) **United States of America**

The United States are essentially self-sufficient in softwoods and temperate hardwoods. Imports of tropical hardwood lumber are not large at 241,000 m^3, while plywood volume is substantial at 1,180,000 m^3. The most significant growth area in value-added products is furniture and furniture components which increased from $ U.S. 626 million in 1980 to $ U.S. 2,082 million in 1990. Initial market development should be directed at the Los Angeles, California area.

Additional markets with positive growth potential but requiring further research include China, Korea, Taiwan and Thailand. Steady but highly competitive markets exist in the United Kingdom and Europe.

2.6 Forest Industries

Production in the log export segment of the forest industry has grown at the rate of about 13% per annum over the past decade, including increases of over 50% per annum during the past two years. The average price per cubic metre has also increased, including a spike in value of nearly 100% during the past year.

The domestic wood processing industry is relatively obsolete and inefficient (with a few notable exceptions). In both the recovery of valuable product of m^3 of roundwood input, and in meeting international product standards, the industry could be radically improved with relatively small investments in technology and training.

The sawnwood and panel industry is currently stagnated in a weak supply position for even the domestic market by a range of economic, institutional and social factors. These are reported to include high internal costs, a volatile forest tenure system, the diverse nature of PNG forests, and the pressure of log export demands. Unless a major overhaul or reform of the industry is feasible within the private sector, the economic prospect for the sector is more of the same.

The economic opportunities for the sector should be much better. The PNG forest contains many valuable species, with growing market acceptance. There are excellent prospects in both export and domestic markets for quality products. Improved technologies of utilization (at relatively small scales) are now available. At normal efficient production costs, there is significant margin for profit at current prices, in both domestic and export markets.

Domestic prices of sawnwood are relatively high, even for mixed species (K350-K450/m^3). This is due in part to a protective tariff structure for sawnwood (20% for lumber, 50% and higher for panels and manufactured items). High prices are also due to a general scarcity of locally available timber, according to sawmillers and lumber wholesalers. The prices for high quality species (e.g. kwila, rosewood, walnut) are approximately equivalent to FAS (dock) export prices for sawnwood (k450-k750/m^3).

The current prices and the outlook for pulp and paper, or pulp chips are less favourable, but this set of products is not a major factor in PNG for the foreseeable future.

Log export values provide a generally sound expression of the economic value of the resource, given the existing industry structure of the region. One of the major factors is the existence of efficient manufacturing capacity in Japan, Korea and other centres - essentially based on log imports. Thailand has recently joined the ranks of log importers, due to overcutting and agricultural clearing in its own forests.

Several countries of the region with valuable forests still standing have expressed their unease with this structure by banning log exports (e.g. Indonesia, Malaysia). In fact these bans have been a major factor in the current price escalation.

The Government of PNG has also expressed its unease with the strength of the log export market, and the apparent weakness of domestic processing. Log export bans have been discussed in both academic and official conferences.

The FIDS team has concluded that a gradual phasedown of log exports, using the high resource rents generated to enact a locally based transformation of the wood processing industry, would provide a more sound path to sector development.

Both time and capital will be required to work through the initial stages of establishing an efficient wood manufacturing subsector in PNG forest industry. Financially strong, technically competent partners with international market connections must be sought. Some degree of log exports can provide positive assistance to each of these steps. Purely domestic (PNG) problems must also be addressed.

In their analysis of the industry, the FIDS team has identified a few basic problems or constraints which must be overcome to achieve the potential of the PNG forest sector. They are as follows.

2.6.1 Timber Ownership

Timber ownership or, more accurately, the separation of economic timber rent from timber ownership (through government purchase arrangements and export taxes), which exacerbates the current local structure of timber ownership versus industry ownership.

There is no direct means of arbitration/remediation between timber owner and industry, when the rent is in the hands of government. Further, local knowledge of the industry realities is weak to non-existent. In the past these "created" economic conflicts within timbersheds have led to landowner dissatisfaction and lack of decision information at the local level. These problems in turn have led to many disruptions of economic operations.

Private/community ownership should be an advantage, not a disadvantage. The team believes that one helpful approach to the problem will be to generate and sensibly allocate increased capital, technology and infrastructure at the local level to enable meaningful local participation in forest industry development.

To effect this enhancement of local capacity, the FIDS team has proposed that a portion of log export revenues be deposited in a series of local development funds (FMA Trust Funds) during a transition period of log export phase-down (see below: Sec. 3.3 Forest Revenue Systems).

This would go a long way towards increasing local participation and easing many of the communications/conflict-of-interest problems.

All such investments, out of FMA Trust Funds, should be subject to bank-type financial criteria, and local development criteria being satisfied.

Continuing separation of the bulk of forest revenue from the legal forest owners will be a sure prescription for expanded forest destruction, and likely forest sector stagnation or decline.

2.6.2 Geography of Forest Resources and PNG Communities

The geography of forest resources and PNG communities may impede industrial development. Scattered along five thousand kilometres of marine shoreline, including vast swampy rivers and/or steep terrain, PNG forest resources present great challenges of economic location.

The FIDS has concluded that a decentralized industry structure at the primary industry base offers the best practical development strategy under PNG conditions. This will be coupled with centralized final manufacturing and export facilities at major ports (See below: Sec. 3.5 Forest Industries).

This basic strategy for viable local forest industries will require development of a few innovative intra-industry and export marketing structures/organizations.

An additional requirement is an enhanced marine transport sub-sector within the forest sector (see below: Sec. 2.7 Essential Infrastructure).

2.6.3 Domestic Shortage of Skilled Manpower and High Wages

A domestic shortage of skilled manpower and relatively high wages due to demand in the mining sector and other rapidly developing sectors; exacerbated by a relatively small pool of skilled PNG personnel and a weak school system.

Production plant labour has been observed by the team to be relatively effective in performance of job activities and responsibilities. Many of the larger plants have developed their own apprenticeship-training programs, for specialized skills such as "saw-doctors", mechanics and electricians.

The FIDS team concluded that this problem is soluble in the short term through the use of modern intermediate technology which is labour saving, but not excessively complex, supplemented by an active program of seeking competent international partners. The bulk of training will take place within each mill centre, with some specialized trades supported by the industrial training school at Lae.

For the longer term, local skills must be expanded through both domestic and international training.

2.6.4 PNG Tree Species Unknown to World Market

PNG tree species are not well known in world markets. The steady expansion of log exports from PNG, with recent acceleration, indicates that this problem is being eased, and that producers in Japan and Korea at least find valuable properties in many of these species. The list of high value species is still relatively short, but can be expected to increase with time and further application of technology.

One of the objectives in maintaining some flow of log exports is to continue to obtain the knowledge benefits of the application of foreign technology in each target market.

The principal export problem for a revitalized wood processing industry in PNG will be to maintain a high level of quality control in all operations. This should also be an objective for the domestic market - providing sub-standard products locally, behind tariff protection is not a sound path to sustained development.

Market prospects for tropical hardwoods in general appear favourable through the 1990's and beyond. Potential export market "niches" available to the processing sector include all of those end uses to which export log buyers are currently applying PNG logs. In addition, processors should ultimately reach offshore markets for tertiary, high value manufactured products (furniture, fixtures).

2.6.5 Grades, Standards and Inspection Services

In commercial trading of forest products, a sales contract is an agreement between buyer and seller based on a mutually agreement as to grades and/or standards. An independent impartial third party inspection service is needed to certify that the species, quality and tallies are correct. These papers in turn are vital documents in final clearance for shipping and processing payments to the exporter. Such an inspection service must be established in PNG.

The most successful model to follow would be the Malaysian Grading Rule and its system for inspection services. The draft PNG grading rule, which was reportedly shelved for lack of interest, should be reinstated and completed. An updated PNG timber handbook on commercial species is also needed for this basic support package and made available for industry and the market place.

2.7 Essential Infrastructure

The main questions of sector infrastructure are governed by the expected/planned location(s) of the industry. The satellite mill is intended for location fairly close to logging operations, and preferably adjacent to a coastal log yard. There are a large number of suitable locations (e.g. south coast of New Britain, West and East Sepik, Northern Province, Milne Bay, Central and Gulf coasts, and in barge accessible regions of the large rivers).

The integrated mill complexes would likely require grid electric power and a proficient deep-sea port facility.

At present there are several ports in PNG capable of shipping quality forest products overseas (e.g. Port Moresby, Lae, Madang, Rabaul). There is ample capacity in international shipping, and reasonable rates for bulk shipments. Some of these centres might require significant electric power supplements for some ultimate forest industry proposals. These should be largely self-financing.

The team concluded that no massive investment in infrastructure (e.g. new ports, major power supplies) was feasible, or needed in the first stages. The existing serviced port centres (Moresby, Lae, Madang) would suffice for some time during initial sector development investments. Decentralized centres can use relatively small diesel-electric power systems and domestic marine transport to ports.

However, an important conclusion of the team is that parts of the domestic marine transport industry do need reform or restructuring for defined forest sector purposes. There are many crude log load-outs placed along the PNG coast at present, but few are capable of handling anything but very small barges. Most could be inexpensively upgraded to handle larger (say 110 m.) crane barges, onto which both logs and timber could be efficiently loaded.

The coastlines and large river systems of PNG are similar to those in may other countries. There is little need to invent new systems. Some modification of systems already in place (e.g. on slow-moving, winding river systems) should lower the cost of transport.

Specific actions will be needed to facilitate interchange of forest products along the coast of PNG, at each stage of intermediate product - logs, rough-sawn green lumber, sawmill residuals (sawdust, wood chips) and finished products.

Most of the required services could be provided by the existing industry, but current costs appear excessive. Many studies in other sectors have reached the same conclusion, but the PNG marine transport industry has been slow to change. The forest sector will have to organize independent action in this field if these costs cannot be reduced.

Effective marine transport will enable efficient utilization of each species and size of log, at the most appropriate centre. It will also link the decentralized processing centres together into one viable industry, with the potential to export valuable products at international standards.

3. FIDS RECOMMENDATIONS - BY SUBSECTOR

3.1 Forest Resources

The team recommends that all harvesting from natural forests be placed on a sustainable basis as a top priority in Government of PNG sustainable development and environment protection policy.

This will require carefully planned and sequenced actions in forest monitoring, forest tenure allocation and cut control, industrial harvesting practices, and forest renewal (see following sections).

The recommended principles involved include:

- there must be improved forest resource information systems, including growth and yield information, to assure sustainable forest management in each defined FMA unit;
- permitted harvesting practices must be defined in sufficient detail to enable monitoring of operator performance (sample activity definitions and regulations are included in the project working document on harvesting and transport);
- existing Timber Permits should be revised in an equitable manner to assure their original intent: sustained yield of commercial forest products;
- allowable harvest must be projected for each FMA based on scientific inventories of existing volumes, and temporary estimates of growth and yield, until data on the latter can be accumulated in practice. This dictates a conservative approach in the short run, to assure sustainability;
- a mixed strategy of selection harvest in natural stands, coupled with a plantation program of valuable hardwoods on previously deforested lands should be pursued to provide a relatively secure and ecologically balanced approach to sustaining local harvest of valuable wood in each FMA (see Sustainable Forest Management below).

Many details need further work, but strategic forest resource advantages foreseen through such a program include:

- assurance of sustainable, local, forest-based economic development;
- future conservation of less accessible, more environmentally sensitive hill forests;
- improved biotic conservation of selectively logged stands for future production of valuable wood and as habitat for all natural flora and fauna;
- future reductions of harvesting and processing costs;
- significant involvement land/forest owner groups in all FMA activities;
- more economic land use with positive soil/water impacts.

The team recommends a focussed approach to bilateral donor agencies (e.g. FMA-centred basis) for technical assistance in ecological baseline-forest inventory, plantation studies and FMA development/management pilot programs. NFA-NFS will have to develop guidelines and standards (with technical assistance if necessary), but several pilot studies could proceed once this is done.

The required forest inventory, forest monitoring and FMA development effort during the next five years should be made a major vehicle for training NFS staff. There are few better ways to train field-oriented foresters.

3.2 Forest Ownership and Tenure

The team recommends that local ownership, control, and management of communal forests (including re-investment in forest sustenance), together with local investment in forest product processing, be strengthened in all cases as a matter of long run forest policy.

Likely the most important tool to achieve this objective is forest revenue policy (see below: Forest Revenue Systems).

A second important tool in enhanced local control and resource sustenance is the proposed new forest tenure system: Forest Management Areas (FMA), to be defined as local units of sustainable production forest.

The FIDS team recommends that existing TP agreements be converted and consolidated within new FMA agreements as soon as possible, to create sustainable forest management units, linked to economic forest product manufacturing units - of the recommended satellite and central processing types (see below).

A second important area of change should be in local knowledge and control of forest management. The team recommends that local persons, with an emphasis on youth, be trained in field forestry techniques during all FMA inventories and field studies. NFA-NFS should assure the training of local FMA officers/foresters in each timber supply area.

As industrial partners are found and feasible operations defined, local persons should be involved and trained at each stage. Whether or not the community decides to invest in wood processing, a basic knowledge of industry operations by the land/timber-owner is essential to a harmonious economic relationship with the industry-owning partner, within any structure.

With regard to "new" forests, the FIDS team recommends that plantation areas be sought first in existing areas of heavily degraded secondary forest, and abandoned cleared lands within each FMA. The plantations should ultimately be owned and managed by the local (FMA) landowner group.

All such investments should be subject to bankable economic analysis, to assure payback of capital and local target ROI, to assure economic sustenance.

Plantation establishment can also provide significant involvement of "shoreside" landowner groups in initial FMA activities, even though their best natural timber may have already been harvested (these lands also frequently contain/govern access, ports, infrastructure, industry sites and trained people - so a harmonious and equitable involvement is highly desirable).

Each local FMA strategy can achieve involvement of both timber-owning and plantable land-owning groups with careful physical and financial planning.

3.3 Forest Revenue Systems

The team recommends immediate adoption of the proposed simplified stumpage system to collect forest revenues. In 1993 alone the system would have collected over K 100 million in additional revenue for the Government of PNG and the landowners.

With respect to the distribution of Royalty and stumpage revenue, the team also recommends distribution of revenues to provide the bulk to the landowner, with provision for NFS supervision of forest conservation and of basic equity in FMA agreements. The Team suggests that the sector strategy should recognize the critical role that landowners will play in establishing a competitive, sustainable forest products manufacturing sector.

The team suggests that beneficial economic development of the PNG wood industry can not be achieved without the long term support and participation of the landowners. A principal factor in developing this support will be the proportion of the wealth of the forest asset which is returned to the landowners, and the manner in which it is distributed.

The team recommends that a large proportion of the wealth revert to the resource owner in a manner that promotes further beneficial reinvestment in the forest-based community. There are several possible approaches to achieve this objective:

- deposit the resource owner's main fund in a Trust Account. The Trustee (or Board of Trustees), composed of highly respected individual(s), would assist landowners to identify sound investment opportunities

- deposit the respective resource owner's share in an income-earning account from which annual withdrawals (of accrued interest and principal) would be made over a rotation period (e.g. 40 years)

- return a portion of the resource owner's share (e.g. 25%) as a direct current payment each year. The remainder could be entrusted to the Forest Authority to initiate investment projects in the respective forest area

- return a major portion of resource wealth directly to individual families within landowner groups, coupled with an expanded program of local technical assistance in banking and investment facilities/procedures - oriented to sustainable forest sector development

It is evident that many variations/combinations of the above scenarios are conceivable and feasible. The team recommends as simple and consistent an approach as possible, across all provinces.

The principal objective of the recommendation is to turn the wealth of the forest into productive individual and community **savings**, to create further sustainable economic and social development. If the wealth goes mainly to current consumption and/or consumer goods, without development of further income-generating activity, the community will suffer in the longer run.

The team recognizes that if a substantial share is not returned to the resource owners, there will be little medium or long term interest in the beneficial development of PNG's forests. Secondly, if the forest wealth is not distributed thoughtfully over time, landowner interests will not align with the potentials of sustainable forest sector development.

The team is confident that returns on investment in the local, regional and national forest industry, and selected reforestation will offer sound socio-economic prospects to these communities. The essential catalyst is a workable system to get the current resource wealth converted into savings and sound long-term investments.

The following table provides a summary of the recommended distribution of surplus at various average log prices (Surplus = Log Price - Logging Cost). The exact schedule for start-up of the new system likely needs further negotiation with Government of PNG and the industry.

Table 3.1
Distribution of Surplus (K/m^3)

Log Price	Surplus	Minimum Stumpage	Additional Stumpage	Operators' Share of Surplus
100	20	20	17	3
120	40	20	34	6
140	60	20	52	8
160	80	20	71	9
180	100	20	90	10

(Source: internal working papers)

Preliminary FIDS analysis indicates that at the projected 1993 log export level (about 2 million m^3), and project prices (remaining relatively high), the net contribution to general government revenues would be roughly equal, with either continuance of log export taxes or implementation of the proposed new system.

However, the land-forest owner's situation would be markedly improved, through the proposed sale of his assets (on a sustainable basis). Table 3.2 provides an example case.

Table 3.2

Distribution of Forest Revenues to Forest Owners
(in Millions Kina)

Log Price (K/m^3)	Minimum Stumpage	Additional Stumpage
100	12.9	36.9
120	12.9	60.8
140	12.9	84.8
160	12.9	108.8
180	12.9	132.8

(Source: internal working papers)

Note: Based on an assumed annual log export volume of 1.88 million m^3; domestic processing of .7 million m^3.

The Guidelines in total propose a number of policy initiatives that are intended to re-orient the forest sector. Initiatives include reduction of log exports, implementation of sustainable forest production, consolidation of some tenures, while at the same time exercising caution about monopoly of tenures (in addition to changes in the revenue system). Therefore negotiations between government, landowners and the industry will have to deal positively with the whole package.

The objectives of the sector cannot be achieved through sterile revenue conflict with the industry. The private sector must be the continuing vehicle of change and development in the PNG forest sector.

3.4 Forest Management for Sustained Production

The FIDS team recommends that operational forest inventories which are proposed for each new FMA should include all species and sizes of trees in each forest type. There are two principal commercial reasons:

- provision of information for future utilization changes;
- provision of information necessary for development of satisfactory residual stand characteristics (ecological and economic).

The team recommends development of an ongoing program of growth and yield measurement in typical residual stands, and in all types of forest plantation established in PNG. The team also recommends an expanded programme of monitoring published natural forest management and forest plantation data from other parts of the region, coupled with occasional focussed field visits to these sites.

The team recommends that ultimate natural forest management plans be coupled to reforestation plans which include a limited area of high value hardwood plantations. Initial estimates suggest that an area equivalent to no more than 5% of current area harvested would suffice to ensure sustainable production of high value wood products.

The team suggests that plantations be limited to proven high-value international performance species, with known local silvic success, in the initial stages (e.g. Teak, Mahogany, Terminalia, Balsa etc.)

As results are proven in trials, plantations can be broadened to include valuable local species.

The FIDS team recommends that plantation areas be sought first in existing areas of heavily degraded secondary forest, and abandoned cleared lands within each FMA. The plantations should ultimately be owned and managed by the local (FMA) landowner group.

As mentioned previously, the required forest inventory, forest monitoring and FMA development effort during the next five years should be made a major vehicle for training NFS forest managers.

3.5 Forest Products Marketing

3.5.1 Domestic Markets

To revitalize the domestic market, local producers must have an assured log supply. When new grades and standards are established in PNG, they should also form the basis for pricing and construction specifications.

3.5.2 International Markets

To support new forest industrial development, the Government must consider action on the following support services with regard to export marketing. It is recommended that:

- A new PNG grading rule and standards be published and made readily available to all interested parties;
- A timber inspection bureau be established in order that shipping documents can be certified by a grading inspector and accepted by the producer, shipping line and buyer. It is recommended that this high profile bureau be patterned after the established grades standards and inspection services currently practised in Malaysia;
- A new PNG timber handbook be completed as soon as possible;
- A forest products market intelligence section be established to monitor prices of all tropical forest products and to establish a data base for marketing and stumpage appraisals;

- The Government continue a program to encourage the formation of a private enterprise marketing organization. The timing must be in concert with new forest industrial development and establishment of the above-mentioned grades standards and inspection services.

3.6 Forest Industries

The FIDS team recommends adoption of a general forest sector strategy which would encourage:

- development of the solid wood products industry as a first priority, including sawmills, finishing plants and veneer mills; development some form of wood-based panel mill to utilize solid wood mill wastes, once an adequate industry is established; continuation of the Jant/Honshu development (if desired by the community) as an initial venture in the pulp sector;

- a series (40 to 60) of satellite sawmills, each producing about 9000 m^3/annum of rough sawnwood (input 20,000 m^3 of roundwood) to supply local requirements, a portion of direct sawnwood exports, and supply to centralized milling complexes for further manufacturing;

- centralized sawmilling complexes (11 to 15) producing approximately 60,000 m^3 sawnwood/annum (input 200,000 m^3 roundwood), with associated dry kiln/ treatment plants of 90,000 m^3 annual capacity to supply both rough sawnwood and finished products to export and domestic markets;

- plywood plants with about 30,000 m^3 annual production each, targeted primarily at export markets;

- at least one medium density fibreboard (MDF) plant to use economic residuals from the sawmill and plywood complexes, with annual output of about 30,000 m^3 targeted mainly for export, with some use in domestic markets and some inclusion in export furniture or other products;

- some "wokabout" or portable sawmills for part-time or special uses in village settings.

The reconnaissance study returns on investment (ROI) of each of these mills (except wokabouts) is highly positive, exceeding bankable standards.

Table 3.3

Expected Return on Investment in Defined Mills

	R.O.I.
Satellite Sawmill	55%
Centralized Sawmill	68%
Dry Kilns/Treating Plant	57%
Planer/Moulding Plant	201%
Plywood Mill	42%
Med. Density Fibreboard Mill	24%
Wokabout Sawmill	negative

These returns are based on particular options which are defined in detail in the industry background paper, and April 1993 log and product market prices. The returns are generally robust, remaining positive in analysis of sensitivity to likely unfavourable price and cost shifts.

The wokabouts are not very profitable - mainly due to intermittent use and their general ability to meet the standards of an integrated industry aiming at export as well as (protected) domestic markets.

The FIDS team recommends that the above general structure should be encouraged through favourable private sector investment policies, and gradual development of appropriate norms or standards of product recovery from roundwood, and of employment (working) conditions in the sawmill and wood products industry.

The team recommends that reasonable pressure be exerted on existing TP holders, to live up to existing manufacturing commitments in a realistic manner. Log export restrictions and log export taxes may be the only short-term tools available. this will require new agreements with Finance Ministry regarding wealth distribution, if landowners are to be willing participants.

At the same time incentives can be offered to industry developers through improved long term resource commitments through FMA's,

As drafted for the new National Forestry Guidlines, the team recommends stumpage incentives (fixed at minimum of $\$20/m^3$) for domestic processors. Again, the team believes that the (short run) problem of reduced stumpage for landowners can be best approached though gradual development of equity in the forest industry, through economic investment of FMA trust funds.

The team also recommends a careful program of seeking private sector manufacturing partners in the international arena - starting with reputable, performing current industry participants and tenure-holders.

While the strategy focusses on wood products as the principal area of opportunity, the FIDS team has not ignored pulp and paper products. The team has recommended that the Honshu-Jant timber supply lease be extended.

Further, the team recommends that the NFS should remain open to opportunities in the export chip market, as the industry develops a number of centralized wood product complexes with significant volume of residual materials. the team does not recommend further ventures in large scale roundwood chipping at this time.

3.7 Essential Infrastructure

The team recommends an early initiative to encourage further development of transport and distribution systems, and local plus export marketing structures/mechanisms in the forest sector. The long coastline of PNG, and existing ports, offer many short-term opportunities for enhanced value of domestic production.

Elements of the initiative should include:

- definition of a technical assistance project in forest products valuation and marketing, to augment and develop NFS capabilities in this field immediately;
- formation of an industry marketing association made up of willing participants, with explicit terms of reference, terms of membership, and means of funding;

- detailed investigation of the current destination and use of PNG log exports in final markets;

- formation and/or adoption of sound wood product standards for export markets in Australia, Japan, the EEC, USA and other Pacific market centres.

The team recommends a cautious approach to developing marine transport infrastructure in the short run. There is already excess capacity in PNG. Every effort should be made to induce the existing industry to adopt more economic pricing policies - based on the prospect of greatly increased domestic forest industry traffic.

If this is not possible, reconnaissance-level calculations indicate a highly positive R.O.I. on appropriate equipment such as:

- self loading/unloading 95m barges with 27 m ocean-going tug

- improved, powered steering river and short-haul scows

The FIDS team recommends the immediate formation a stimulative industry organization for the purpose of analyzing and reforming marine transport as required. The proposed marketing organization could fullfill this function.

Ultimately, an organized forest industry marketing association/cooperative might want to invest in specialized forest product vessels to improve market-focussed international delivery services for manufactured forest products.

4. SOCIO-ECONOMIC IMPACT OF PROPOSED STRATEGY

4.1 Framework

The FIDS team has conducted wide discussions within the PNG forest sector community regarding the aspirations of the Government, the industry and the landowners. In broad terms, the following goals were derived:

- all PNG forest extraction will be placed under sustainable management systems as soon as possible;
- manufacture of forest products will be increased rapidly, and export markets will play a major role;
- returns to land/timber owners will be equitable from the new industries and these owners will be encouraged to participate in new forest industry ventures.

These general goals are compatible and coherent, but their successful achievement will depend on a few critical, inter-related elements of the total sector strategy:

- effective reform of the NFA/NFS to develop improved information systems and operational field controls;
- reform of the timber revenue system to collect fair value and distribute it efficiently and equitably;
- negotiation of sound FMA agreements between landowners and industry investors - which lead to economic industry investments.

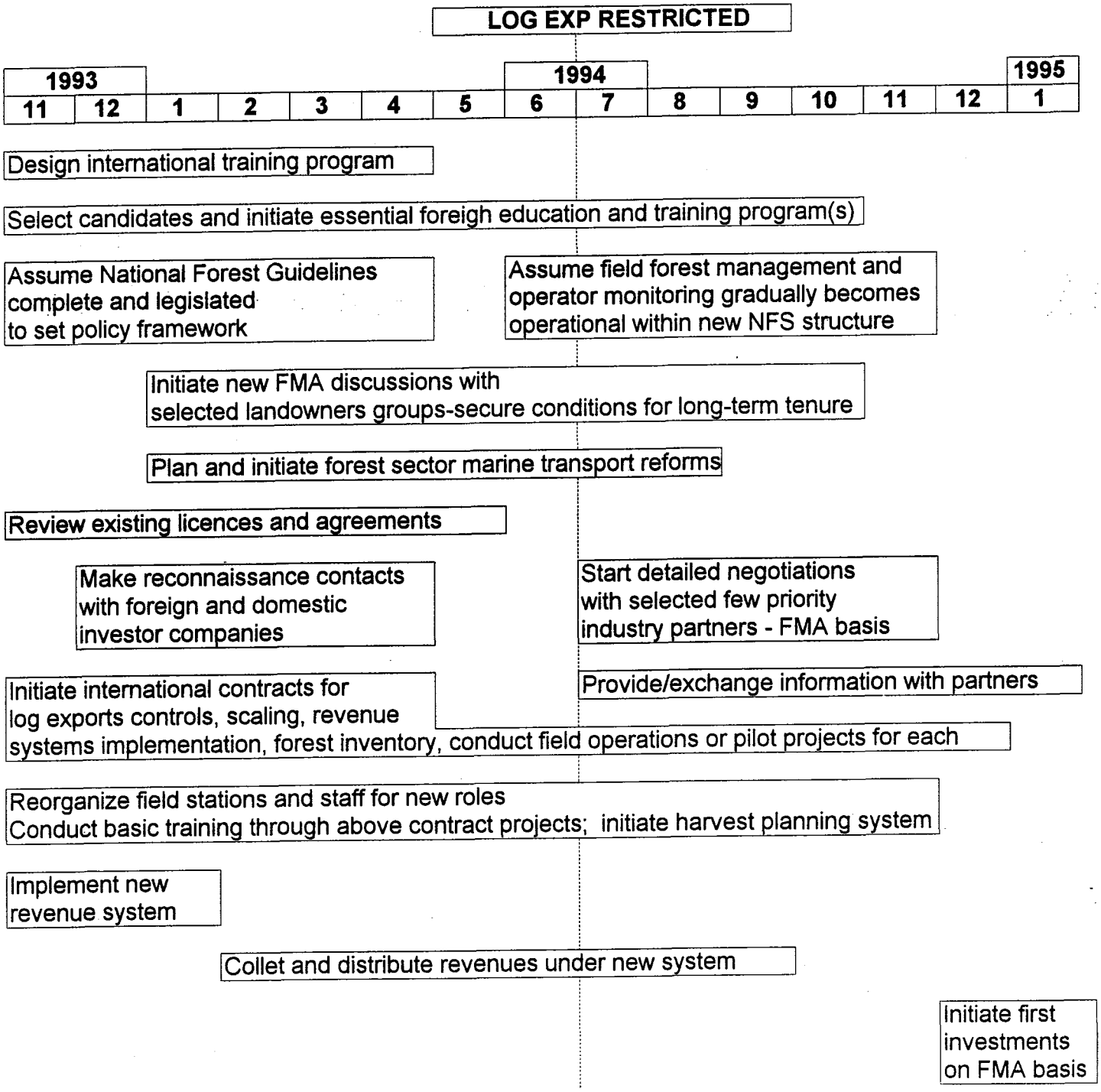
There are many feasible paths to improved manufacturing performance within these broad guidelines. The strategy proposed has analyzed and accepted several additional guiding principals of constraints:

- decentralized local manufacturing will play a significant role with local ownership where feasible;

- a significant part of timber "rents" from log sales/exports will be tagged for reinvestment in efficient, sustainable expansions of forest and mill production;
- current marine transportation problems/constraints can and will be remedied within the sector if necessary;
- efficient and equitable access to lumber, panel and other wood product markets in Asia, Europe and North America can be obtained by efficient PNG producers;
- sufficient short-run improvements in NFS, industry and landowner competence in the forest sector can be achieved through "on-the-job" training, if sound international assistance is obtained through international agencies and industry partners - longer run technical enhancements/HRD will depend on international training to the turn of the century at least;
- log exports will be restricted - to zero for permittees who do not manufacture, after 8 months from September 1993; some log exports will be permitted by manufacturers.

Chart 4.1 provides a sketch of the principal tasks which will be undertaken during the fifteen months following the FIDS strategy report.

CHART 1 - DRAFT SCHEDULE: FIFTEEN MONTHS - POST FIDS REPORT



4.2 Impacts of the Sector Development Strategy

The expected impacts of implementing the FIDS strategy can be projected in general terms at this stage, even though detailed impacts can only be projected after actual industry investment proposals are in hand. The following projections are based on likely combinations and timings of mills of the types analyzed in the FIDS case studies.

The base scenario used is an optimistic one - the best feasible rate of progress (on the critical strategy elements) which the team can envisage at this stage.

Figure 4.1 shows the forecast total harvest of the industrial wood from PNG forests 1993-1999.

After an initial decline (post log-export restriction), the total of production for the growing domestic manufacturing industry, plus log exports granted to these operators, will rise for five years, At present, the forecast is constrained at the "consensus" sustainable harvest of about 3.6 million m^3, until the turn of the century.

By that time, improved forest inventories and forest management systems may prove that further sustainable expansion is feasible. The feasible production on the industry side seems unlikely to exceed this constraint before the year 2000.

Figure 4.2 outlines the expected industry mix, as the manufacturing establishment expands through domestic and international investment.

FIGURE 4.1

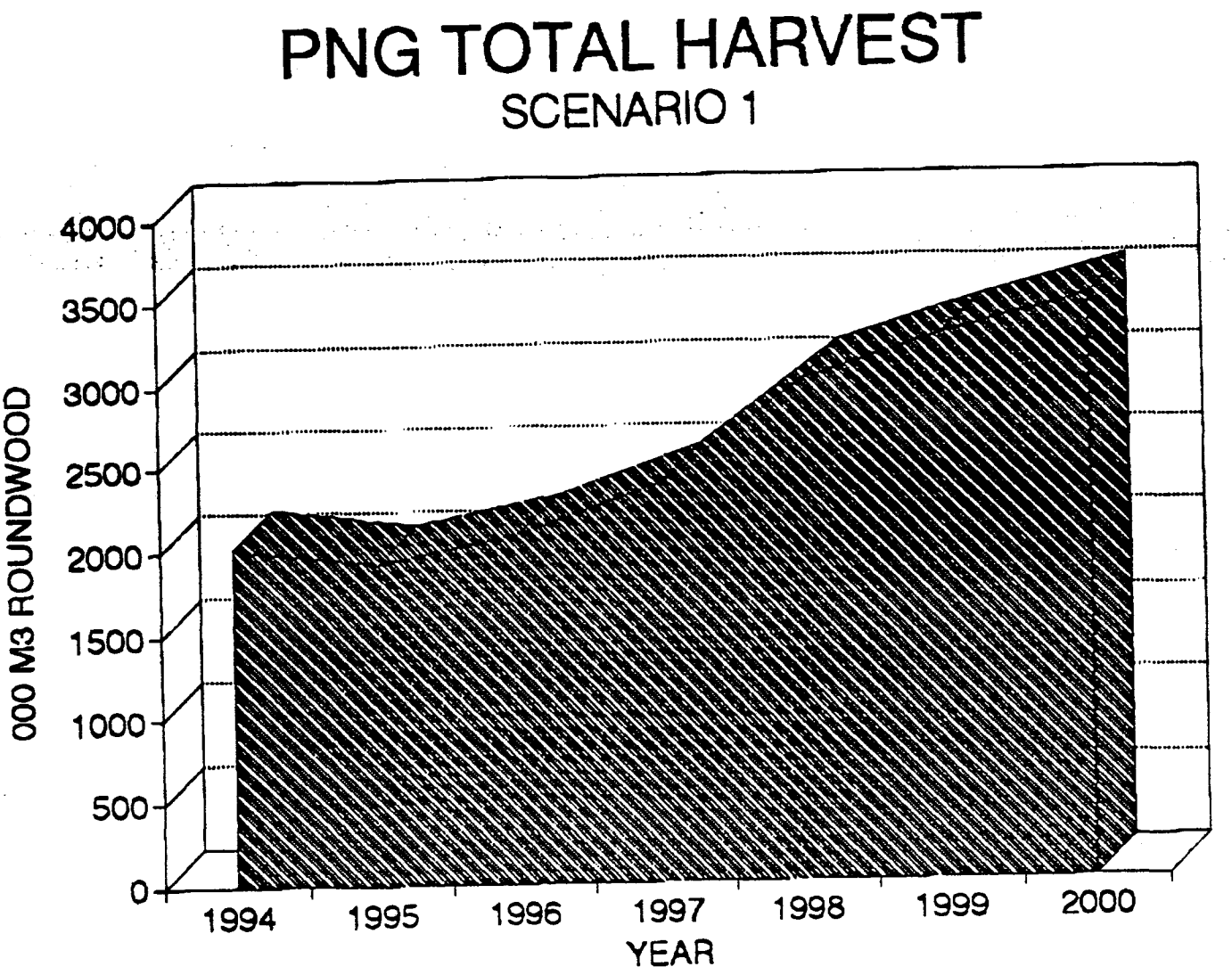
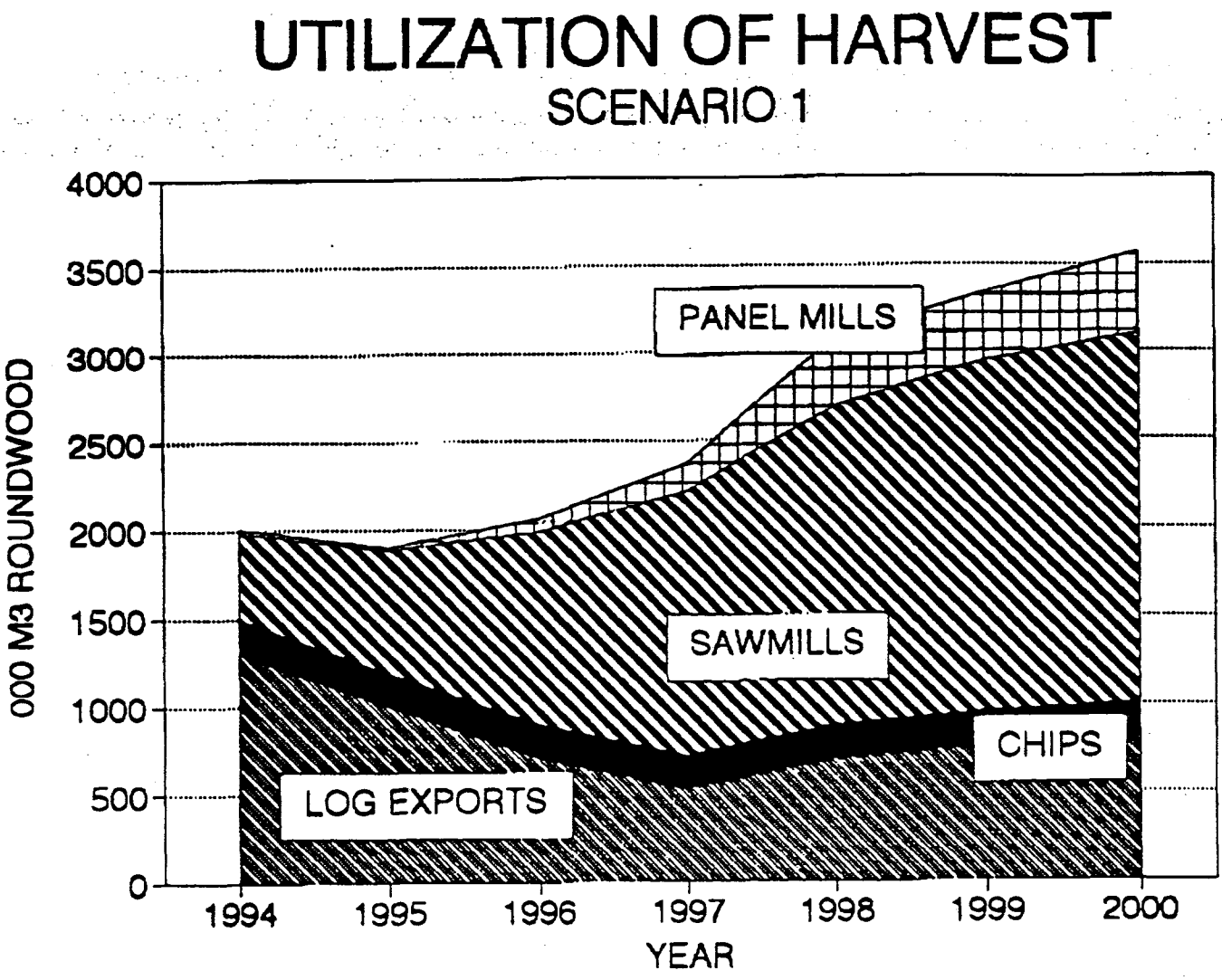

PNG TOTAL HARVEST
SCENARIO 1
000 M3 ROUNDWOOD
4000
3500
3000
2500
2000
1500
1000
500
0
1994
1995
1996
1997
1998
1999
2000
YEAR

FIGURE 4.2


UTILIZATION OF HARVEST
SCENARIO 1
000 M3 ROUNDWOOD
4000
3500
3000
2500
2000
1500
1000
500
0
PANEL MILLS
SAWMILLS
CHIPS
LOG EXPORTS
1994
1995
1996
1997
1998
1999
2000
YEAR

The largest expansion will occur in sawnwood and derived manufactured products. Wood-based panels (veneers, plywood and MDF/particle board) will also play a major role. Log exports are assumed to be constrained at 33% of roundwood used in mills. The Jant chip mill is assumed to be renewed and to continue in operation at current levels.

Details of the forecast mill construction schedule, together with other elements of the impact forecast, are provided in Tables 4.1 and 4.2.

Gross sales from the forest sector should rise to over K700 million by the turn of the century, at current prices. If the relative price of quality hardwood products continues its rise in final markets over the period, these values could be even higher.

The bulk of the new manufactured products (up to 75%) will be exported. Figure 4.3 provides a sketch of the growth in gross sales value and expected gross foreign exchange earnings.

Even with a high proportion of imported capital goods to build the mills, there will be a high fraction of local construction costs and continuing domestic wages. If the landowner savings/investment plans work, there will be high domestic capital paybacks and further local development will ensue.

All forest sector jobs will pay competitive salaries to the PNG industrial/resource sectors.

The expected PNG wages and salaries component (direct only) is show in Figure 4.4 by industry segment.

TABLE 4.1

BASIC ECONOMIC IMPACT - FIDS STRATEGY PROJECTION
SCENARIO 1: BEST FEASIBLE RESPONSE

WAGES - BASE

Current minimum wage (K/ann):	6966	sawmill, panelmill wages above
(legislated)		this level at various skill levels
Benefits package	2786	est. average including fringes:
Total labor Cost (K/ann)	9754	12000

WAGES - SAWMILL COST - k/m3	SATELLITE SAWMILL	SAWMILL/MFR COMPLEX	ACCOUNTING - SHEDDEN REPORT
Labor cost including fringe benefits	5.76 k/m3	12.30 k/m3	10.50
Salaries & overhead (management)	8.45 k/m3	4.50 k/m3	8.30
ESTIMATED AVERAGE WAGES/SALARIES/FRINGES:		15.51 k/m3	

GROSS SALES RETURN - SAWMILLS

	k/m3 log inputs	% OUTPUT	AV SALES RETURN
Average sales return - exportable	250	75%	220 k/m3
" - domestic market	131	25%	roundwood input

GROSS SALES RETURN - PANEL MILLS

Veneer/plywood mills	360 k/m3	MDF panels	210 k/m3

ASSUMED/TARGET PRODUCTION - FOREST PRODUCTS (roundwood input - 000m3)

	1994	1995	1996	1997	1998	1999	2000
SAWNWOOD	500	700	1100	1500	1800	2000	2100
VENEER/PLYWOOD	20	20	80	160	300	300	360
OTHER PANELS	0	0	0	0	*100	*100	*100
PULP CHIPS	200	200	200	200	200	200	200
EXPORT LOGS	1300	1000	700	520	663	758	812
IND. HARVEST 000m3	2020	1920	2080	2380	2963	3258	3472

EXPECTED GROSS ECONOMIC IMPACTS OF FOREST SECTOR - 000K/ANNUM
WAGES & SALARIES: FORSECTOR-BASED

	1995	1996	1997	1998	1999	2000
Harvest for Domestic Ind. DIRECT	8640	14160	19920	25200	27600	29520
" INDIRECT	10800	17700	24900	31500	34500	36900
Sawmills/mfrs DIRECT	10854	17056	23258	27909	31010	32580
" INDIRECT	13567	21319	29072	34886	38762	40701
Wood-based panels DIRECT	310	1240	2481	4652	4652	5582
" INDIRECT	388	1550	3101	5814	5814	6977
Log & Chip exports DIRECT	14400	10800	8640	10716	11508	12142
" INDIRECT	18000	13500	10800	13395	14385	15177
PNG WAGES & SALARIES: FORSECTOR-BASED						
TOTAL DIRECT	34204	43256	54298	68477	74770	79804
TOTAL INDIRECT	42755	54070	67873	85596	93462	99755
GROSS SALES FO INDUSTRY:	318000	382000	471000	611950	665850	716770
INDIRECT GNP DERIVED:	349800	420200	518100	673145	732435	788447
DIRECT GROSS FOREIGN EXCHANGE EARNED						
US$	238500	286500	353250	458963	499388	537578

* mill residues used - no new roundwood required

TABLE 4.2

ESTIMATED INDUSTRY CAPITAL REQUIREMENTS

	Capital/plant	No. New Plants x Capital/plant					
	000 US$	1995	1996	1997	1998	1999	2000
Satellite sawmills	1000	10	15	8	4		
capital requirement in year		10000	15000	8000	4000		
Central Sawmills	10000	2	2	1	1	1	
		20000	20000	10000	10000	10000	
Kilns & Planers	6000	1	1	2	2	1	
		6000	6000	12000	12000	6000	
Veneer/plymills	17000	1	1	2		1	
		17000	17000	34000		17000	
MDF/Fibreboard pan	22000				1		
					22000		
Pulp chip mill renewal			1				
			7000				
TOTAL NEW INDUSTRY CAPITAL		53000	65000	64000	48000	33000	
000 US$ BY YEAR		1995	1996	1997	1998	1999	

FIVE-YEAR TOTAL: 263000

Note: it is assumed that the existing industry can produce at least 100,000 m3 additional sawnwood with enhanced efficiency and log availability, under the new conditions; the existing plywood mill can also produce 20,000 m3 more; capital requirements for new production are assumed to be met entirely within the year previous to the production

FIGURE 4.3

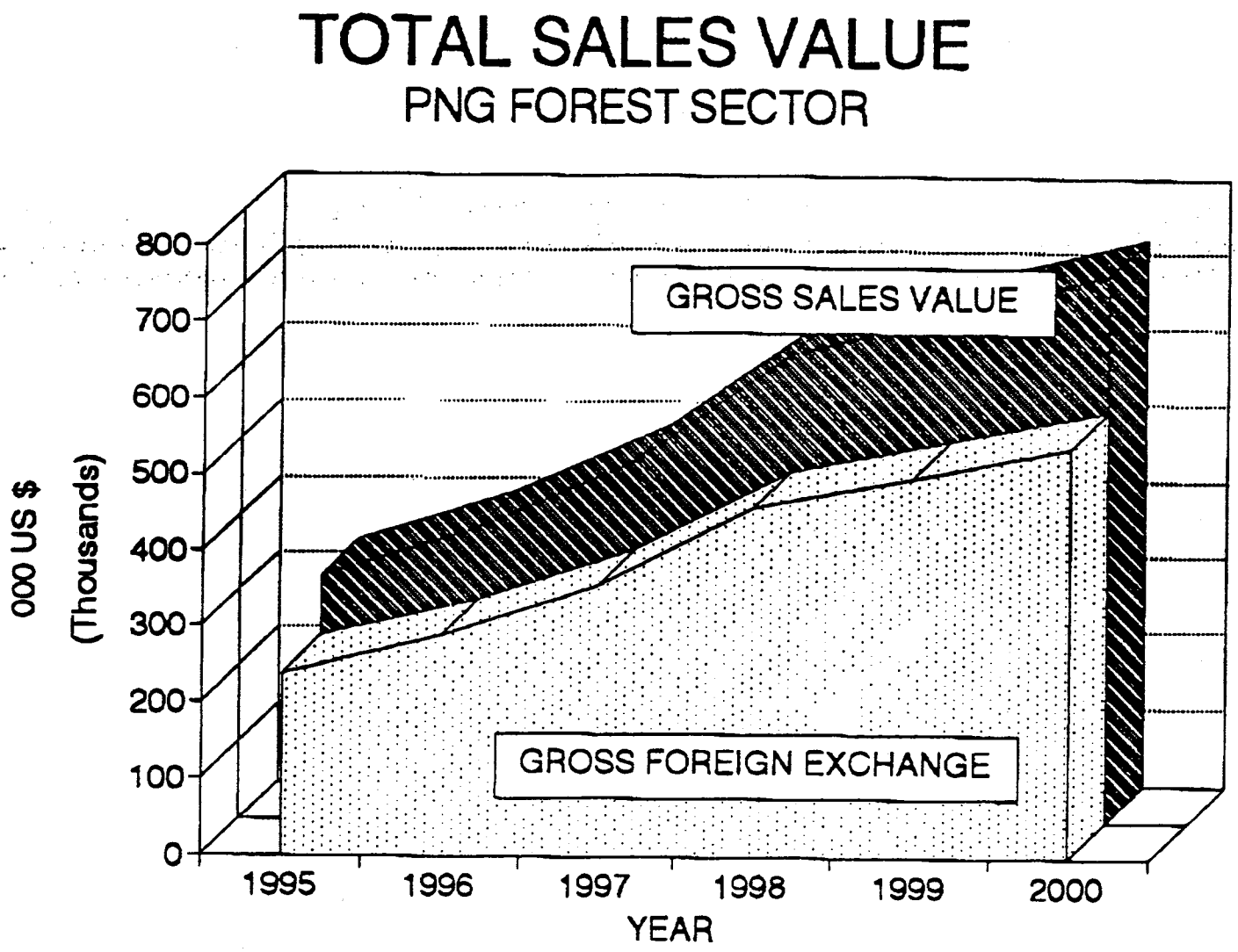
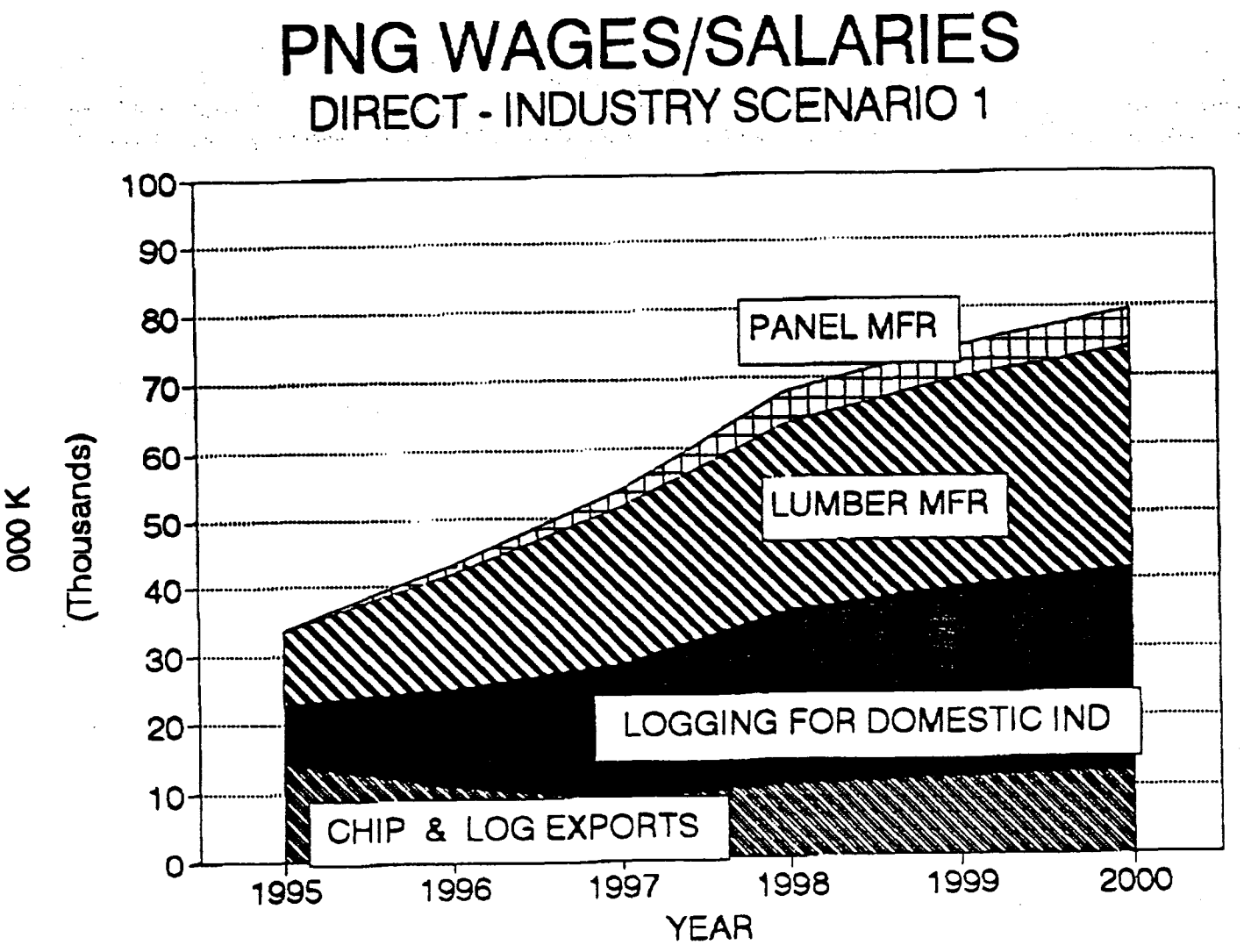

TOTAL SALES VALUE
PNG FOREST SECTOR
000 US $
(Thousands)
800
700
600
500
400
300
200
100
0
GROSS SALES VALUE
GROSS FOREIGN EXCHANGE
1995
1996
1997
1998
1999
2000
YEAR

FIGURE 4.4


PNG WAGES/SALARIES
DIRECT - INDUSTRY SCENARIO 1
000 K
(Thousands)
100
90
80
70
60
50
40
30
20
10
0
PANEL MFR
LUMBER MFR
LOGGING FOR DOMESTIC IND
CHIP & LOG EXPORTS
1995
1996
1997
1998
1999
2000
YEAR

The direct training and technology absorption components of these industrial jobs will ultimately be spread to many other sectors. Embodied skill transfers will include mechanical, electrical, construction and heavy equipment operation, as well as wood technologies and management/supervision.

The indirect (derived) income effects in other sectors as a result of servicing the forest sector are likely to be slightly greater than the direct effects (see Table 4.1).

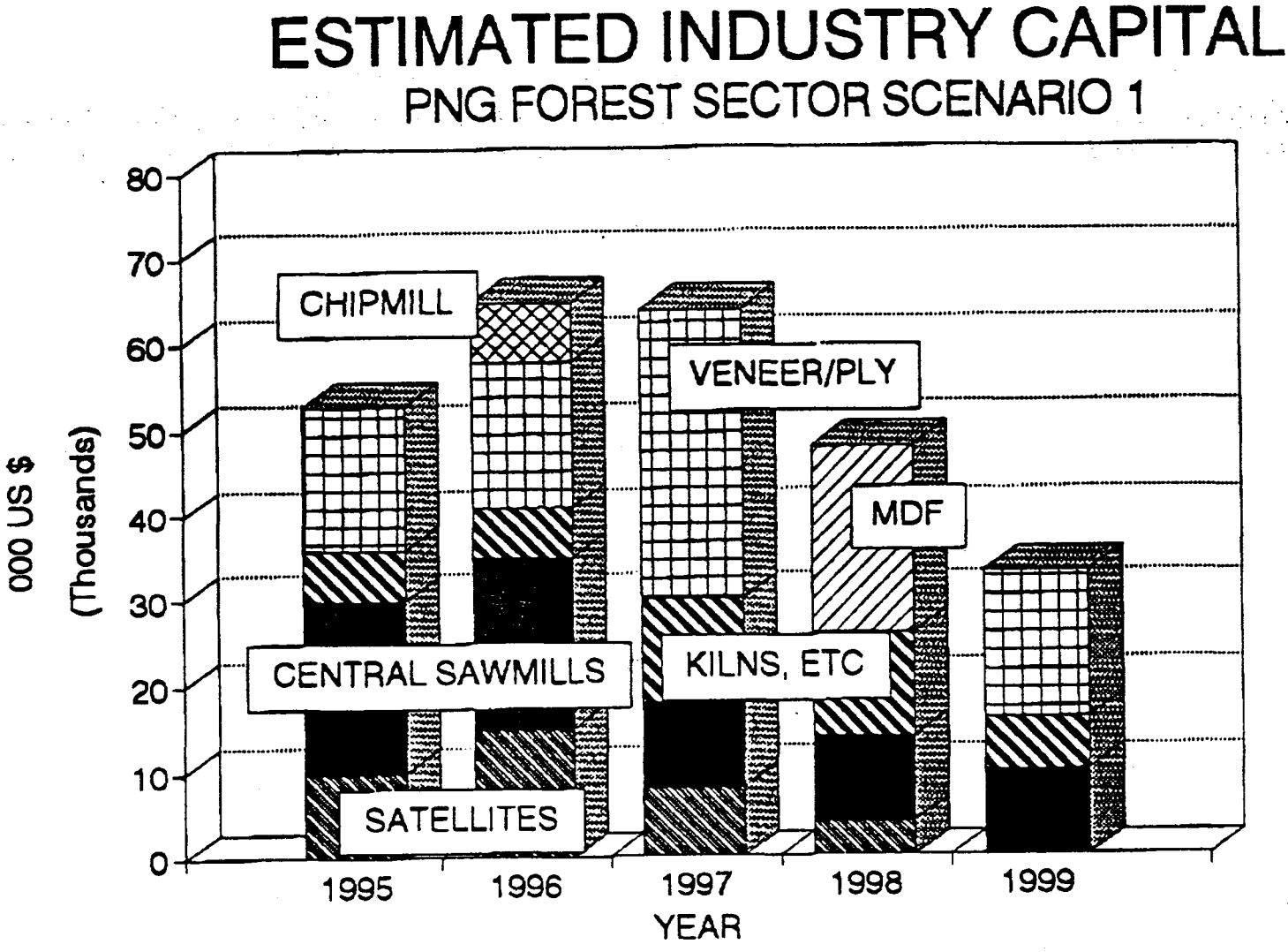
The yearly private capital requirements to achieve the forecast industry expansion are shown in Figure 4.5, based on the capital estimates of the FIDS case studies and the expected construction schedule outline in Table 4.2.

This investment schedule accentuates the urgency of getting the framework outlined in Section 4.1 in place by the end of 1994.

The schedule, together with the expected rates of return (see case study analyses) also outlines the outstanding potential for profitable landowner involvement in the forest sector - leading to direct owner interest in forest sustenance in PNG.

In summary, the FIDS strategy offers one of the most significant sustainable development opportunities in PNG for the next decade.

FIGURE 4.5


ESTIMATED INDUSTRY CAPITAL
PNG FOREST SECTOR SCENARIO 1
000 US $
(Thousands)
80
70
60
50
40
30
20
10
0
CHIPMILL
VENEER/PLY
MDF
CENTRAL SAWMILLS
KILNS, ETC
SATELLITES
1995
1996
1997
1998
1999
YEAR