

SA 1000/1000

Information Document, N° 30

ECONOMIC COMMISSION FOR LATIN AMERICA  
UNITED NATIONS SEMINAR ON PREFABRICATION OF HOUSES FOR LATIN AMERICA  
(Copenhagen, Denmark, 13 August - 1 September 1967)

Study undertaken within the framework of the United Nations Development Programme/Special Fund Project - Survey of pine forests in Honduras

August 1, 1965

Final Report

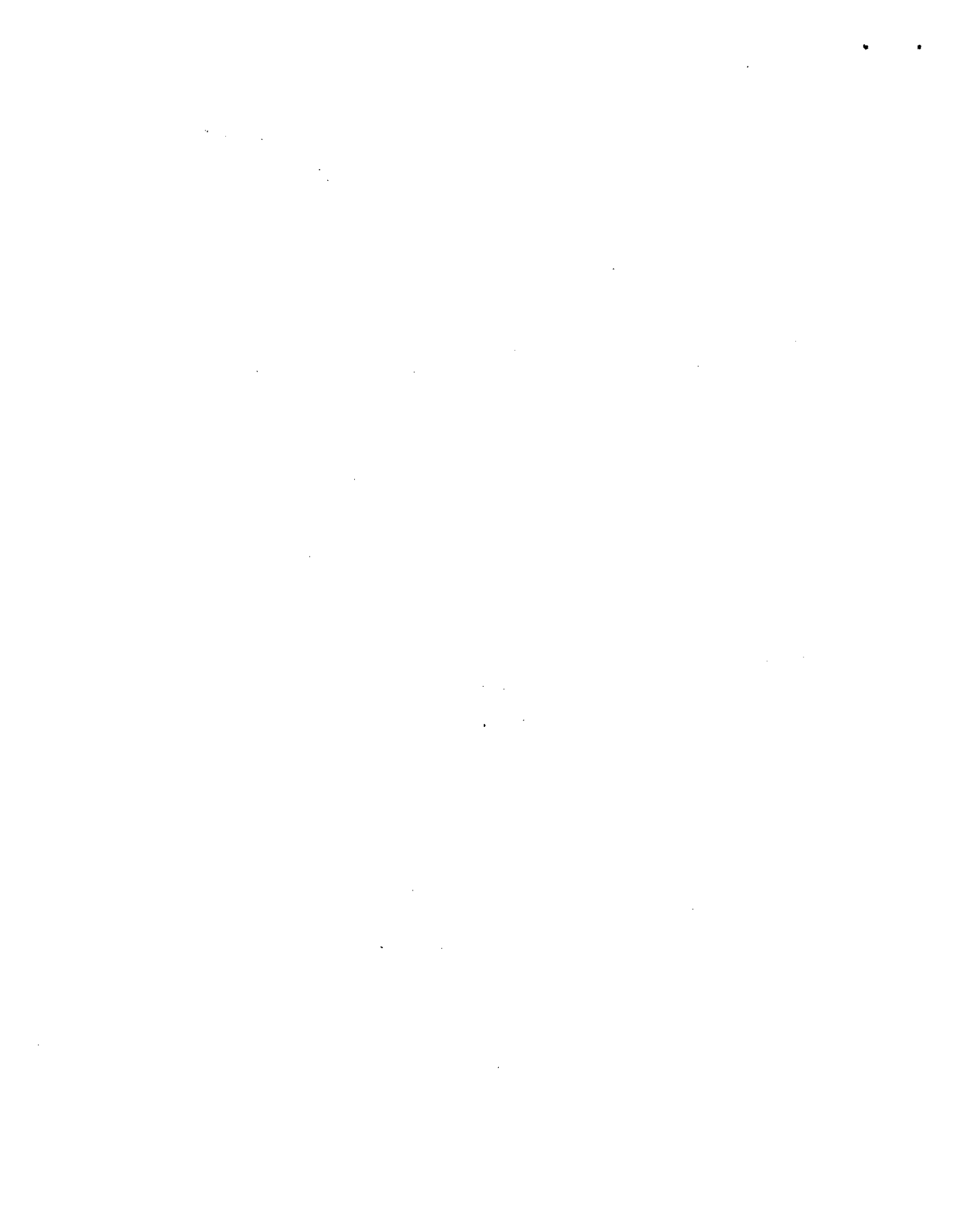
LOW-COST INDUSTRIALIZED WOOD HOUSING  
IN HONDURAS

Prepared for:

Food and Agriculture Organization of the United Nations  
Rome, Italy

Prepared by:

The Tuolumne Corporation, San Francisco, California  
and  
John M. Dickerman, Washington, D.C.



## I INTRODUCTION

This report is submitted in fulfillment of the objectives of the Honduras industrialized low-cost wood housing study for the Forestry and Forest Products Division of the Food and Agriculture Organization of the United Nations, Rome, Italy (Contract FO/HON/3). The project team comprised Peter Arnold, Robert W. Fritz, and Henry H. Haight, officers and directors of The Tuolumne Corporation, San Francisco, California, which specializes in research and management consulting in the forest products and building materials industries. The Tuolumne Corporation engaged Mr. John M. Dickerman, Housing Industry Consultant, Washington, D.C., as Financial Advisor on Phases I and III of this study.

### Objectives and Scope of Research

In November of 1963, The Tuolumne Corporation prepared a report for FAO entitled "A Preliminary Investigation of Forest Industry Opportunities in Honduras" (UNSF/HON/50). This study showed that a promising new forest-industry opportunity in Honduras could be in the production and sale of low-cost industrialized wooden houses, if financing, market, lumber quality, design, assembly, and erection problems could be solved. The present study, divided into three phases, is a detailed investigation of this opportunity.

### Phase I (Financing, Market)

The mayor objectives of Phase I were as follows:

1. To determine the present and future size of the low-cost housing demand that could be met by a plant manufacturing wooden houses in Tegucigalpa.
2. To establish the parameters for the minimum housing needed by low-income families able to purchase these houses.
3. To explore the most effective sources for, and methods of, financing a low-cost housing project in the Tegucigalpa area, to find potential financing agencies, and to ascertain their housing requirements.

Since favourable results were achieved in Phase I, the study continued to Phases II and III.

/Phase II

Phase II (Lumber Supply, Wood Preservation)

The major objectives of Phase II were as follows:

1. To determine the methods, costs, and investments required to assure an adequate supply of properly dried lumber resistant to termites and decay.
2. To determine the most suitable procedures for assuring consistent delivery of lumber of standard quality, including the establishment of uniform lumber grading procedures and quality control measures.
3. To determine the probable cost of lumber of the required grades and quantities delivered to the housing assembly plant.

Phase III (Proposed Housing Design, Costs, Financing)

This final phase, which incorporated the conclusions of Phase I and II, had the following as major objectives:

1. To prepare the preliminary design of an industrialized low-cost house, making maximum use of lumber, observing the minimum requirements in Phase I, and taking into account the need for keeping costs for materials, manufacturing, and house assembly to a minimum, and the use of standard panels and other house components.
2. To determine the raw material requirements, in terms of quantities and costs, of the plant-assembled houses, and requirements for manufactured articles.
3. To select a potential plant site, or sites, and estimate plant investment and working capital requirements.
4. To estimate production costs for a plant operating at full capacity and at various levels below full capacity.
5. To determine the most effective marketing strategy for the industry and the distribution costs associated therewith, particularly the method and cost of transportation of house components to housing sites, the method and cost of house assembly, and other distribution factors.
6. To estimate potential return on investment for the project based on pro forma cash flow and income statements.

7. To determine requirements for large housing developments in urban areas of Honduras (initially Tegucigalpa, as determined in Phase I) which the industry would supply, with special emphasis on the best type of distribution arrangements, availability and location of land (and urbanization costs), and financing requirements for development and construction.
8. To determine the requirements for management and for training of personnel for the industry.
9. To assess the risks associated with the project, including such factors as legal and governmental implications.
10. To ascertain the possibilities of financing the low-cost housing project as proposed on the basis of the technical studies, and to recommend the most promising means of financing.

This report comprises the analysis of findings of Phases I, II, and III, and the summary and conclusions for the project as a whole.

#### Phase I

Since this program could be established only if long-term, low-interest-rate mortgage financing could be obtained, great emphasis was given in Phase I to the financing problem. All available literature was consulted in the search for possible financing methods for housing in developing countries, and numerous public and private authorities were contacted, not only in Honduras, Guatemala, and San Salvador, but also in Washington, D.C., New York, and Chicago.

Published information on the ingredients required for housing-market projections is very limited in Honduras. All available government statistics on housing were used; the main source was the Census of Population and Housing for the Department of Francisco Morazan, dated April 1961. These data were supplemented by the publications listed in Appendix A, and by interviews with public and private officials, landlords, low-income families, housing developers, and firms that had credit experience with low-income families in Tegucigalpa. Estimates of family ability to pay for housing were based on a study of family income distribution in Tegucigalpa made by the Universidad Nacional Autonoma de Honduras, since other data such as social security and income tax information, were either incomplete or inconclusive. The formula

/used was

used was taken from a publication by Walter D. Harris, Hans A. Hosse and Associates, "La Vivienda en Honduras" (Housing in Honduras), a study published by the Pan-American Union late in 1964. The formula was originated by Guido Dandri of Italy, for demand calculations in areas where statistical data are sparse. The data on family savings are subjective, but no other data exist and a considerable number of interviews are represented in the observations.

Phase I was initiated with a planning meeting of the project team in early October 1964. After initial contacts in the United States, the project team traveled to Tegucigalpa and other Central American capitols. After field investigations were completed in Honduras, personal interviews continued in Washington and New York. The project team then completed its analysis and made a final presentation to top officials in the Inter-American Development Bank and to the Honduran Ambassador to the United States in Washington, D.C. in late December. After review of the findings in Rome, FAO authorized the study to proceed to Phases II and III.

#### Phase II

Initially, all data pertaining to the objective of this phase were collected, reviewed, and analyzed. Field investigations and consultations in the United States were carried out during March and April of 1965, both prior to and after field work in Honduras, and included educational and governmental organizations involved with research on wood treatment and seasoning; industry associations in wood treating, seasoning, and grading; and suppliers and producers of chemical preservatives, treating plants, and equipment, treated lumber, and manufactured wood houses. US field investigations were carried out in Madison, Wisconsin; New Orleans and Alexandria, Louisiana; Gulfport, Mississippi; Stockton, Benicia, San Francisco, and Los Angeles, California; St. Louis, Missouri; and Washington, D.C. Phase II field work in Honduras, most of which was carried out during April 1965, involved interviews with a number of sawmill owners, lumber exporters, and government agencies, and with management of the treatment plant in northern Honduras.

/Phase III

Phase III

Phase III was initiated with the trip sponsored by FAO and Tuolumne enabling the architect-in-charge of the Instituto de la Vivienda to visit the United States in May of 1965. Phase I findings had determined that INVA would be the organization in Tegucigalpa to administer the wood housing program. Mr. Francisco Prats Hijo traveled first to Washington, D.C., where he was given an intensive training and orientation program presented by lumber framing and wood engineering experts at the Research Institute Foundation of the National Association of Home Builders. These experts had been introduced to the particular problems of low-cost wood housing in Honduras through previous meetings and presentations by the project team. A tour of the factory and erection operations of the Barber and Ross Company, a house prefabricator and lumber precutting firm located near Washington, was also arranged for Mr. Prats as well as meetings with officials of the Inter-American Development Bank.

Mr. Prats then traveled to San Francisco to meet with The Tuolumne Corporation and principals of Moore, Lyndon, Turnbull, and Whitaker, a California architectural firm noted for its experience with wood and its original ideas. This firm had already made a preliminary house design utilizing information from existing INVA designs, pictures, and reports provided by The Tuolumne Corporation. Mr. Prats also toured the plant of the D.G.H. Corporation, a small local wood-house prefabricator, and had several meetings with Parker Sorg, its manager. After several design meetings, a very preliminary house design was made and sent to the NAHB experts for review of wood engineering details.

After Mr. Prats returned to Tegucigalpa, the project team joined him there to help finalize the house design. INVA redesigned the wood house, concentrating primarily on cost reduction. These preliminary designs, showing isometric views, elevations, and construction details are enclosed with this report.

The project team then investigated all the costs associated with the wood house. Interviews were held with several lumber producers, importers, contractors, and trucking firms, to determine the material and labor costs associated with production of the wood house as designed. Several meetings

/were held

were held with architects and engineers of INVA to determine the costs of urbanization, plumbing and electrical installations, sanitary appliances, and land for which INVA would be responsible in the wood housing program. Since INVA contracts directly with local contractors in building many of its houses, actual costs for contracting materials, labor, including profit and overhead, were obtainable. All costs associated with the wood-house industry's production of wood houses for sale to INVA were examined, including such non-wood items as asbestos cement roofing and glass windows. Several lumber companies were contacted to determine their interest in investing in wood treatment facilities and/or a wood assembly plant, as well as their ideas on lumber specifications. The project team also investigated (in Tegucigalpa) financing details of the proposed program, including costs for life and fire insurance, interest and amortization, and self-help financing of down payments. In July, the project team returned to the United States to complete the analysis and write the final report for presentation to FAO.

## II. SUMMARY AND CONCLUSIONS

Industrialized low-cost wood housing, as proposed in this study, is recommended for Tegucigalpa, Honduras. Major findings of the completed feasibility investigation of the wood-house program are as follows:

### Financing Low Cost Wood Housing

1. In order to meet the financing needs of the low-income families who would buy industrialized wood housing in Tegucigalpa, long-term, low-interest rate, high loan-to-value mortgage loans are essential.
2. Except for the program sponsored by the Honduran Housing Institute (INVA), no such mortgage pattern exists in that country. Considering the present state of the domestic savings institutions and their resources, even with the improvements now under discussion (including a Federal Housing Authority and insured deposits), this lack of mortgage financing will require some years to rectify.
3. In the continuing absence of any reasonably immediate expectation of financing such a project with loans from private international lending sources, with the U.S. AID program's future dimensions and nature  
/currently undecided



- currently undecided pending either additional authorization or modifications by Congressional action, and with other international lending sources unavailable for this purpose for a variety of reasons, the Inter-American Development Bank is the logical potential source.
4. The encouraging interest shown by officials of the IDB in Honduras and in Washington, D.C. in the promise for a true low-cost wood house program, and their informal indication of the potential of financing through IDB in connection with INVA should by all means be aggressively followed.
  5. The collateral developments, including the proposed reorientation of INVA, the new Central American Bank secondary mortgage market, the probability of an extended or a revised AID program, and the eventual possibility of an International Home Loan Bank, all point to the potential evolution of a savings pattern in Honduras, and to the possibility of supplemental foreign funds being in time made available for the interim home financing needs of this developing country.
  6. It is important to observe the growing interest in Honduras in the development of an integrated wood products industry (and in housing as an outlet for such products) among both government and business leaders. If encouraged, this interest could indirectly contribute to the creation of mechanisms needed for improved home financing for low-income families.
  7. The feasibility of such a wood house program is essential to further consideration by the most logical financing source, the Inter-American Development Bank.

#### Market Requirements

1. The present total housing need in Tegucigalpa is estimated to be some 8,100 units, with an annual pressing need for new housing that is approximately 2,700 units, including the backlog of demand not met by local house production since the last Housing Census was taken. If this demand is met during the 1965-1967 period, future demand will average about 2,000 houses per annum between 1968 and 1970.

2. Of the total demand for new houses in Tegucigalpa, there is a total minimum effective market for low cost wood housing of some 425 units per annum. That is, 425 families could be expected to save a 10% down payment, to qualify as sufficiently good credit risks, to have enough income after paying for necessities such as food and clothing to make the regular monthly payments required to pay off principal and interest, and to accept houses constructed of wood. If, as proposed, down payments are reduced to 5% for some families and eliminated for others through self-help programs, the effective market for wood houses of the type proposed would be 500-750 houses per annum.
3. Maximum monthly payments for housing have to be as low as 15% (about \$7.50-\$10.00\*) of monthly family income for the lowest income group in this market that can be expected to qualify for the housing. It should be noted that families earning from \$85-\$125 per month (the upper level of the market proposed here) are reported to be the best credit risks in Tegucigalpa.
4. The low-income housing currently being constructed by the Housing Institute (INVA) in Honduras consists of brick row houses with asbestos cement roofs and cement tile floors. The least expensive of these, built on a direct-contract basis, has a cost of \$1,630, including land, urbanization, and sanitary installations, but not including INVA administrative charges.
5. The wood-house program, involving a minimum production of 500 houses per year, should cost INVA no more than \$20 per square meter per erected house, exclusive of land and urbanization. Total costs for wood housing of minimum size should not exceed \$1,200, including all house costs, urbanized lot, and INVA administrative charges. Industry would have to work closely with INVA in simplifying house design and construction, and in building into the house as much as possible at minimum cost. However, this would give INVA the means for vastly

---

\* All currency is in U.S. dollars except when Lempiras are specified; one U.S. dollar equals to two Lempiras.

increasing its production of truly low-cost houses, so much in demand in Tegucigalpa, and reducing the per unit burden of administrative expenses.

6. The minimum wood house, 36 square meters (about 400 square feet) in size, should be expandable so that additional bedrooms can be added in the future at minimum cost. Sanitary facilities should be similar to those presently installed in INVA housing. Land acquisition and urbanization specifications should be integrated with current INVA programs and should be administered by INVA. Lumber should be the main material for the wood house, except in roof covering and floor. Lumber treatment against termite and decay damage must protect the house for about 30 years, at least several years beyond the term of the mortgage.

Lumber Supply and Wood Preservation

1. Honduras produces enough pine lumber of adequate grades and sizes to supply economically the contemplated housing industry's lumber requirements. Initially, these requirements will probably be between 3/4 and 1-1/2 million board feet (1.770 cubic meters to 3,540 cubic meters) annually, depending on house design.
2. The average cost, including profit margins and contingencies, of pine lumber, produced in an integrated supplying complex and delivered to a wood house assembly plant near Tegucigalpa, of the specifications required should be as follows:

	<u>Dollars per Thousand Board Feet</u>
Initial Sawing	\$ 35.00
Drying	2.30
Planning	6.00
Precutting	4.00
Pressure-Treating	25.00
Redrying	2.30
Hauling	9.40
Total	\$ 84.00 (\$35.60/cubic meter)

/3. Pressure-

3. Pressure-treated wood is required to give the needed 30-year assurance against termite and decay damage. The cost to the housing project for this treatment should be about \$25 per thousand board feet, allowing the supplier approximately a 14.5% profit margin. The producer would have a very substantial incentive to capitalize on developing other markets for treated lumber, outside the INVA program. The investment required for the treatment plant is estimated to be about \$42,000 with an additional \$10,000 for working capital.
4. A single large sawmill could probably supply all of the initial requirements for lumber for the housing project. A number of sawmill owners and lumber exporters indicated considerable interest in investing in plant and equipment to supply the project.
5. INVA should provide a well-trained inspector to inspect all lumber shipments to the housing project. Lumber exported from Honduras is produced to the size and grade specifications of the American Lumber Standards Committee (ALS). These standards, if adhered to, will be acceptable for the housing project's quality-control requirements.
6. Industrialized housing, once production is established in Tegucigalpa, could find markets in other areas of Honduras and Central America. It should be economically feasible to truck precut, pressure-treated lumber to house-assembly plants in urban areas on the North Coast and for export to El Salvador and Nicaragua. Also, the profit and marketing advantages of care in dressing, storing, and treating lumber might well serve as an incentive to other Honduran producers, to improve their manufacturing and marketing practices for domestic and Central American construction markets.

#### Proposed Wood House Design

1. The preliminary wood house design is sketched in Figure II-1. As shown, duplex housing is proposed with each housing unit occupying a space 20 feet by 20 feet (36 square meters), the size proposed for the lowest-cost (minimum) unit in the wood housing program. The lot size is such (108 square meters) that each "main house" can have additional bedrooms with the construction of an "expansion" house in the back patio, as shown in the sketch.

/2. The main

2. The main house has one large living-dining area, most of which can be converted to a bedroom at night, a master bedroom, a kitchen with sink, a shower room, a toilet room, and a laundry-wash basin under an overhang in back. The expansion house has two larger bedrooms with closet areas.
3. The foundation and floor will be a concrete monolithic slab with a raised rim around the perimeter to support the exterior walls and to diminish the danger of wood rot from interior water sources.
4. Wall panels will be fastened to the foundation with threaded masonry nails hammered through the bottom two-by-four of the panel into the raised concrete rim. Walls will be approximately square panels (six feet, eight inches) which, when joined together, form a single wall with what will represent a four-by-four post at each panel joint. Each exterior panel is framed on all sides with two-by-fours and faced with one-by-six siding, planed to a shiplap pattern. All panel joints are covered by battens (strips of lumber).
5. The roof structure is very similar to that now used in INVA housing; corrugated asbestos cement panels, three feet by eight feet, over wooden rafters. The roof overhangs all exterior walls by one foot except where additional overhang structure protects the front door area, the back toilet and shower area and laundry basin, and the walkway between the main and expansion house.
6. Doors are built of lumber in the assembly plant and windows are glass jalousies, both similar to the type now purchased by INVA. Besides basic hardware items, galvanized tin sheets protect parts of the kitchen and shower area. Sanitary equipment would be of the type now supplied in INVA housing.
7. No painting is envisioned for this minimum wood house except for the front and rear exterior doors. Lumber pressure-treated with chromated copper arsenate has a greyish-green color, which, with the grey asbestos cement roof, should give a pleasing impression.
8. Depending on the results of house experimentation and market testing, a materials contingency fund will allow for interior wall panelling, pressure-treated wood fencing, or other additions deemed necessary.

9. Although the main house is indeed minimal, it will provide much improved shelter and sanitation to a low-income group in Tegucigalpa at monthly payments lower than the vast majority of this group now pays for housing.

Wood House Program - INVA Responsibilities and Costs

1. INVA would administer the wood house program and be responsible for supplying the land for the houses, urbanizing the lots, and contracting directly with private industry and several local contractors to build the houses, complete with plumbing and electrical installation and sanitary equipment.
2. Land for the wood house program is available in "Colonia Kennedy", INVA's current housing development financed by the IDB near Tegucigalpa. INVA would charge \$100 per lot for the land which covers its original cost both for lot and allocated urbanized area.
3. Urbanization, directly contracted by INVA, consisting of sewer systems, potable water systems, rainwater drainage, asphalt streets and paving, green areas, and electricity, would cost the wood-house program \$250 per lot. In order to lower sewer system costs in the future, INVA should investigate the lagoon system of sewage disposal.
4. Costs for lot preparation and concrete slab foundation on a direct-contract basis are estimated at \$106 for the main house and \$85 for the expansion house.
5. Plumbing and electrical installations would be directly contracted by INVA for \$113 per house.
6. Sanitary equipment and final work directly contracted by INVA would add \$130 to each house in the wood-house program.
7. Exclusive of INVA administrative charges and the house structure, that portion of the total Main House cost that INVA would charge to the mortgage would therefore come to \$700 (\$350 for the urbanized lot and \$350 for other contracted items). Contracted items for each expansion unit would cost INVA \$87.
8. Some 500 main houses and 125 expansion houses are planned for completion during each of the first two years of the wood house program. On an annual basis, INVA would be responsible for costs (including contingencies,

/and margins

and margins for contractor profit and overhead) totaling about \$360,000.

Wood House Program - Industry Responsibilities, House Costs, and Investment Return

1. In order to deliver pine lumber to Tegucigalpa at an average price of \$84 per thousand board feet in the exact dimensions and specifications required for an industrialized wood house, it has been recommended that all planing, precutting, drying and pressure-treating take place in one facility that will be integrated with a sawmill in the major lumber-producing area of Honduras. Certain lumber companies, in addition to their interest in an integrated treatment facility, have expressed keen interest in investing in a wood-house assembly plant near Tegucigalpa which would assemble, haul, and erect panels and other house components on the Kennedy development for sale to INVA.
2. Investment requirements for the assembly plant are estimated at \$21,500. The assembly plant would represent a very simplified production process of nailing a variety of precut lumber pieces repetitively into various predesigned panels and other house components for immediate wagon hauling by house to the erection site. Houses would be assembled and erected at the rate of two main houses (one duplex) per day and one expansion house every other day. With this type of operation, working capital requirements are high, amounting to \$22,100, thus making total capital requirements \$43,600.
3. The industry would sell INVA 500 main houses and 125 expansion houses per year under an initial two-year contract. Window installation and exterior door painting would be subcontracted by the industry, which would erect all walls, doors and roofs above the INVA-contracted concrete foundation.
4. Annual lumber requirements for precut, treated lumber of the specifications desired would be somewhat over 1 million board feet (2,360 cubic meters). Each main house would require 1,700 board feet; each expansion house would utilize 1,275 board feet. These are liberal estimates, developed from computation of lumber requirements by type and number of component.

5. House costs have been estimated conservatively. INVA could expect the following unit-cost breakdown by type of house:

	<u>Main House</u>	<u>Expansion House</u>
Cost of Materials		
Lumber	\$142.80	\$107.10
Non-Wood Materials	87.91	60.50
Contracted Items	<u>36.19</u>	<u>36.19</u>
Total	\$266.90	\$203.79
Total Cost of Assembly and Erection Labor, Supervision	35.62	40.60
Operating & Depreciation Expense	<u>6.81</u>	<u>Nepl.</u>
Total Manufacturing Cost	\$309.33	\$244.39
Profit and Contingency	<u>40.67</u>	<u>30.61</u>
Sales Price to INVA	\$350.00	\$275.00

6. Annual sales to INVA for the first year of full production would approach \$210,000. The assembly plant's profits, assumed to be free from taxation because of its status as a new industry, should approximate \$24,000, about 11.5% of sales. This profit would be reduced by the amount of the contingency, if that were needed, or by a managerial profit-sharing plan, insurance expenses, or interest charges on borrowed capital, if any. Even so, such profits could return the total capital employed between the second and third year of operation, which is considered to be fair in view of the risks associated with setting up a pioneering industry.
7. Although it is not expected that this program would involve contracts with INVA for any initial wood house production level below 500 houses per year for two years, breakeven operations would occur with operations at production of half the planned level.

/Terms of



Terms of INVA-Industry Cooperation in the Wood House Program

1. With INVA's and the wood industry's responsibilities in the wood-house program combined, the minimum wood house costs, exclusive of INVA administrative charges, would be as follows:

	<u>Main House Cost Per Unit</u>
INVA Land, Urbanization, and Contracted items	\$700
Wood Industry Assembly & Erection	350
Total	<u>\$1050</u>

With the expansion house cost per unit at \$362, total cost for families who could afford the two units would be \$1,412, exclusive of INVA administrative charges.

2. Experimental houses will have to be built, and market testing will have to be carried out before final specifications and working drawings are drawn up. Therefore, a cost contingency for any possible additions to the house (such as fencing or paneling) must be included. This amount, when combined with INVA administrative charges, should not exceed \$150 so that the total mortgage does not exceed the \$1200 market requirement for the minimum house.
3. While INVA is planning to administer and finance the construction of these experimental houses, interested industry investors should plan to have their personnel work with the experimental program to gain as much experience as possible, particularly with precutting to specified tolerances and working with treated wood.
4. Once the wood house program has been initiated, construction and installation work of the various contractors should be very carefully scheduled, particularly for those operations that must precede wood-house erection.
5. A consulting specialist, experienced in lumber construction and house prefabrication will be required to help INVA and industry implement the program. He would first act as an INVA advisor in detailing lumber requirements and other materials specifications, /developing working

developing wording drawings, and constructing experimental houses. Then he would help industry in developing precutting, assembly, and erection tolerances for the lumber, in laying out the assembly plant, training its supervisors and workmen, and advising in the assembly, erection, and inspection of the first houses sold to INVA.

6. A lumber grading specialist will also be required to train INVA inspectors in the inspection of grade and moisture content of pine lumber used in the wood house program. He would also work with industry in developing the selected grading rules for lumber that will be upgraded in the process of precutting common grades of lumber to the short lengths required for panelization. INVA inspection of wood pressure-treatment quality can be made on the basis of periodic random lumber samples selected for laboratory test at the facilities of treatment-equipment manufacturing firms.
7. Whether some or all of INVA's present contracting procedures will be utilized in negotiations with the wood-house industry will depend on the industry situation and its ability to perform at the time INVA is ready to let final contracts.
8. Local financing for the assembly plant and the treatment plant will probably be available. It may also be possible to obtain this financing from the Inter-American Development Bank under its ordinary operations, as differentiated from its Social Progress Trust Fund under which mortgage financing for low-cost housing is obtained.

Financing the Wood House Program

1. The total mortgage for the minimum house of the wood house program would be \$1,200, detailed as follows:

Complete house costs	\$ 1,050
INVA administrative charges and "closing costs"	65
Contingency	85
	<hr/>
Total Main House	\$ 1,200

/With the

With the rapid rate of production envisioned for the wood house program, INVA would charge \$42.50 per house for administrative costs. "Closing costs", such as costs of legal fees, registration, legal stamps, and deed, would come to \$22.50 per unit, under INVA's administration. This would leave \$85 for a contingency to permit addition of certain house amenities should experimental construction and market testing require it.

2. Present INVA-IDB house financing in Tegucigalpa families is for a term of 20 years with interest at 4.5% plus life insurance and fire insurance. These houses sell for from \$1,725 to \$2,200, including all INVA charges, and a 5% minimum down payment is usually required.
3. Under similar financing, the wood house program would permit a low-income family, on the basis of a \$60 down payment, to purchase new, sanitary housing quarters (with the opportunity for a two-bedroom expansion) for \$8.67 per month, detailed as follows:

Mortgage - principal and interest	\$7.22
Life insurance	1.00
Fire insurance	.45
	<hr/>
Total Monthly Payment	\$8.67

On the basis of 15% of total family income, families with an income as low as \$58 per month (about \$700 per year) could afford this house.

4. Selected families could eliminate the \$60 down payment by joining an INVA auto-construction group (self-help program), in which the head of the family performs not less than 10 hours work each week, which is credited against an INVA loan financing certain construction work with local contractors. The wood house program would have enough self-help activities to allow for \$60 of construction work.
5. If families elected to purchase the expansion house too, total monthly payments would be \$11.30. On the basis of 15% of total family income, families with incomes as low as \$75 per month could afford the two units. If the unit were added later, the mortgage could be refinanced, when the family equity in the existing structure obviated the need for a down payment on this addition.

/6. Assuming

6. Assuming that 1000 main wood houses would be built and sold over a two-year period, and that of these 250 would include the expansion unit, the total amount of money required (beyond that for current INVA programs) would be \$613,000 per year, or \$1,226,000 for an initial two-year program. To avoid the sharp drop in unit volume at the conclusion of the two-year initial period, consideration should be given to (among other possibilities) either petitioning for a supplemental IDB loan to bridge over the period until amortization from the first wood house loan would provide funds for a balanced production schedule, or requesting that IDB forego repayments in a certain amount to permit such funds to go into a revolving fund for an agreed period. Regardless, a substantial number of houses beyond the original 1000 could be financed from the difference in funds available through IDB's practice of lending funds at lower interest rates and longer terms than the mortgage loans by INVA to house purchasers.
7. The proposed wood house program substantially meets the objectives of both INVA and IDB within the context of interpretation made by the organization's criteria. INVA is the only implementing agency in Honduras with the objectives, legal power, and organization to undertake and administer a truly low-cost housing program. The Inter-American Development Bank is the logical, if not the only, source for long-term, low-interest mortgage loans for the proposed wood house program.
8. The results of such a wood house program appear to be in harmony with the objectives of IDB and its programs. It would not only serve to provide badly needed houses for low-income families at prices within their means, but would also mobilize an important domestic resource in introducing a rapid, economical system of fabricating and erecting houses that would create a whole new wood products industry for Honduras.
9. Further important benefits for Honduras are apparent. The program would minimize the strain on foreign exchange, holding to a minimum the need to import materials. Added foreign exchange is distinctly possible also as a result of export of treated lumber to Central American markets, and the shipment of precut treated lumber to other

/assembly plants

assembly plants fabricating to the design requirements of urban housing markets in El Salvador and Nicaragua. With the program's incentives for improved efficiency and quality control, it would benefit the lumber industry by improving the ability to compete in domestic and export markets. Technologies required in the treatment process and fabrication system would introduce useful skills that would be a valuable addition to the nation's labor force. And finally, the wood house program would help solve the pressing housing problem in Tegucigalpa where, as is typical of Honduras, some 70% of urban families earn less than \$1000 per year, and as a consequence have little choice except to live in over-crowded, unsanitary shelter.

1111

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

In the second section, the author outlines the various methods used to collect and analyze the data. This includes both manual and automated processes. The goal is to ensure that the data is as accurate and reliable as possible.

The third part of the document provides a detailed breakdown of the results. It shows that there is a significant correlation between the variables being studied. This finding is supported by statistical analysis and is consistent with previous research in the field.

Finally, the document concludes with a series of recommendations for future research. It suggests that further studies should be conducted to explore the underlying mechanisms of the observed relationships. This will help to build a more comprehensive understanding of the subject matter.