D.1-c Summary of Personnel Allocation:

Regular Positions:

Office of the Director	-	21
Finance & Administrative Division	-	50
Planning & Programming Division	-	20
Technical Information Division	-	18
Research Group	-	69
Support Personnel of Research Group	-	21
Total - - -		299
Add: Contractual		21
Casual		30
Assisted project employees		19
Grand Total as of December, 1985		369

D.1-d List of Researcher Distribution

A. HOUSING & MATERIALS R & D Center

Center Chief - Joaquin O. Siopongco

1) Program A - Housing from Timber and Other Non-Timber Products

Program Coordinator - Jesus E. Rocafort

Position		No. of Researcher
Sr. Sc. Research Specialist	-	3
Sc. Res. Specialist II	-	5
Sc. Res. Specialist I	-	4

2) Program B - Composite Building Materials

Program Coordinator - Arturo A. Pablo

Sr. Sc. Res. Specialist	-	2
Sc. Res. Specialist II	-	5
Science Research Specialist I	-	7

3) Program C - Utilities Construction Materials

Program Coordinator - Felino R. Siriban

Position	No. of Researcher
Sr. Sc. Res. Specialist	4
Sc. Res. Specialist II	1
Sc. Res. Specialist I	5

B. Paper, Chemical Products and Dendro-Energy R & D Center

Center Chief - Jaime O. Escolano

1) Program A - Paper Technology

Program Coordinator - Vicente V. Lasmarias

Sr. Sc. Res. Specialist	4
Sc. Res. Specialist II	1
Sc. Res. Specialist I	4

2) Program B - Forest-Based Chemical Products

Program Coordinator - Erlinda C. Salud

Sr. Sc. Res. Specialist	5
Sc. Res. Specialist II	2
Sc. Res. Specialist I	9

3) Program C - Dendro-Energy

Program Coordinator - Calvin P. Estudillo

Sr. Sc. Res. Specialist	1
Sc. Res. Specialist II	2
Sc. Res. Specialist I	4

C. Furniture, Wares and Packaging R & D Center

Center Chief - Ricardo F. Casin

1) Program A - Furniture from Forest Products

Program Coordinator - Felix C. Morado

Sr. Sci Res. Specialist	4
Sc. Res. Specialist II	3
Sc. Res. Specialist I	4

2) Program B - Wares from Forest Products

Program Coordinator - Arnaldo Monteiro

Position	No. of Researcher
Sr. Sc.Res. Specialist	2
Sc. Res. Specialist II	3
Sc. Res. Specialist I	4

3) Program C - Packaging from Forest and Agricultural Products

Sr. Sc. Res. Specialist	2
Sc. Res. Specialist II	1
Sc. Res. Specialist I	5

D.2 Budgetary Condition of FPRDI, etc.

FPRDI budget for every calendar year as submitted one (1) year ahead to the Office of the Budget and Management (OBM) for approval. As mentioned by Director Tesoro, we are already in the 3rd quarter of our approved 1986 budget.

FPRDI can provide for the internal transportation expenses of the equipment, machinery and other materials to be provided by the Japanese government including the installation, operation and maintenance and running expenses during the implementation of the after-care program.

D.3 Present Conditon of the following:

a) Water - FPRDI has sufficient and continuous supply of water since the installation of our counterpart deepwell in 1982. The Institute is even supplying the water requirement of the neighboring Forest Research Institute (FORI).

b) Electricity - There has been a continuous supply of electricity since then and power failure occured and if it does, seldom only for few minutes. Our two (2) standby generator of 250 KVA each for the project will be used in case of power failure from the National Power Corporation (NPC).

D.4 Accommodation and Transporation Facilities for Experts.

a) Accommodation - Four (4) units Consultant House Duplex Type of 3 bedroom each with adequate facilities are available for experts to be assigned in the project. Located at UPLB College of Forestry Campus, about 10 minutes walk from FPRDI.

b) Transportation-Facilities - The four (4) units vehicles donated by Japan for the particleboard project: Toyota Corona received in 1977 is out of order; Toyota Hi-Ace Double Cab, 1979 has just been repaired for various trips; Nisaan Patrol, gasoline type, 1981 has been out of order for a long time and involved big amount of budget for another trouble shooting of the machine; the Mitsubishi Fuso Truck with crane, 1982, is always used in transporting raw materials for various studies of FPRDI. Henceforth, the above 3 vehicles which could severed as transportation for

experts seem to be uncertain. These vehicles have been used during the implementation of the particleboard project and already quite old and involved high maintenance cost.

We earnestly request new vehicles for the project to be used by the experts and counterpart personnel.

D.5 Position and Activities of Counterpart Personnel:

A. Researcher/Technical Personnel	Present Position & Activities
1. Arturo A. Pablo	- Sr. Science Research Specialist - Program Coordinator, Composite Building Materials Program - Coordinate/manage the R & D project/studies of the program.
2. Ramon P. Saraos	- Sr. Science Research Specialist - Conducts research on batten-board and performs consulta-tion work to the Institute.
3. Necitas C. Generalla	- Science Research Specialist II - Conducts R & D project/studies on particleboard and wood-cement boards. - Assists the Program Coordinator in coordinating the activities of the program - Presently studying at Auburn University, Alabama, U.S.A (1986-1988).
4. Erlinda L. Mari	- Science Research Specialist II - Codducts R &D project/studies on particleboard particularly gluing and on reduction of formaldehyde emission of board. - Presently studying at Tottori University, Japan (1985-1988)

5. Orlando R. Pulido
   - Science Research Specialist II
   - Conducts R & D project/studies on particleboard production, secondary processing of board and hardboard.
   - Presently studying at Kyoto University, Japan (1984-1987)

6. Vicente C. Mallari,Jr.
   - Science Research Specialist II
   - Conducts R & D project/studies on particleboard, flaking and drying of wood particles of various wood species.
   - Presently studying at Tottori University, Japan (1984-1987)

7. Luisa S. Cañadido
   - Science Research Specialist II
   - Conducts R & D project/studies on strandboards, waferboards, and treatment of fungicides on wood-based panels.
   - Presently studying at Shizouka University, Japan (1985-1988)

8. Dwight A. Eusebio
   - Science Research Specialist I
   - Conducts R & D project/studies on particleboard on plantation wood species and agricultural residues and wood-cement boards.
   - Presently studying at Tokyo University, Japan (1986-1988)

9. Alfredo F. Rosillo
   - Electrical Engineer, Physical Plant, FAD.
   - In-charge of all the FPRDI electrical maintenance including installation and repair.

10. Natalia M. Foronda
    - Science Research Specialist I
    - Conducts R & D project/studies on the preservation and fire-proofing of particleboard in the application of fungicides, preservatives, and fire-resistance chemicals. Assists in the overlaying of particleboards.
    - Presently conducting research at University of Malaya, Malaysia (1986)

11. Lauro R. Tristeza
- Sr. Mechanical Engineer
- In-charge of the Physical Plant Section. Supervise the mechanical and electrical, civil works maintenance system of the Institute. Assists in the particleboard project in the mechanical repair and boiler operation.

3. Technician and Operator

12. Felix V. Eusebio
- Science Research Assistant II
- In-charge of the mechanical and electrical maintenance of the particleboard pilot plant equipment and other related apparatuses. Assists in the particleboard production and in wood-cement board studies.

13. Antonio G. Centeno
- Science Research Assistant II
- In-Charge and operates the mat-forming machine and assists in particleboard production.

14. Cirilo B. Bobila
- Architectural Draftsman
- Designs and estimates building structures requirement of the Institute including specifications of machine lay-out and foundation.

15. Emerson L. Romanillos
- Science Research Assistant I
- Preparation and manufacture of laboratory scale particleboard studies in overlaying and testing of board properties. Assists in the pilot plant production of boards.

16. Edgardo M. Villena
- Science Research Assistant II
- Assists in particleboard production in the operation of hot-press, panel saw and sanding machine and in wood-cement board studies.

18. Carlos V. Dionglay
- Science Research Assistant I
- Preparation of raw materials in chipping, screening and gluing in the pilot plant production and assists in wood-cement board studies-shredding and mixing mat-forming processes.

18. Ernesto L. Zuniga
- Science Research Assistant I.
- Assists in the preparation of materials - chipping and in veneer and plywood project in rotary cutting, drying and gluing processes.

19. Francisca L. Fandiño
- Science Research Assistant I
- Assists in the testing of board properties and performs secretarial works, typing of technical reports and correspondences.

C. Contractual Counterpart Personnel

1. Joel P. Mari
- Science Research Assistant II
- Preparation and manufacture of laboratory scale production of boards and in secondary processing of particleboards (overlaying or rotary and sliced veneers of various species, and testing of board properties. Assists in pilot plant production in gluing process.

2. Edgardo F. Funtanilla
- Science Research Assistant II
- Assists in the preparation of raw materials in the quality control section by testing board properties; assists in the laboratory-scale production of boards. Performs clerical works such as typing of technical reports, project/study proposals and correspondences.

3. Benson M. Egula
- Science Research Assistant I
- Preparation of raw materials and in gluing process, mat-forming process, chipping operation and other related activities.

4. Jasmin B. del Rio
- Science Research Assistant I
- Assists in the testing of glue and wax solids, pH, viscosity, and specific gravity. Computes test data for laboratory and pilot scale studies.

5. Divinia P. Romanillos
- Science Research Assistant I
- Assists in laboratory production of boards, testing of boards, and in-charge in budgeting, voucher preparation of the project. Present assigned at Budget Section, PPD.

6. Sabino B. Damasco
   - Science Research Assistant I
   - Assists in the mat-forming operation of particleboard pilot plant operation and in veneer and plywood gluing studies, veneer cutting and drying, plywood manufacturer and testing of the strength properties.

7. Jose B. Buendia
   - Sr. Mechanical Plant Operator
   - Operates various machines: flaker, hacker, knife grinder, boiler, welding equipment. Performs masonry, carpentry and maintenance of the pilot plant equipment.

8. Nathaniel A. Ramos
   - Mechanical Plant Operator I
   - Operates various machines/equipment: gluing machines, boiler, generators, panel saw and table saw. Performs carpentry, masonry, mechanical and electrical repair maintenance of equipment and in-charge of the store room for tools and equipment.

9. Norberto L. Lauricio
   - Mechanical Plant Operator I
   - Assists in the preparation of materials, gluing process in laboratory and pilot plant and assigned to reinforce the veneer and plywood group in testing veneer and plywood properties.

10. Mario A. Alcachupas
    - Mechanical Plant Operator I
    - Operates the dryer and conducts quality control process of getting M.C. of particles and particle classification. Assists in laboratory production of particleboards in fire-proofi of boards, overlaying and application of fungicides studies.

11. Eulogio T. Vivas
    - Mechanical Plant Operator I
    - Preparation of raw materials in various project/studies. Assists in gluing preparation and operation and in wood-cement board studies. Performs maintenance works of the equipment and buildings.

12. Rafael E. Talero
- Mechanical Plant Operator I
- Preparation of raw materials. Operates panel saw, sanding machine and chipping equipment. Assists in mat-forming and laboratory production and testing of board properties.

13. Marcelino S. Castillo
- Mechanical Plant Operator I
- Operates the chainsaw, chipping and shredding machines, panel and table saw for test specimens and also the forklift for utility services.

14. Juanito C. Lamadora
- Mechanical Plant Operator I
- Material preparation for various studies and operation of the chainsaw, panel saw, table saw. Assists in mat-forming process and maintenance works.

15. Angel S. Castillo
- Mechanical Plant Operator I
- Preparation of materials for various studies, assists in the operation of the hacker, flaking and shredding machines, maintenance of the equipment and building.

D. Prospective Counterpart — Position & Activities

1. Felisa D. Chan
- Science Research Specialist I
- Conducts R & D project/studies on veneer and plywood adhesives, additives and filler formulations, manufacture of plywood of various species using rotary and sliced veneers. Assists in particleboard project in gluing and on the application of phenolic type of glue (tannin adhesive) and overlaying of thick panels.

2. Greg C. Foliente
- Science Research Specialist I
- Conducts R & D,project/studies in housing designs and low-cost construction system using composite building materials, particleboard, plywood, wood-cement boards, fiberboards, laminated materials, coconut lumber, etc. Assists the Program Coordinator in the coordination of the various activities of the Program.

3. Emmanuel Noli B. Sicad - Science Research Specialist I
   - Conducts R & D project/studies on veneer and plywood using some small diameter tree species (rotary and sliced cutting of suitable species), drying, gluing and plywood manufacturing conditions. Assists in the statistical designs and some statistical computation of particleboard data.

4. Ramon D. Villarama - Science Research Assistant II
   - Operates the veneer lathe, clipper, dryer, glue spreading machine, and the laboratory hot press for veneer and plywood manufacture. Conducts property tests and computes test results for analysis.

5. Bonifacio B. Salonga - Science Research Assistant II
   - Conducts property tests of veneer and plywood and computes test results. Assists in the wood-cement board project in raw materials preparation and manufacture of the product.

D.6 State the Promotion of Contractual Personnel to the Regular Position.

Name	Contractual Position	Regular Position
1. Erlinda L. Mari	- Science Research Specialist IV	- Science Research Specialist II
2. Orlando R. Pulido	- Science Research Specialist IV	- Science Research Specialist II
3. Luisa S. Cañadido	- Science Research Specialist III	- Science Research Specialist II
4. Natalia M. Foronda	- Science Research Specialist III	- Science Research Specialist I
5. Dwight A. Eusebio	- Science Research Specialist III	- Science Research Specialist I
6. Grecelda A. Eusebio	- Science Research Specialist II	- Science Research Specialist I
7. Alfredo F. Rosillo	- Science Research Specialist I	- Electrical Engineer

8.	Hilario C. Dolores	- Science Research Specialist I	- Science Research Specialist I
9.	Lauro R. Tristeza	- Science Research Specialist I	- Sr. Mechanical Engineer
10.	Edgardo M. Villena	- Engineering Drafts-man	- Science Research Assistant I
11.	Emerson L. Romanillos	-Science Research Assistant II	- Science Research Assistant I
12.	Carlos V. Dionglay	-Science Research Assistant I	- Science Research Assistant I
13.	Elsa S. Quidayan	- Clerk I	- Planning Assistant
14.	Brigiano E. Talero,Jr.	-Driver	- Driver
15.	Celso A. Cangao	- Driver	- Driver
16.	Calixto T. Lulo	- Driver	- Driver

The promotion of the above counterpart contractual personnel into various regular positions is in line with policy of the FPRDI to promote deserving personnel qualified for the positions. Other contractual personnel who were not promoted may either lack civil service eligibility as pre-requisite for the position or are not qualified for the existing vacant position.

D.8: Utilization, Maintenance and Management of Equipment and Machinery Provided by Japan.

The particleboard Pilot Plant equipment and machineries are being used for the R & D studies on particleboard using various wood species singly or mixture and some agricultural residues. These (equipment and machineries) are property maintained by our mechanical and electrical engineers, trained technicians and operators of the project. Repair and replace-ment of defective parts are immediately perform by the mainte-nance group. Tools and spare parts for the mechanical and electrical spare parts are kept in a separate store room,

respectively with aseigned toolkeeper in each room. They are the only personnel authorized to issue tools and spare parts needed in the plant and they conduct inventory of tools and spare parts regularly determined the expendable items to be purchased per recommendation of the maintenance group.

D.9 Equipment, Machinery and Other Materials for Secondary Processing of Particleboard which are presently available at FPRDI or which can be provided.

A. Equipment/Machinery and Other Materials Presently Available

a) veneer rotary lathe - rotary cutting of veneer.
b) veneer clipper - cutting into various sizes.
c) veneer dryer - drying to certain M.C.
d) veneers for overlaying particleboard
e) local overlaying and coating materials.

B. Request Equipment/Machinery and Other Materials to be Donated by Japan

1. Overlaying equipment:
   a) glue spreader
   b) laminator
   c) cold press
   d) mirror plates
   e) cushion sheet

2. Maching equipment:
   a) boring machine
   b) router
   c) edge bander
   d) veneer slicer

3. Coating equipment:
   a) roller coater
   b) reverse roll coater
   c) spray gun
   d) infra-red dryer
   e) ultra-violet ray dryer
   f) curtain flour coater
   g) doctor blade

4. Press equipment:
   a) cold-hot press

5. Testing equipment:
   a) testing machine, 2 tons/capacity
   b) abrasion tester
   c) fade meter
   d) gel time meter
   e) gloss meter
   f) chalking tester
   g) scratch hardness tester
   h) surface roughness tester
   i) drying oven
   j) thermostatic water bath
   k) dessicator
   l) direct reading balance
   m) wet film thickness gauge
   n) dial thickness gauge
   o) stop watch

6. Other Essential Equipment:
   a) small sawmill
   b) knife sharpener
   c) microcomputer
   d) IBM Typewriter
   e) vehicles
   f) books and standards.

D.10 Place of Installation of the Equipment/Machinery:

Based on our proposal, the installation of the various equipment/machineries of the project will be at the one-storey particleboard storage building measuring 15 x 20 meters, with a mezzaine and to the 2nd floor production room of the particleboard pilot plant building.

D.11 Appropriate Costs and Days Necessary for Custom Clearance and Internal Transport of Equipment and Machinery provided by Japan.

FPRDI will attend promptly to all the shipping documents and early transport of equipment as what we did in the particleboard equipment. Coordinate very well with

our long time and very efficient broker, M.E.C. Brokerage, Inc. The cost involved will depend on the weight, volume, and number of crates.

0.12 Production of Particleboard at FPRDI.

A. Rate of Production of the Plant

The normal operation of the pilot plant based on various studies is usually 3 days a week.

1st day - chipping, screening and drying.
2nd day - gluing for the dried chips, mat-forming and hot-pressing of boards. Chipping if necdesary and drying of chips.
3rd day - gluing, mat-forming and hot pressing of boards.

B. Production Costs

Giant ipil-ipil, Kaatoan bangkal and mixtures of various species has been the basis of estimating the cost of production in the FPRDI particleboard pilot plant. The production cost per panel are as follows:

Board thickness, mm	8	12.7	15	18
Board density, kg/m^3	650	650	650	650
Board weight, kg	8.8	14.0	17.0	19.0
Board size, cm	92x184	92x184	92x184	92x184
1. Raw materials				
Wood	14%	14%	14%	10%
Glue mix	23%	19%	19%	19%
2. Manufacturing Overhead				
Electricity	13.3%	14%	14%	10%
Bunker & diesel	20%	23%	23%	27%
Maintenance	5%	3%	5%	5%
3. Labor				
Supervision/ Technicians & operators	17%	17%	17%	17%

	8	12.7	15	18
4. Depreciation cost				
Machines & buildings	8%	8%	8%	8%
Total cost/panel	₱45	₱60	₱80	₱90
Present selling price	₱60	₱80	₱100	₱120

C. Quality of the products.

FPRDI particleboard is always maintained to pass 200, with MOR of 180 kg/cm^2 or more, Type 150, between 130-180; and Type 100 between 80-130 (JIS and PHILSA Classification) board properties. Thin particleboard, 8-mm is usually produced in homogenous type. Thicker boards, 12.7, 18, 20, 25 and and 32-mm are usually produced in 3-layer with fine materials on the surface layer to have a fine surface quality good for overlaying and coating.

Process control coupled with efficient control systems builds up into the product at all stages of manufacture is being practiced in the particleboard project. This is maintained or controlled in such a way to produce acceptable product in the most economical way. The cause-and-effect production variables that affect the quality of a particlebboard product includes board strength, bending strength, screw and nail-holding strength, appearance and dimensional stability. Among the important variables included are: particle geometry, moisture content, resin content, and board density. Closer process supervision and control is made because the production variables interact in several ways, which complicate the process and could cause significant effect on the final board properties. The sampling and testing

method employed are:

1. Screen distribution analyses and measurement of particle thickness every 30 minutes, a minimum of 3 samples per operation.

2. Moisture content (RC) of particles immediately before and after drying are determined every 10 minutes.

3. Resin content (computed from M.C. data after gluing is observed every 3 or 5 minutes.

4. Forming weight of each board is recorded and plotted in control charts.

5. Each pressed board weight is recorded for adjustment of pressing schedule, board thickness is measured at 4 corner points immediately after pressing.

6. Board thickness is measured at 6 points after trimming.

7. Each board is inspected and the process or equipment causing any defect is promptly adjusted.

8. Mechanical and physical properties of the particleboard are determined from the results of tests on one samples board taken from each production lot. Testing method specified PHILSA - 106 Revised 1981 are followed.

D.13 Activities at FPRDI on the Secondary Processing of Particleboard.

Laboratory study on the overlaying of particleboard using sliced and rotary cut veneers and impregnated (di-allyl-phthalate and melamine) paper overlays were conducted. Problems such as localized curing, sticking to caul plates and insufficient curing were encountered in the use of di-allyl-phthalate impregnated paper overlays on particleboards.

Application of coating materials using paint (quick dry and flat wall enamel) and varnish (clear gloss and dead flat

lacquer) on particleboards showed that these coating materials could withstand prolonged exposure to high moisture and relative humidity.

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資料 7

STATUS REPORT ON THE

RP-JAPAN PARTICLEBOARD PROJECT

(March 18, 1977 - June 18, 1986)

FOREST PRODUCTS RESEARCH AND DEVELOPMENT INSTITUTE
National Science and Technology Authority
College, Laguna 3720
Philippines

RP-JAPAN PARTICLEBOARD PROJECT

Background

The project "Technical Cooperation on the Technological Development of Particleboard in the Philippines" started when the FORPRIDECOM, NSDB, requested technical cooperation from the government of Japan thru JICA on the Technological Development of Particleboard for low-cost housing construction and promotion in the Philippines.

Upon this request, the government of Japan, thru JICA, sent survey teams to study and work out the details of the Technical Cooperation Program with its Philippine counterpart.

After careful studies and discussions, both parties agreed to recommend to their respective governments, the immediate implementation of the Project, as described in the R/D signed on March 18, 1977 between the Head of the Japanese Implementation Survey Team, the Director-General of NSTA (formerly NSDB) and the Director of FPRDI (formerly FORPRIDECOM) (This Record of Discussions has been extended from March 18, 1980 to January 31, 1982 with a follow-up period from February 1, 1982 to March 31, 1983). This recommendation was accepted in principle by both government and as a result, the cooperation program was started.

Objectives

The project has 3 main objectives: (1) promotion of research and developments; (2) technical advice and guidance to existing factories; and (3) training of manpower.

Feedbacks

1. When particleboard was re-introduced by FPRDI as a new panel product in the Philippines, it was readily accepted for its good-quality.

2. End-users who apply laminates or overlays prefer particleboard to plywood or oriented strandboard because of its smoother surface.

3. Particleboard performs better (its durability is enhanced) when it is either laminated with paper or veneer or coated with paints and varnishes.

4. Furniture companies are willing to accept any possible material like particleboard because of the limited supply of wood species traditionally used.

5. Many end-users appreciate the decorative appearance of 8-mm thick homogeneous particleboards made of bigger flake, particularly when these are used as interior wall panellings.

6. Particleboards of 15-mm, 18-mm or thicker are preferred by most furniture and cabinet makers, especially those using dowels which require more strict thickness tolerance.

7. There is a growing demand for particleboard as an alternative panel board.

8. Local public demand suggests that a commercial particleboard plant should be established to augment pressing needs of the construction and furniture sectors.

9. Wood-processors also feel that the establishment of a particleboard plant should be given priority especially during this period of economic crisis when judicious use of available resources, including woodwastes, is imperative.

SIGNIFICANT ACCOMPLISHMENTS

of the

RP-Japan Particleboard Development Project

(1977-1986)

PARTICLEBOARD BRODUCTION

Particleboard production at the FPRDI pilot plant is continously being done for

A. Research and development
B. Industry promotion
C. Technical guidance to the industries

Production Volume

Year	Production Volume
1981	1,585
1982	563
1983	1,321
1984	1,269
1985	800
1986 1st & 2nd Quarter	600
TOTAL	6,138

SALES/DELIVERY

A large number of industrial end-users and individuals have used FPRDI particleboards for housing and furniture. Private individuals account for 50% of the sales while private companies and government offices account for 35% to 15%, respectively.

Sales/Delivery of Particleboard

		Uses
1.	Government Offices (15%)	
a.	National Science & Technology Authority	- Exhibit boards, room partitions.
b.	Forest Products Research & Development Institute (FPRDI)	- Exhibit boards, wall panelling, cabinets.
c.	University of the Philippines, etc.	- Bulletin boards
2.	Private Companies (35%)	
a.	Singer Industries, Inc. Metro Manila	- Knock-down bed bunks, sewing machine cabinets
b.	Villarosa Industries Metro Manila	- Speaker boxes, TV and stereo cabinets.
c.	Delta Audio System Metro Manila	- Speaker boxes
d.	J.C. Trading Mindoro	- House panelling, ceiling, and cabinets.
e.	Reach-Out Biblical Society Metro Manila	- Religious novelty items
f.	Varifold Co. Metro Manila	- Home and office furniture (tables, cabinets, drawers)
g.	Design Ligna Metro Manila	- Tables and home cabinets
h.	Bermo M & T Corporation Metro Manila	- Furniture, toys, and other wooden export products.
3.	Private Individuals (50%)	

RESEARCH AND DEVELOPMENT WORKS:

Studies have been conducted on the following:

On Potential Raw Materials ->

A. Fast-growing species - including giant ipil-ipil, Kaatoan bangkal, Moluccan sau, yemane, gubas, etc.

B. Secondary/lesser known species - loktob, mixtures of para-rubber, ilang-ilang, african tulip, etc.

C. Wood processing wastes - saw-mill wastes, wood-carving wastes.

D. Agricultural residues - coconut trunk, cotton stalks, bamboo.

On Production Technologies and Techniques

A. Some research results have been confirmed thru pilot-plant scale studies. Thus, production standards have been established for some of the above-mentioned raw materials. Please refer to Annex A - List of Technical Reports Completed.

A patent has been approved and other patent applications have been filed for other production techniques.

1. Philippine Patent No. 15153. Process for producing water-resistant laminated hardboard.

2. Pending patent applications:

   a. Water-resistant PVC-bonded particleboards and its process of manufacture.

   b. Particleboard and Its Process of Manufacture. A. Kaatoan bangkal, B. Giant ipil-ipil, C. Moluccan sau, D. Coconut trunk. E. etc.

B. Some studies have been conducted on special treatments like control of formaldehyde emission, fire-retardants, fungicides, and overlaying with veneers.

On Utilization

Technical guidance are extended to end-users on: modification in design and specifications of products, in comparison with those made of lumber and plywood.

TECHNOLOGY DISSEMINATION

To promote particleboards, FPRDI has accomplished the following:

A. Publication of technical brochure

B. Sponsored a national symposium on particleboard last September 29, 1982.

C. Participation in national exhibits, TV shows, interviews.

D. Field surveys for prospective market/end-users.

E. Distribution of particleboard for performance tests.

TECHNICAL ASSISTANCE

Technical assistance have been extended to some private companies and individuals thru:

A. Product testing

B. Consultation

C. Cooperative studies

D. Lecture-workshops

Among the companies assisted are the following manufacturers of particleboards, strandboards, and suppliers of resin adhesives:

A. National Housing Corporation (strandboard)

B. Taggat Industries, Inc. (strandboard)

C. Cor Tech Inc. (Rice Husk Board)

E. Resins, Inc. (adhesive)

F. Borden International,(Phil.) (adhesive)

INQUIRIES/VISITORS ATTENDED TO:

FPRDI has responded to numerous inquiries from various individuals, private companies, and government agencies on the production and utilization of various types of particleboard for housing and furniture.

Recently, some lecture-workshops were conducted for some Asians including a 5-man group of government officials from Thailand, Malaysia, Indonesia, and Nepal.

PERMANENT IMPROVEMENTS/INFRASTRUCTURE ESTABLISHED

A. Particleboard pilot plant building

B. Particleboard research laboratory and researchers Office.

C. Consultants, room and conference room

D. Particleboard storage house

E. Generator and electrical house

F. Consultants quarters - 4 units duplex-type housing with adequate furnishings.

G. Access roads to the pilot plant.

FUTURE PLANS

In line with the major thrust of FPRDI to assist the wood-based industries, efforts will be directed towards:

A. R & D on the production and secondary processing of thick particleboards for housing and furniture; utilization of agri-wastes; application of other types of adhesives, etc.

B. Skills development for industrial manpower thru in-plant training-and-seminar-workshops.

C. Acquisition of more patents on developed technologies and techniques.

ANNEXES

ANNEX A

LIST OF TECHNICAL REPORTS COMPLETED

A. Published Reports

1. Production of particleboard from Kaatoan bangkal on a pilot plant scale - by N. Generalla and A. Pablo. Forpride Digest, Vol XI Nos. 3 & 4 July-December, 1982.

2. Particleboard Industry in the Philippines - An Overview. by Juliet S. Aguinaldo and Arturo A. Pablo. Forpride Digest, Vol. XI, Nos. 3 & 4. July-December, 1982.

3. Projected Domestic Market Demand for Particleboard - by J. Aguinaldo. The Philippine Lumberman, Vol. XXIX No. 4. April, 1983.

4. Particleboard and its Development - by Arturo A. Pablo The Philippine Lumberman, Vol. XXIX No. 4, April, 1983.

5. Report from Japan - Marketing Profile: A Particleboard Plant-Trading Firm - by Juliet S. Aguinaldo. The Philippine Lumberman, Vol. XXIX No. 9, September 1983.

6. Quality Control in Particleboard Production - by Necitas C. Generalla. The Philippine Lumberman, Vol. XXIX No. 9, September, 1983.

7. Effect of Particle Size on Resin Adhesive Distribution in Particleboard Manufacture of Kaatoan Bangkal - by Grecelda A. Eusebio and Necitas C. Generalla. FPRDI Journal. Vol. XII, Nos. 3 & 4, July - December, 1983.

8. The Effect of Particle Acidity on the Mechanical Properties of Particleboard - by Natalia M. Foronda, Luisa S. Cañadido, and Orlando R. Pulido. FPRDI Journal, Vol. XII, Nos. 3 & 4, July-December, 1983.

9. Effect of formaldehyde to Urea Mole Ratio on the Properties of UF Resin in Particleboard - by Erlinda L. Mari. FPRDI Journal, Vol. XII, Nos. 3 & 4, July-December, 1983.

10. Various Resin Content Levels: Their Effect on the Properties of Phenol-Formaldehyde-Bonded Kaatoan bangkal Particleboard - by Natalia Manalo-Foronda and Orlando R. Pulido. FPRDI Journal, Vol. XII, Nos. 3 & 4, July-December, 1983.

11. Application of Fire-Retardants in Particleboard - by Erlinda L. Mari, Luisa S. Cañadido, Necitas C. Generalla, and Arturo A. Pablo. FPRDI Journal, Vol. XII, Nos. 3 & 4, July - December,1983.

12. Effect of Moisture Content on the Flaking Characteristics of Giant Ipil-Ipil - by Grecelda A. Eusebio. FPRDI Journal Vol. XII, Nos. 3 & 4, July - December, 1983.

B. Unpublished Reports

1. Effect of particle geometry on resin adhesive distribution in particleboard manufacture of Kaatoan bangkal /Anthocephalus chinensis (Lamk.) Rich. ex Walp./ - by Grecelda A. Eusebio and Necitas C. Generalla.

2. Effect of moisture content on the flaking characteristics of giant ipil-ipil /Leucaena leucocephala (Lam.) de Wit/ - by Grecelda A. Eusebio.

3. Effect of various surface resin content levels on the properties of phenol-formaldehyde-bonded Kaatoan bangkal (Anthocephalus chinensis) particleboards - by Natalia Manalo-Foronda and Orlando R. Pulido.

4. Study on the effect of particle acidity on the mechanical properties of particleboards - by Natalia Manalo-Foronda, Luisa S. Cañadido, and Orlando R. Pulido.

5. Effect of various relative humidity conditions on the strength properties of Kaatoan bangkal particleboards - by Grecelda A. Eusebio.

6. Trial manufacture of particleboard using mixture of woodwastes and bagasse - by Dwight A. Eusebio.

7. Analysis of resin distribution on glued particles of Akamatsu (Pinus densiflora S. et Z.) by the Kjeldahl method. - by Erlinda L. Mari, Luisa S. Cañadido.

8. Research and development on the utilization of wood and other fibrous materials for particleboard: Giant ipil-ipil - by Erlinda L. Mari, Necitas. C. Generalla, Vicente C. Mallari, Jr. and Arturo A. Pablo.

9. Effect of some manufacturing variables on formaldehyde emission of particleboard - by Erlinda L. Mari, Lourdes Turreda, Vicente C. Mallari, Jr., and Joel Mari.

10. Pilot-plant scale production of particleboard using coconut trunk by Necitas C. Generalla, Arturo A. Pablo, Erlinda L. Mari, and Grecelda S. Eusebio.

11. Effect of particle size on the properties of giant ipil-ipil particleboard by Erlinda L. Mari, Necitas C. Generalla, and Arturo A. Pablo.

12. Waferboard manufacture from giant ipil-ipil and coconut trunks - by Luisa S. Cañadido, Natalia M. Foronda, and Necitas C. Generalla.

13. The effects of storage time of raw materials for particleboard manufacture - by Hilario C. Dolorse, and Juliet S. Aguinaldo.

14. The effect of adhesives and wax emulsions on the dimensional stability of particleboards - by Luisa S. Cañadido, Natalia M. Foronda.

15. Studies on the waterproofing of ordinary particleboards for exterior panelling or roofing - by Arturo A. Pablo, Vicente B. Lasmarias, Orlando R. Pulido, and Joaquin O. Siopongco.

16. Effect of layering on the properties of particleboard - by Vicente C. Mallari, Jr., and Erlinda L. Mari.

17. Properties of particleboard from various wood species and other fibrous materials - by Grecelda A. Eusebio, Necitas C. Generalla, and Dwight A. Eusebio.

18. Effect of fungicide on the mechanical properties of Kaatoan bangkal [Anthocephalus chinensis (Lamk.) Rich. ex Walp] particleboard - by Natalia M. Foronda, Luisa S. Cañadido, and Lourdes D. Turreda.

19. Control of formaldehyde emission from particleboard by the addition of formaldehyde scavengers: a. ammonium chloride and ammonium hydroxide - by Erlinda L. Mari.

20. The effects of surface to core weight ratio on the properties of giant ipil-ipil particleboards - by Erlinda L. Mari.

21. Effect of particle geometry on the properties of giant ipil-ipil particleboards - by Dwight A. Eusebio, and Necitas C. Generalla.

22. Studies on improving the properties of coconut trunk particleboard - by Necitas C. Generalla, Grecelda A. Eusebio, and Arturo A. Pablo.

23. Compressibility factors of some particleboard raw materials - by Grecelda A. Eusebio.

24. Dimensional stabilization of particleboard: By application of laboratory-made wax emulsions on Kaatoan bangkal particles - by Luisa S. Cañadido, Natalia M. Foronda, and Erlinda L. Mari.

25. Research and development of adhesives for wood-based panels. Study I. Fortification of polyvinyl acetate emulsions with isocyanate compound - by Lourdes D. Turreda, Luisa S. Cañadido, and Natalia M. Foronda.

26. Effect of various chemicals on the properties of wood-cement board from some wood species - by Dwight A. Eusebio, and Necitas C. Generalla.

27. Decay resistance of UF- and PF- bonded particleboard against fungi - by Natalia M. Foronda, Mercedes L. Roxas, and Luisa S. Cañadido.

28. Woodwastes utilization for particleboard manufacture in the Philippines - by Hilario C. Dolores.

29. The effect of pressing time, board density and resin content on the properties of particleboard from madre de cacao /Gliricidia sepium (Jacq.) Steud./ - by Sabino B. Damasco and Hilario C. Dolores.

30. Production of strandboards from yemane. I. Effect of strand length and resin content on board properties - by Luisa S. Cañadido, Lauro R. Tristeza, Alfredo F. Rosillo, and Arturo A. Pablo.

31. Studies on the suitability of various mixture of raw materials for particleboard manufacture - by Gracelda A. Eusebio, Dwight A. Eusebio, and Danilo C. Belen.

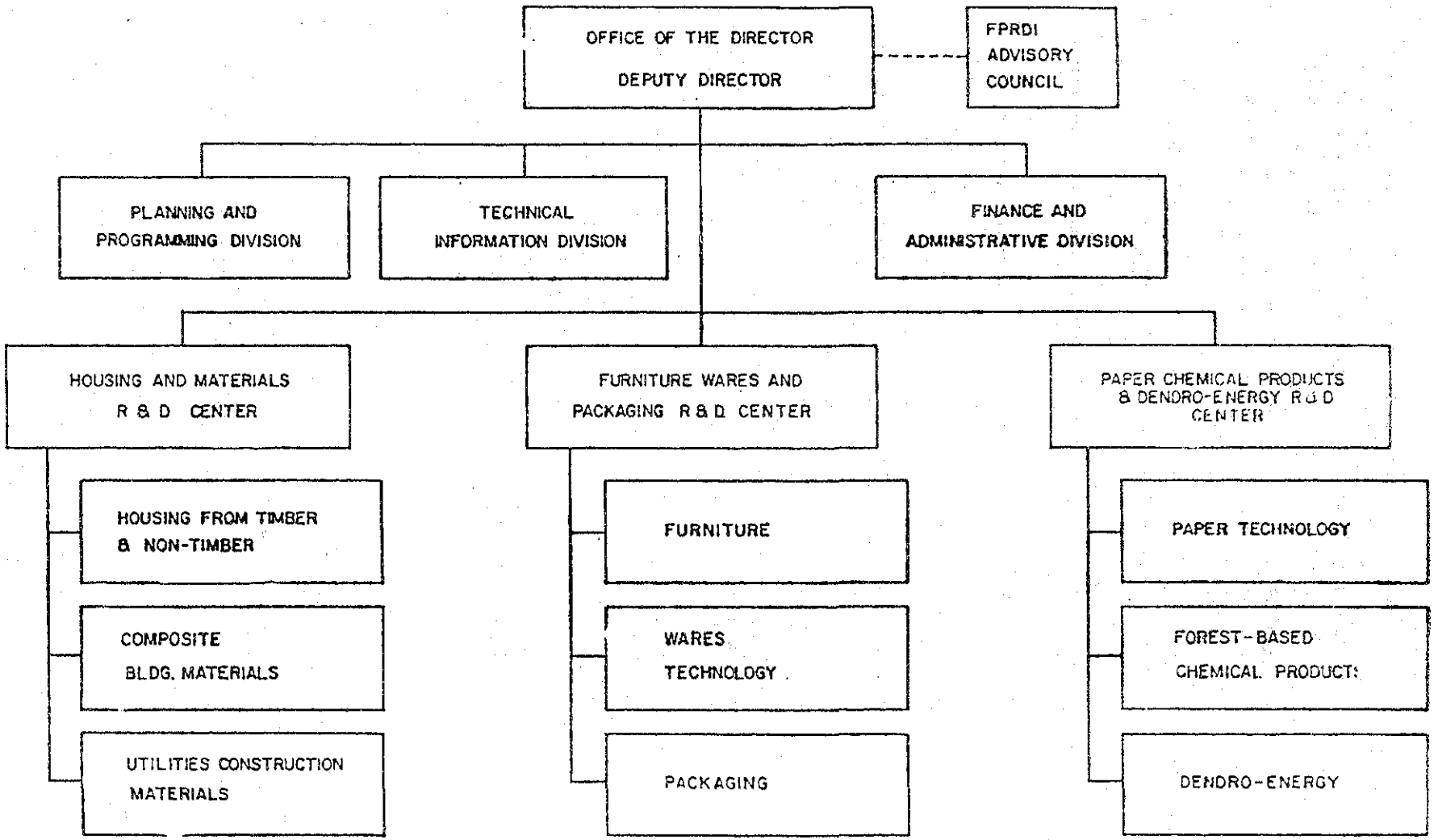
32. Biodegradation of treated and untreated particleboards caused by fungi - by Natalia M. Foronda.

33. Particleboard from coconut trunk and other parts - by Arturo A. Pablo, and Necitas C. Generalla .

34. Production of strandboard from low, medium, and high density wood species: Effect of board density, mat MC and pressing time on board properties - by Luisa S. Cañadido.

ANNEX B

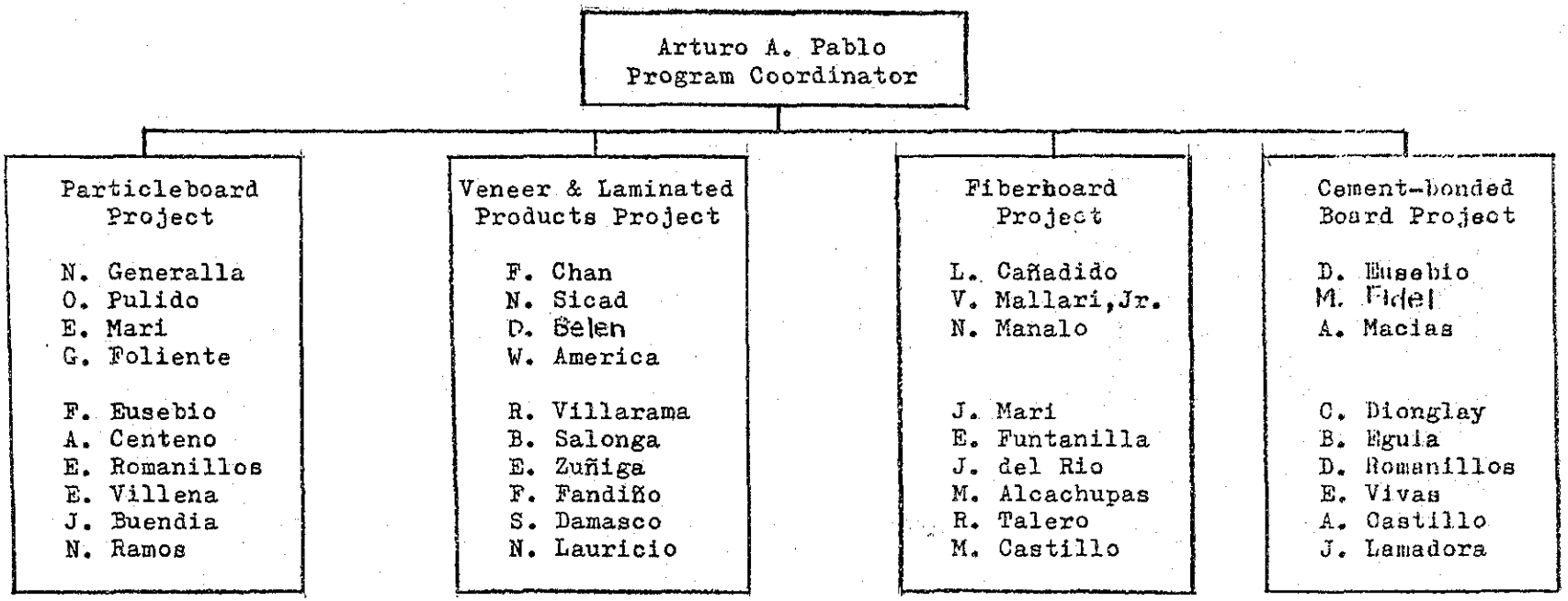
ORGANIZATIONAL CHART OF FPRDI



ANNEX C

ORGANIZATION CHART

COMPOSITE BUILDING MATERIALS PROGRAM



ANNEX D

FPRDI PERSONNEL TRAINED IN JAPAN

	Name	Present Position at FPRDI	Specialization
1.	Arturo A. Pablo	- Senior Science Research Specialist Program Coordinator - Composite Building Materials	- Production Management
2.	Necitas C. Generalla	- Science Research Specialist II	- Quality Control
3.	Orlando R. Pulido	- Science Research Specialist II	- Process Control
4.	Erlinda L. Mari	- Science Research Specialist II	- Adhesive Technology
5.	Luisa S. Cañadido	- Science Research Specialist II	- Product Development
6.	Vicente C. Mallari, Jr.	- Science Research Specialist II	- Gluing
7.	Dwight A. Eusebio	- Science Research Specialist I	- Testing
8.	Alfredo F. Rosillo	- Electrical Engineer	- Electrical Maintenance
9.	Felix F. Eusebio	- Science Research Assistant II	- General Plant Maintenanc
10.	Antonio G. Centeno	- Science Research Assistant II	- Mat-forming
11.	Cirilo B. Bobila	- Architectural Draftsman	- Board Finishing
12.	Juliet M. Sibal*	- Sc. Res. SpecialistI	- Marketing & Promotion
13.	Wilfredo P. Garcia**	- Mechanical Engineer	- Flaking & Flakes Preparation
14.	Aida Lee***	- Science Research Specialist I	- Testing
15.	Leduvino D. Versola****	- Science Research Specialist I	- Mechanical Maintenance

* Became housekeeper
** Transferred to IRRI
*** Re-joined Mabuhay Vinyl Corp.
**** Went to Saudi Arabia

ANNEX E

JAPANESE EXPERTS INVOLVED IN THE PROJECT

Long-Term Experts (1 to 2 years)

Masao Gotoda	-	Chief Advisor (1982-83)
Hideo Motoki	-	Chief Advisor (1981)
Kunihiko Fujiwara	-	Production Management
Setsuo Takemoto	-	Resident Project Coordinator (1980-83)
Yasuo Ito	-	Resident Project Coordinator (1979-80)

Short-Term Experts (1 to 6 months)

On Plant Design

Kazuhiro Yamakoshi	-	Mechanical Engineer
Yoshihiro Arakawa	-	Mechanical Engineer
Hiromoto Ogata	-	Electrical Engineer
Nagahide Toda	-	Electrical Engineer

On Installation

Nobuo Kushiro	-	Electrical Installation
Tomekichi Mizokoshi	-	Electrical Installation
Shigeo Kurihara	-	Mechanical Installation

On Particleboard Technology

Mutsumi Iwashita	-	Laboratory Research & Development
Tomoyasu Sakuno	-	Wood Adhesion
Hiroki Tanaka	-	Quality Control
Masayuki Oka	-	Production
Kunio Nakama	-	Mechanical Installation
Shigeo Nakano	-	Mechanical Installation

On Maintenance

Hiromitsu Hagisawa	-	Mechanical Maintenance
Yasuo Okamoto	-	Mechanical Maintenance
Masao Shibuya	-	Electrical Maintenance

ANNEX F

1986 LIST OF COUNTERPART

A. Researchers

1.	Arturo A. Pablo	-	FPRDI
2.	Necitas C. Generalla	-	Auburn University, Alabama, U.S.A. (1986-1988)
3.	Orlando R. Pulido	-	Kyoto University, Japan (1985-1988)
4.	Erlinda L. Mari	-	Tottori University, Japan (1985-1988)
5.	Luisa S. Cañadido	-	Shizouka University, Japan (1986-1988)
6.	Vicente C. Mallari,Jr.	-	Tottori University, Japan (1984-1987)
7.	Natalia M. Foronda	-	University of Malaya, Malaysia (1986)
8.	Felisa D. Chan	-	FPRDI
9.	Emmanuel Noli B. Sicad	-	FPRDI
10.	Dwight A. Eusebio	-	Tokyo University, Japan (1986-1988)
11.	Greg C. Foliente	-	FPRDI
12.	Danilo C. Belen	-	FPRDI
13.	Lauro R. Tristeza	-	FPRDI
14.	Alfredo F. Rosillo	-	FPRDI
15.	Antoinette Macias	-	FPRDI
16.	Maritoni Matibag	-	FPRDI

B. Research Assistants/Technicians

1.	Felix V. Eusebio	-	Science Research Assistant II
2.	Antonio G. Centeno	-	" " " II
3.	Cirilo B. Bobila	-	Architectural Draftsman
4.	Ramon D. Villarama	-	Science Research Assistant II
5.	Bonifacio B. Salonga	-	" " " II
6.	Joel P. Mari	-	" " " II
7.	Edgardo F. Funtanilla	-	" " " II
8.	Emerson L. Romanillos	-	" " " I
9.	Edgardo M. Villena	-	" " " I
10.	Carlos V. Dionglay	-	" " " I
11.	Francisca L. Fandiño	-	" " " I
12.	Ernesto L. Zuñiga	-	" " " I
13.	Sabino B. Damasco	-	" " " I
14.	Jasmin B. del Rio	-	" " " I
15.	Benson M. Eguia	-	" " " I
16.	Jose B. Buendia	-	Senior Mechanical Plant Operator
17.	Norberto L. Lauricio	-	Mechanical Plant Operator I
18.	Rafael E. Talero	-	" " " I
19.	Juanito C. Lamadora	-	" " " I
20.	Mario A. Alcachupas	-	" " " I
21.	Marcelino S. Castillo	-	" " " I
22.	Nathaniel A. Ramos	-	" " " I
23.	Eulogio T. Vivas	-	" " " I
24.	Angel S. Castillo	-	" " " I

資料8

収集資料リスト

1. Forest Products Research and Development Institute, (1986) Status Report on the RP-Japan Particleboard Project (March 18, 1977-June 18, 1986), Laguna, Philippines, June 1986.

2. _____. (1985) FPRDI Journal Volume XIV No. 1 & 2, January-June 1985

3. _____. (1984) FPRDI Journal Volume XIII No. 3 & 4, July-December 1984

4. _____. (1983) FPRDI Journal Volume XII No. 3 & 4, July-December 1983

5. _____. (1982) FORPRIDE Digest Volume XI No. 3 & 4, July-December 1982

6. _____. (1982) Particleboard for Housing and Furniture, September 1982

7. _____. (1982) "Secondary Processing of Particleboard" by Willy Villarosa; "Particleboard for Sewing Machine Cabinets and Furniture" by Avelardo J. Guinto; and "Prospects of the particleboard in the Toy Industry" by Pete Castaneda. (papers presented during the Symposium on Particleboard Technology at FPRDI, Laguna on September 29, 1982)

8. _____. (—) FPRDI Mature Technologies Volume2

9. Placido O. Urbanes, Jr. (ed.) The Philippine Lumberman Vol. XXIX No.4, (FPRDI Particleboard Plant) The Lumberman Inc., Quezon City, Philippines, April 1983

10. National Science and Technology Authority (NSTA). Organizational Profile (NSTA組織・関連機関活動概要パンフレット一式)

11. Varifold Architectural Products, Inc. 製品パンフレット

12. Resin Incorporated 会社・製品概要パンフレット

JICA