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PRODUCTION OF WOODEN TEXTILE INDUSTRY ACCESSORIES

DP/VIE/80/027

VIET NAM

Technical report: Project formulation mission to Viet Nam*

Prepared for the Government of the Socialist Republic of Viet Nam
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of P. Borretti
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United Nations Industrial Development Organization
Vienna

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ABSTRACT

In the framework of the priority assigned by the Vietnamese Government to the development of the textile industry, a project was included in the UNDP Country Programme 1982-1986 to help improve the manufacture of wooden accessories used in the weaving industry.

This report deals with the related project formulation mission (preparatory assistance) carried out by a UNIDO woodworking consultant from 27 March to 3 April 1985.

The purpose of the report is to assess the current conditions and requirements in the supply of loom shuttles and picking sticks, and make recommendations on steps to be taken to improve their local manufacture.

The recommended technical assistance activities take into account the recently-changed Government priorities concerning the scope of the project - with the inclusion of shuttle-hardware production as an area requiring urgent improvements. Thus two project documents are annexed to the report.

1. Project document on extended preparatory assistance (Annex I) having the following objectives:

(a) to establish a verified basis on the suitability and possible treatment alternatives of selected commercial Vietnamese timber species for the efficient and cost-effective manufacture of wooden loom accessories/

(b) to establish project requirements for the production of shuttle-hardware of appropriate quality, using as a starting point the existing metal-working facilities operated by the Nam Dinh Textile mill;

(c) to establish project requirements for the efficient production of wood machining cutting tools, using as a starting point the existing machine-tool facilities operated by the Nam Dinh or Viet Thang Textile mills.

2. Project document on the establishment of a pilot plant for the wood-processing of shuttle-blocks into finished shuttles (Annex III):

Upon completion of the extended preparatory assistance activities, the Government will be in a position to select priorities in project implementation within the allocated UNDP budget of US$ 1 million.

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1. FINDINGS

1.1 Distribution and output of the textile industry

The bulk of the cloth output is provided by the weaving plants in the North, which produced 108.5 million linear meters of cloth in 1984 as compared to 67.5 million in the South. Also in the North are the three largest weaving plants, Nam Dinh, 8 March, and Vinh Phu, with an output in 1984 of 34 million linear meters, 25 million and 27 million, respectively. The largest plant in the South is the Viet Thang, with an output of 23 million linear meters.

The textile mills operate under the Ministry of Light Industries and are grouped under the two central Unions of Textile Enterprises (UTE) in the North (Hanoi area) and the South (Ho Chi Minh City area).

1.2 Types, consumption and origin of loom shuttles and picking sticks

Loom shuttles in use in Viet Nam are of two main types: the shuttle-change type (where the shuttle itself is changed when new yarn is introduced in the weaving process), and the cop-change type (where only the pirn is replaced). The majority of shuttles are of the shuttle-change type (for use on Chinese-made looms, most of which are installed in the Northern weaving mills) and produced locally; whereas the cop-change shuttles (mostly used in the Southern weaving mills on Japanese and American looms) are all imported. The major current exporter of shuttles to Viet Nam is the Democratic Republic of Germany. The breakdown of imported shuttles is as follows:

(a) Imported from the Democratic Republic of Germany (1984): 55,000 pieces at a cost of Rubles 9.40 each (total Rubles 517,000)

(b) Imported from Japan (1984): 500 pieces at a cost of US$ 13,5 each (total US$ 6,750)

Previously, cop-change shuttles had also been imported from China (30,000 in 1983 at a price of US$ 3.4 each) and India (40,000 pieces in 1981 at a price of Rupie 65 each). Chinese-made shuttles were found to provide good performance whereas the Indian ones would expand considerably under Vietnamese climatic conditions.

The weight of shuttles in use in the Vietnamese weaving mills ranges from 235 for the Japanese Tsudakome looms in the South to 475 grams for East German looms in the North. Shuttle-length varies from 343 mm for the Chinese looms in the North to 433 mm for the American looms in the South.

1.3 Manufacture of shuttle-blocks and picking sticks

All locally-manufactured shuttles, and the majority of picking sticks, are made of laminated veneer. Picking sticks and side levers had originally been made of solid wood, but at present they are mostly manufactured using laminated veneer due to the scarcity of appropriate timber species.

The majority of laminated shuttle-blocks (some 250,000 out of the total 274,000 consumed in 1984) is produced by the Cau Duong Plymill of the Ministry of Light Industries, located near Hanoi, and distributed to the shuttle plants in the North and the South for processing into finished shuttles. The mill also delivers annually over 100,000 picking sticks and side lever in ready-for-use form to the respective weaving mills.

The balance of the shuttle-blocks and picking sticks is produced by the Hoa Bin Ply/Match plant located in Ho Chi Minh City. The mill has been involved, in cooperation with the Viet Thang textile mill, also in Ho Chi Minh City, in wood-compression trials by utilizing a press originally designed for plastic work. However, no positive results could be achieved in this respect and no details could be made available on such experiments.

1.4 Wood-processing of shuttles

There are four main shuttle-manufacturing plants in the country, of which three (8 March, Nam Dinh and Vinh Phu) located in the Hanoi area, and Viet Thang in Ho Chi Minh City. They are all attached to the respective weaving mills. In addition, there is a small shuttle plant in Ho Chi Minh City operated under the local authorities.

The oldest shuttle-pirn plant is the one attached to the Nam Dinh textile mill established in 1960, followed by the 8 March Plant in 1965, Viet Thang's in 1979 and Vinh Phu's in 1983. The largest shuttles output in 1984 was attained by Nam Dinh with 88,000 pieces followed by 8 March with 84,000 pieces, both on a two-shift operation.

The first shuttle making equipment introduced in Viet Nam was of Chinese make and was installed at the 8 March Mill. Also of Chinese origin is the equipment at the Vinh Phu plant, which had originally been acquired with the Chinese looms installed in the textile plant, and only later, in 1983, begun to be utilized for regular shuttle production.

The shuttle-making equipment in operation at both the Nam Dinh and Viet Thang plants were instead made locally on the basis of the original Chinese machinery, but simpler in design. Some of this equipment is quite ingenious in design and could be retained, or further developed, for use in improved future plants.

1.5 Timber supply

1.5.1 Distribution of forests with commercial timber species[1/]

The province of Gia Lai - Kon tum is leading in tree-standing volume concerning dense forests, followed by Nghe

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1/ Details of species predominance in the Dong Nai province in the South, and in the Nghe Tinh province, in the North, are given in Appendix C of Annex II. A list of main commercial timber species occuring in the forest of the Dong Nai province is given in Appendix B of Annex II.

Tinh province. However, the provinces with the largest ratio of commercial timber-volume per hectare are Nghe Tinh, Binh Tri Thien and Gia Lai - Kon tum with a volume of over 40 m^3/ha.

Concerning average and poor-density forests, the provinces with the largest standing volume of commercial timber are Nghe Tinh, Binh Tri Thieu and Dac Lac.

The forests with the largest percentage of commercial timber are those rich in Lagerstroemia-Legumineous, where nearly all trees are of commercial value.

1.5.2 Timber species used in the manufacture of wooden accessories for weaving looms

The main timber species utilized in the manufacture of laminated shuttle-blocks, picking sticks and side levers at the Cau Duong Plymill in Hanoi, is Goi nep (Aglaia gigantea - Pelegrin). However, because of the irregularity in the supply of any particular species, the plant is obliged to utilize a number of alternative timber species, often combined with each other: below is a list of main such alternative species:

1. Goi te (Aglaia sp)
2. My (Lysidica thodostegia - Hance)
3. Muong (Cassia sp)
4. Sang (Sapindus oocarpus - Radlk)
5. Tram hong (Canarium sp)
6. Tram (Melaleuca leucadendron - Linn)
7. Tram trang (Canarium album - Raeusch)
8. Vang Trung (Endospermum sinensis - Benth)
9. Xoan dao (Pygeum arboreum - Endl et Kurz)

The species utilized by the Plymill in Ho Chi Minh City for a limited production of shuttle-blocks, picking

sticks and side levers is the Ven Ven (Anisoptera cochinchinensis - Pierre).

The predominant timber species used both in the Southern and Northern shuttle plants for the manufacture of pirns is the Bang Lang (Lagerstromia loudoni - Taijm).

At an earlier stage shuttle blocks had been made of solid wood of the Mo species (Manglitia glaua - Anel).

1.5.3 Tentative suitability of Vietnamese timber species for compress-wood treatment

The following properties should be present in timber species as an initial base for suitability for wood-compression treatment:

(a) Density at 12-15% M.C. : 600-800 kg/m^3

(b) Straight grain

(c) Easy to dry and no tendency to splitting in the seasoning process.

Based on information provided to the consultant by the Industrial Forest Research Institute, at Chem, Tu Liem, Hanoi, the following species reflect the above-mentioned requirements:

	LOCAL NAME	BOTANICAL NAME	DENSITY	GRAIN	SEASONING
1.	Vên vên	Anisoptera cochinchinensis Pierre	0,64	S	SD
2.	Cáng lõ	Betula alnoides-Buch. Ham.ex D.Don	0,66	S	FD
3.	Giẻ gai	Castanopsis chinensis-Hance	0,74	S	FD
4.	Giẻ gai Bac Bô	" tonkinensis-Seem	0,65	S	FD
5.	Hoàng dàn giá	Dacrydium pierrei-Hick	0,68	S	FD
6.	Sang lẻ	Lagersroemia calyaclata-Kur	0,68	S	FD
7.	Bằng Lang	" sp	0,66	S	FD
8.	Mõ	Manglietia conifera-Dandy	0,48	S	FD
9.	Thông ba lá	Pinus kesiys-Royle	0,75	S	FD
10.	Thông nàng	Podocarpus imbricatus- Bl	0,56	S	FD

Notes:

1. Density at 12-15% M.C. g./cm^3
2. Grain: Straight (S); Interlocked (I)
3. Seasoning properties: Slow drying (SD); Fast drying (FD)

No similar information could, however, be made available during the mission by the Forest Research Institute on the remaining commercial species available on the market as per list given in Appendix A to Annex II, nor could access be provided by the Institute to relevant publications[1/] which are likely to be available in its library.

By cross reference with information on Laotian timber species[2/], the Consultant identified two further species occuring in Viet Nam, which might have an initial potential for wood-compression treatment. These are:

(a) Sang may (Sageraea elliptica);

(b) Muong den (Cassia siamea - Lamk).

1.6 Hardware and milling tools supply

All the imported cop-change shuttles are supplied complete with hardware, while the steel components of the locally-made shuttles are manufactured in the country. The Viet Thang textile mill is equipped to produce such hardware, while the Nam Dinh mill is partly self-sufficient in this respect.

There are no machine-tool workshops in Viet Nam specifically and fully equipped to produce high-speed milling cutters required for critical wood-processing operations in shuttle

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1/ 1. Rapport à l'Institut d'Inventaire Forestier et de Planification du Viet Nam. 56 p. Clement J., 1979.

2. Oecogenie et classification de la végétation forestière du Viet Nam. Maison D'Edition Sciences et Technique, Hanoi, 276 p., 50 photos, 37 fig., 16 tabl. 421 ref., 2e edit. 1978.

2/ UNIDO, Properties and use of Laotian timbers, W. Krieg and B. McCombe, LAO/74/010,1978.

making. Two of the main textile mills, however, Nam Dinh and Viet Thang, are equipped with machine-tools facilities, which are partly and occasionally utilized to provide tooling services to the respective shuttle plants.

2. MAIN PROBLEMS IDENTIFIED

2.1 Quality of laminated shuttle-blocks and picking sticks

Wood lamination is an exacting process whose efficiency depends on a number of critical factors (such as appropriate moisture content of veneer in relation to the requirements of phenolic glue, pre-drying at a controlled temperature after dipping veneer layers in phenolic bath, precision and uniformity of press platens etc.) which appear difficult to control under the working conditions of the two existing wood-lamination plants (Cau Duong and Hoa Bin).

Resulting poor adhesion of veneer layers in laminated shuttle-block contributes to splits in the shuttle body both during wood-processing and while in use in the looms. An additional problem in the case of picking sticks is caused by the failure to arrange veneer layers at an angle of about 15° with respect to each other so as to increase the resistance to impact.

2.2 Lack of uniformity in timber supply in the manufacture of laminated shuttle-blocks and picking sticks

One of the drawbacks in the manufacture of laminated shuttle-blocks by the largest producer, the Cau Duong plymill, is the difficulty to obtain a regular supply of a given species of peeler logs. Thus the plant is often obliged to change from one species to another in the lamination process, or to mix veneer-lamination of more than one species in the same shuttle-block. The end result is a variation in the weight of the shuttles in use, which is not considered satisfactory by the weaving mills concerned.

2.3 Excessive wood-processing steps and inaccuracy of machines

Taking the Nam Dinh shuttle plant as an example, over fifty processing steps are involved in machining and hand-finishing the blocks into finished shuttles. Of these, thirty-eight are machining operations, many of which could be eliminated and/or combined, if more modern (not necessarily sophisticated) machines were made available, so as to streamline the process, increase precision and quality, and minimize laborious, and unavoidably inaccurate, final scraping and finishing by hand of defective shuttle surfaces.

A major problem in the performance of the existing woodworking equipment is its age (25 and 20 years old in the case of the 8 March and Nam Dinh shuttle plants respectively), particularly in the case of Nam Dinh whose equipment was manufactured locally on the basis of available materials.

2.4 Breakages due to wood-processing

Part of shuttle and pirn breakages during processing is due to the way some of the machines operate. This is particularly the case of the wood lathes used in the end-tapering of shuttles where a high percentage of shuttle-splitting occurs, causing among other things serious safety hazards to the machine operators. A similar problem is present in the rough-turning of pirns.

Splits also occur at the two ends of the shuttles in connection with the filling of the steel tips, as a result of 1) the diameter of the end boring being too tight compared to the shank diameter of the steel tip, and 2) the lack of a gap between the shank-end of the tips and the bore-bottom. The gap being required for providing room for excess glue when inserting the tips and, at the same time,

preventing the shank-end to exert pressure to the bottom of the bored recess.

2.5 Inefficiency of cutting tools and defective hardware

One of the major causes of defective parts in processing, especially in shuttle manufacturing, is traced to the conditions of the wood-machine cutting tools — especially those used in heavy milling operations such as the main longitudinal opening in the shuttle body. Most of these cutting tools are entirely produced and sharpened by hand.

Even when such tools are partly machined in the machine-tool workshops for the textile equipment available at both the Viet Thang and Nam Dinh textile plants, they cannot be heat-treated, as required by high-speed wood-working cutters, due to the lack of the necessary treatment equipment. Furthermore, in most cases, the base steel material available for cutter making is not suitable for high-speed wood processing.

As a result, cutters in use are often unbalanced, of uneven cutting edges and wear quickly. These conditions result in damaging stresses on the equipment, especially on the bearings of cutting spindles; are largely responsible for the defective surface quality of shuttles in process; and inflate operating costs due to frequent cutter replacement.

A major constraint experienced in the performance of loom shuttles is the prevailing low quality of related hardware manufactured locally for the shuttle-change type of shuttles. The problem concerns parts such as steel-tongues, tongue-springs and end-tips, and contributes to the reduced serviceable life of shuttles and frequent hold-ups in loom operation. Main problems in this respect are loose tips, misalignment of tongues and tongue-springs loosing tension.

2.6 Lack of proper timber drying facilities

A major problem in the performance of shuttle blocks and pirns results from the absence of appropriate timber drying facilities. This contributes to splits occurring in pirns and in the glue lines of laminated shuttle blocks.

3. CONCLUSIONS AND RECOMMENDATIONS

The manufacture of shuttles and other wooden accessories required in loom operation has a number of serious problems to overcome in order to attain a reasonable standard in terms of quality of the finished products and productivity.

The urgency of taking corrective steps in this direction is underlined by the priority assigned by the Vietnamese Government to the development of the manufacture of essential consumer goods, and in particular to the objective of "meeting the minimum clothing needs of the whole population". 1/

Improvements in shuttle manufacture are essential not only for extending the serviceable life of wooden loom accessories but also for contributing towards increased productivity and quality in weaving production. Defective shuttles can in fact be responsible not only for extensive hold-ups in loom operation, but also tend to seriously affect the quality of the finished woven material, through problems such as weft breakages, snagging during unwinding of the weft, rip out of warp ends, etc.

Furthermore, defective quality of shuttle-hardware fittings and incorrect running of the shuttle during its traverse will result in collision with fixed loom parts, and additional blows and pressures leading to unnecessary shock and wear for the loom itself.

1/ Report delivered by the Party General Secretary Le Duan at the Fifth National Congress of the Communist Party of Viet Nam (March 1982)

The findings of the mission reveal that the problems associated with the performance of loom-shuttle accessories, especially of shuttle bodies, involve far more manufacturing aspects than had originally been identified. In particular, four areas can be singled out as being in need of major attention:

(a) Wood treatment as related to the possibility of extending and improving the utilization of timber species in the manufacture of shuttle blocks, through techniques such as wood-compression, resin impregnation, etc.

(b) Wood processing as related to improving the conversion of shuttle-blocks into finished shuttles, and of sawnwood strips into pirns, through introduction of streamlined production methods and modern yet unsophisticated machinery; 1/

(c) Metal working as related to improving the manufacture of steel components incorporated in both shuttles and pirns;

(d) Tool making and tool maintenance as related to improving the manufacturing and upkeeping of wood-processing cutting tools used in the machining of shuttles and pirns.

The original terms of reference provided by the Government in requesting technical assistance for the development of loom wooden accessories manufacture had focused on areas (a) and (b) only. However, by the time the Consultant started his project formulation mission the UTE had switched its priorities to areas (a) and (c), and requested that no project resources be allocated to the improvement of shuttles and pirns wood processing until the project budgetary

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1/ The consultant was able to finalize a detailed project proposal for the assistance to be provided in this area (see AnnexIII).

requirements could be ascertained for the pilot production of shuttle blocks and shuttle hardware components.

Because of these newly-set Government priorities, it was no longer possible for the consultant to formulate the envisaged project document covering the full budget of US$ 1 million allocated by UNDP to VIE/80/027.

Under the circumstances, it has been recommended, with the concurrence of the UTE, that the project be implemented under two distinct phases:

(a) Phase I

This phase will involve the extension of the project preparatory assistance in order to identify project requirements and cost concerning three components:

i) pilot production of shuttle-blocks and picking sticks, based on the findings of an ad-hoc timber-testing programme to be carried out abroad;

ii) pilot production of shuttle hardware;

iii) pilot of wood-processing cutting tools, as applied to manufacture of shuttles and pirns.

Details of Phase I are given in the attached Revision of the Preparatory Assistance Document of VIE/80/027, with an increase of UNDP inputs by US$ 79,000 (Annex II).

Project requirements concerning a fourth component - Pilot wood-processing of shuttle blocks into finished shuttles - are attached to this report (Annex III), in the form of a project document.

(b) Phase II

On the basis of the outcome of Phase I, and of the requirements in the project proposal provided in Annex III for shuttle wood-processing, the Government will decide which of the four components should be implemented under the budget allocated to project VIE/80/027, thus enabling UNIDO Headquarters to prepare the final project document.

LIST OF ORGANIZATIONS/FACTORIES VISITED AND PERSONS MET

A. Hanoi		
1.	Ministry of Light Industries (MOLI) (Project counterpart Ministry)	- Mr. Nguyen Hieu, National Project Director - Mrs. Le Thi Lai, Planning Dept. - Mr. Phan Trong Tiem, International Dept.
2.	Union of Textile Enterprise (UTE) (Project counterpart Dept.)	- Mr. Neuyen Hun Khao, Deputy General Director of UTE Central Office - Mr. Do Van Gian, Wood processing Technician
3.	UNDP Office	- Mr. Wolfgang Sholtes, Assistant Res. Rep. - Mr. Jerome Sauvage Mar, Programme Officer
4.	UNIDO Project - DP/VIE/80/038[1/]	- Mr. Martin Howorth, Chief Technical Adviser
5.	8 March Textile Mill and Shuttle Pl. : (near Hanoi)	- Ms. Le Thi Nhu Hao, General Manager - Mr. Che Dinh Thuan, Technical Manager
B. Ha Nam Ninh		
6.	Nam Dinh Textile Mill and Shuttle Plant	- Mr. Nguyen Van Tuyen, Deputy General Manager - Mr. Tran Xuan Cung, Technical Manager of Shuttle Plant - Mr. Pham Ngoc Bich, Deputy Director

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1/ Maintenance assistance to selected textile factories in the South (projects completed in February 1985)

7. Central Mechanical Workshop for the Textile Industry 1/	- Mr. Nguyen Huy Tu General Manager - Mr. Pham Huy Lien Technical Manager
C. Vinh Phu	
8. Vinh Phu Textile Factory and Shuttle Plant	- Mr. Fo Giam Doc Deputy General Manager - Mr. Truong Phong Technical Manager - Mr. Quan Doc Foremen Shuttle Plant - Mr. Fo Quan Doc Assistant Foremen
D. Cau Duong (near Hanoi)	
9. Cau Duong Plymill and Plant for Laminated Shuttle-blocks & Picking Sticks	- Mr. Dao Duc Thanh General Manager - Mr. Nguyen Van Khac Technical Manager
E. Ho Chi Min City	
10. The United Textile Enterprises (UTE) of the South	- Mr. Duong Minh Anh Lan Vice General Director for Technology - Mr. Ho Si Linh Head of Technical Dept.
11. Viet Thang Textile Mill and Shuttle Plant	- Mr. Tran Van Nho Deputy General Manager, Production Dept. - Mr. N.V. Ngoc Foreman Dept. No.1 - Mr. L.V. To Foremen Dept. No. II

1/ Procution of shuttle-block hardware for the Nam Dinh Shuttle Plant

12.	Dong Nai Sawmill and Plymill	- Mr. Le Quang Lo Production Manager
13.	Hoabinh Plymill Match Mill and Laminated Picking Sticks Plant 1/	- Mr. Ton That Nghinh General Manager
14.	FAO Project VIE/80/019 (Logging Training & Development)	- Mr. Victor Buenaflor Chief Technical Adviser
15.	C. Itoh Texmac Co. Ltd. 2/	- Mr. Masahiro Watanabe Manager, Export Dept. - Mr. Takeiro Matsuura Assistant Manager
16.	Polytechna Checkoslovak Technical Co-operation Agency	- Mr. Josef Fukan Head of UN-relations Branch (met during his visit to Hanoi)

1/ Conducting trials on manufacturing of laminated shuttle blocks

2/ Contractors for the UNIDO Project DP/VIE/80/038 (Maintenance assistance to the Textile industry)

ANNEX II

UNITED NATIONS DEVELOPMENT PROGRAMME

PROJECT REVISION

Country : Viet Nam

Project Title : Production of Wooden Textile Industry Accessories

Project Number : VIE/80/027/B/01/37

The above project is revised as shown in the attached text and budget to reflect an extension of preparatory assistance for the purposes described.

The change to the project budget - UNDP input is as follows

Previous UNDP input	-	Project Budget 'A'	$15,000
Revised UNDP input	-	Project Budget 'B'	$94,800
UNDP input	-	increase	$79,800

Signed on behalf of UNDP

Date

PART I. LEGAL CONTEXT

This project document shall be the instrument envisaged in Article I, paragraph 2, of the Agreement between the Government of Viet Nam and the United Nations Development Programme concerning assistance under the Special Fund Sector of the United Nations Development Programme, signed by the parties on 27 March 1978.

PART II. THE PROJECT

A. Development Objective

To contribute towards improving the operative efficiency and productivity of the weaving industry.

B. Immediate Objectives

1. To establish a verified basis on the suitability and possibile treatment alternatives of selected commercial Vietnamese timber species for the efficient and cost-effective manufacture of the following wooden loom accessories :

   (a) shuttle wooden blocks (for subsequent processing into finished shuttles);

   (b) shuttle pirns;

   (c) picking sticks and side levers.

2. To establish project requirements for the production of shuttle-hardware of appropriate quality, using as a starting point the existing metalworking facilities operated by the Nam Dinh Textile mill.

3. To establish project requirements for the efficient production of wood-machining cutting tools, using as a starting point the existing machine-tool facilities operated by the Nam Dinh or Viet Thang Textile Mills.

C. Special Considerations

The activities of the project are expected to generate the following indirect benefits:

(a) By investigating properties, treatment compatibility, behaviour in processing and in use, it will be possible to bring about a more rational utilization of commercial

timber in the wood-processing industry as a whole — while at the same time strengthening the capability of Vietnamese wood technologists to pursue this research work;

(b) A similar impact will be generated in the timber industry by rationalising the design characteristics of wood-processing cutting tools and improve the capability to manufacture and maintain them.

D. Background and Justification

The Government places great emphasis on the development of the country's textile industry towards meeting the basic needs of the population in terms of clothing. In this context a project has been included in the Country Programme to help improve and expand the production of loom shuttles and other wooden textile-industry accessories. This document pertains to three preparatory activities of such a project.

Some 230,000 shuttles (of the shuttle-change type) are produced annually by four shuttle plants attached to main textile mills (three in the North and one in the South) and operating under the Union of Textile Enterprises (UTE). The shuttle-blocks supplied to the shuttle plants are manufactured in two ply mills located respectively in the North and South, with the Can Doung mill, near Hanoi, being responsible for the bulk of shuttle-blocks production as well as of picking sticks and side levers. The totality of pirn-change shuttles is imported at a rate of 50,000 to 60,000 pieces per year.

Although loom-shuttles, pirns and picking sticks have been produced in the country since 1960, a number of constraints have developed in utilising local timber species — especially in connection with the supply to the weaving industry of shuttles of appropriate quality. This has affected the productivity and quality of cloth production and reduced considerably the life of shuttles as compared with imported ones. In fact the consumption of locally-made shuttles is of about 2.2 pieces per 1,000 linear meter of cloth as against 1.7 pieces and lower for imported shuttles.

Due to the non-availability of timber species suitable for solid-wood shuttles, these are produced by the veneer lamination process. Because of the exacting requirements of this particular process and the inadequacy of equipment, as well as of the cost of importing phenolic glue, the Vietnamese government wishes to identify alternative processes, such as wood compression, resin impregnation, etc., which would allow the utilization of a wider range of species than is currently possible and allow a streamlined and efficient production of shuttle blocks.

On the other hand, Viet Nam offers no suitable timber testing and research facilities, and the required experience to conduct such a highly specialised research work.

This project is to provide the services of a timber research institution to carry out overseas the necessary research work in this respect, as a preparatory activity for the establishment of a pilot production unit designed for efficient and cost-effective manufacture of shuttle blocks, shuttle-pirns and lamintated picking sticks and side levers.

A second major constraint experienced in the performance of loom shuttles is the prevailing low quality of related hardware (in particular of the steel-tongues, tongue-springs and steel tips) contributing to the reduced serviceable life of shuttles and frequent hold-ups in loom operation. Main problems in this respect are: loose tips, misalignment of tongue-springs loosing tension. Shuttle hardware is partly manufactured at the metal workshops operated by the Nam Dinh, Viet Thang and 8 March textile mills, and partly supplied by metalworking workshops under the Ministry of Metallurgy.

A third cause of defective shuttles and pirns, and their high rejection rate during wood processing is to be traced to the poor conditions of wood-machining cutting tools which are in many cases entirely made and sharpened by hand, in spite of the fact that at least some of the machines in the machine-tool workshops operated by the Nam Dinh, Viet Thang and 8 March textile mills, could be utilized for this purpose.

The Vietnamese Government wishes to identify the steps to be taken to extend the know-how and facilities of the existing UTE metal working and machine-tool workshops to fulfill efficiently the demand for shuttle-hardware of its weaving mills and for wood-processing tools of its shuttle manufacturing plants. This preparatory assistance project will provide the services of two short-term consultants as a basis for further technical asistance.

E. Outputs

1. Outputs related to objective 1

1.1 A report providing: (a) a detailed account of all the testing work undertaken; (b) an analysis of findings; (c) conclusions; (d) detailed specification of recommended processes to be adopted and equipment to be introduced for the manufacture on a pilot basis of shuttle blocks, pirns, picking sticks and side levers.

1.2 Fully-machined samples of shuttles,[1/] pirns, picking sticks and levers by species tested and according to alternative processes (from Vietnamese species).

1.3 A comparative manufacturing cost analysis of the various process alternatives.

1.4 Four Vietnamese technicians exposed to all phases of the research work carried out overseas by the contractor.

1.5 Report on the identification of current, experimental Vietnamese plantation timber which might be utilized on the longer term in shuttle manufacture.

2. Output related to objective 2

A detailed report on the supply status of shuttle/pirn hardware and on steps to be taken to improve its manufacture.

3. Output related to objective 3

A detailed report on the supply status of wood-machining cutting tools (required in shuttle/pirn manufacture) and on steps to be taken to improve their manufacture.

F. ACTIVITIES

1. Activities related to output 1

All the research work will be carried out under a contract to a consulting firm or a research institution, and shall involve the following activities (from the species listed in Appendix A):

1.1 Selection through a bibliographic search among the list of commercial timber available in Viet Nam ten species considered the most suitable - or that can be treated to become such - for the manufacture of shuttles, picking sticks and pirns.

1.2 Testing mechanical and physical properties as related to working requirements of shuttles, pirns and picking sticks.

1.3 Determination of most suitable wood seasoning alternatives, and recommend appropriate kiln drying schedules.[2/]

1.4 Investigation of resin-impregnation suitability concerning the production of shuttle blocks.

1/ To include two main designs of shuttles in use in Viet Nam: pirn-change and shuttle-change types as per drawing in Appendix E. Samples will be provided to the contractor by UTE.

2/ Average temperature and humidity data given in Appendix D.

1.5 Testing for suitability to wood-compression process concerning shuttle blocks.

1.6 Testing of veneer-bonding characteristics, determination of optimum glue formulation and pressing requirements in connection with the wood-lamination process, as applied to the production of shuttle blocks, picking sticks and side levers.

1.7 Determination of suitability and economics of improving surface wear of pirn-change shuttles by facing them with plastic.

1.8 Testing of wood-machining workability as related to the manufacture of shuttles and pirns.

1.9 Sample-making of shuttles, picking sticks and pirns according to samples and design specification to be provided by the Vietnamese counterpart agency (from the most appropriate species).

1.10 Studying behaviour of samples subjected to simulated conditions of Relative Humidity as occuring in Viet Nam.

1.11 Rating of selected timber species as to their suitability for the manufacture of shuttles, picking sticks and pirns.

1.12 Determining, on the basis of the workability tests (activity 1.8), optimum cutting tool geometry concerning cutters of high-speed steel type (and eventually tungsten carbide tipped tools) with particular emphasis on milling of shuttles and turning of pirns.

1.13 Elaborating full specification of processing methods and equipment found to best suited for available Vietnamese timber species for the purpose of producing on a pilot basis:

(a) shuttle blocks to be supplied to shuttle-making wood-working plants;

(b) pirns;

(c) picking sticks.

1.14 Undertaking a mission to Viet Nam, upon completing the research programme, to determine whether any of the existing equipment can be utilised for the selected shuttle-blocks manufacturing process.

2. Activities related to output 2

The following activities will be carried out by a metal-working consultant with direct experience in the manufacture of shuttle hardware:

2.1 Survey of existing metal-working workshops of the Union of the Textile Enterprise (UTE) operated by the Nam Dinh and 8 March textile mills.

2.2 Analysis of hardware-supply requirement of shuttles and pirns used in the Vietnamese textile industry concerning pirn-change and shuttle-change types.

2.3 Identification of appropriate raw materials and process alternatives.

2.4 Elaboration of detailed specifications of the chosen process to include manufacturing methods, cost of additional equipment, estimate manufacturing cost of each hardware item etc.

2.5 Establishment of technical assistance requirements.

3. Activities related to output 3

The following activities will be carried out by a consultant with a direct experience in the manufacture of wood-processing cutting tools involved in shuttle/pirns production (excluding circular saws and planing knives):

3.1 Survey of existing machine-tool workshops operated by the Nam Dinh, Viet Thang and 8 March textile mills.

3.2 Analysis of milling, boring and turning tools used in wood-processing operations concerning the manufacture of shuttles and pirns.

3.3 Identification of appropriate raw materials and tool manufacture alternatives.

3.4 Elaboration of detailed specifications of the chosen process to include manufacturing methods, cost of additional equipment, and an estimate of manufacturing cost.

3.5 Establishment of technical assistance requirements.

G. Inputs

1. Government inputs

1.1 Four technicians to be attached for two months to the overseas contractor during the duration of the research work. These technicians will come from the following Vietnamese departments:

- one technician from UTE Headquarters, Hanoi
- one technician from the Forest Research Laboratory, Hanoi
- one technician from the Can Duong Ply/Lamination Mill, Hanoi
- one technician from the Hoa Binh Ply/Matches/ Lamination Mill, Ho Chi Minh City.

1.2 Dimension stock and peeled veneer (about 0.25 m^3 for each of the 10 species selected by the contractor) for testing, Specifications will be provided by the contractor.

1.3 The Government will provide office space and transportation for the two consultants on hardware and tool manufacture.

1.4 List of fast-growing plantation timber to be produced in Viet Nam.

2. UNDP inputs

2.1 Project Personnel US$ 31,000*

(a) Metal-working consultant
(Shuttle-hardware production)

Job-requirements:
The consultant shall have a specific experience at factory level in the full manufacturing cycle of shuttle hardware of the type used in Viet Nam. He shall be familiar with the preparation of detailed process specifications as well as of manufacturing-cost estimates.

- Duration of assignment: 1 month
- Duty station: Hanoi and Nam Dinh

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* The above sum includes US$ 12,000 for the 1.5 m/m assignment of the consultant for the project formulation work already carried out.

(b) Consultant in manufacture of woodworking tools (Production of wood processing cutting tools)

Job requirements:
The consultant shall have a specific experience in the manufacture of wood-processing cutting tools 1/ of the type used in shuttle & pirn manufacture.

He shall be familiar with the preparation of detailed process specifications as well as of manufacturing-cost estimates

- Duration of assignment: 1 month
- Duty station: Hanoi and Nam Dinh

2.2 Subcontract US$30,000

(a) Testing and processing of timber species: 3 months

Contract requirements:
The contactor shall be a timber research institution or a leading shuttle manufacturing plant experienced and equipped to conduct a fully applied research programme concerning the manufacture of shuttle blocks, pirns and picking sticks. The contractor's experience shall include wood compression, resin impregnation, wood lamination and possibly, plastic-facing of wooden shuttles.

2.3 Training

Fellowships US$28,800

The fellows will be technical personnel already involved in the manufacture of wooden loom-accessories or in timber research work.

1/ Excluding circular saw blades and planning knives

2.4	Miscellaneous	US$ 5,000
	Sundries	
	Cost of airfreighting dimension stock and veneer to the contractor, and tested material to Hanoi. (US$4,000) Cost of reports (US$1,000)	
	GRAND TOTAL UNDP INPUTS	US$94,800

BUDGET COVERING UNDP CONTRIBUTION
(in US Dollars)

Country: Viet Nam

Project Number: VIE/80/027/B/01/37

Title: Production of Wooden Textile Industry Accessories

		TOTAL		1985	
		m/m	$	m/m	$
10.	PROJECT PERSONNEL				
11.01	Consultant for Wood (Project Formulation)	1.5	12,000	1.5	12,000
11.02	Consultant for Metalwork (hardware production)	1.0	8,000	1.0	8,000
11.03	Consultant for woodcutting tools production	1.0	8,000	1.0	8,000
11.99	Sub-total Experts	3.5	28,000	3,5	28,000
15.00	Experts Travel		3,000		3,000
19.00	Component Total	3.5	31,000	3.5	31,000
20.	SUBCONTRACTS				
21.	wood-species and processing testing		30,000		30,000
29.	Component Total		30,000		30,000
30.	TRAINING				
31.	Fellowships	8	28,800	8	28,800
39.	Component Total	8	28,800	8	28,800
50.	MISCELLANEOUS				
53.	Sundries		5,000		5,000
59.	Component Total		5,000		5,000
	Grand Total		94,000		94,000

LIST OF CURRENTLY AVAILABLE TIMBER SPECIES IN VIET NAM

Item No.	Local Name	Botanical Name
1.	BANG LANG	Lagerstromia loudoni - Taijm
2.	BANG LANG NUOC	Lagerstromia flos-Reginal - Retz
3.	BINH LINH	Vitex pubescens - Vahl
4.	CANG LO	Betula anoides - Buch
5.	CHAI	Shorea vulgaris
6.	CHO CHI	Parashorea stellata - Kury
7.	DAU	Dipterocarpus sp.
8.	DAU SONG NANG	Dipterocarpus dyeri - Pierre
9.	GIE GAI	Castanopsis chinensis - Hance
10.	GIE GAI BAC BO	Costanopsis tonkinensis - Seem
11.	GOI NEP	Aglaia gigantea - Pellegrin
12.	GOI TE	Aglaia sp.
13.	GU MAT	Sindora cochinchinensis - Baill
14.	HOANG DAN GIA	Dacrydium pierrei - Hick
15.	LAU TAU	Vatica cochin
16.	LIM VANG	Peltophorum tonkinensis - Pierre
17.	LONG MANG	Pterospermum
18.	MO	Manglietia conifera - Dandy
19.	MUONG	Cassia sp.
20.	MUONG DEN	Cassia siamea - Lanik
21.	MY	Lysidice rhodostegia - Hance
22.	SANG	Sapindus oocarpus
23.	SANG LE	Lagerstroemia calyaclata - Kur
24.	SANG MAY	Sageraea elliptica
25.	SAU DEN	Hopea odorata

Item No.	Local Name	Botanical Name
26.	THI RUNG	Diospyros
27.	THONG BA LA	Pinus kesiys - Royle
28.	THONG NANG	Podocarpus imbricatus-BI
29.	THONG NHIRA	Pinus mercusii
30.	TRAM	Melaleuca leucandendrom - Linh
31.	TRAM HONG	Canarium sp.
32	TRAM TRANG	Canarium album - Raeusch
33.	TRUONG MAT	Paviesia
34.	VANG TRUNG	Endospermum sinensis - Benth
35.	VEN VEN	Anisoptera cochinchinensis - Pierre
36.	XOAN DAO	Pygeum arboreum - Endl & Kurz
37.	XOAY	Dialium cochinchinensis - Pierre

ANNEX II
Appendix B

LIST OF MAIN COMMERCIAL TIMBER IN THE FOREST OF THE DONG NAI PROVINCE

Quelques essences commerciales importantes dans les 3 groupes NG1 NG2 NG3

	Diameters (cm)								TOTAL	TYPE DE DISTRIBUTION
	10-	18-	30-	40-	50-	60-	70-	80+		
Sindora coch. Gu mat NG1		10	6	5	4	2	2	1	30	erratique
Hopea odorata Sao den NG2	175	195	68	34	8	2		1	483	surbaissé
Lagerstroemia Bang lang NG2	165	285	106	90	54	34	20	19	773	cloche asymétrique
Vatica cochin. Lantan NG2	415	165	26	4	3	2	1		616	sous-bois
Vitex pubescens Binh linh NG2	340	230	55	40	15	15	2	2	699	édificatrice
Paviesia Truong mat NG2	235	225	44	18	6	1		1	530	id.
Eugenia spp. (ensemble) NG3	700	480	75	45	14	5	1	3	1323	édificatrice
Diospyros Thi rung NG3	460	170	21	5	5	3			664	id
Diospyros ? Nho noi NG3	260	135	44	19	8	2			468	id
Pterospermum Long mang NG3	100	85	15	12	1	1	1		305	sous-bois
Polyalthia Nhoc NG3	240	80	17	11	2				350	id
Dipterocarpus alatus Dan rai NG3	420	330	98	83	48	26	9	7	1021	édificatrice
Shorea vulgaris Chai NG3	195	205	86	55	34	9	1	2	587	surbaissé
Anisoptera cochin; Ven Ven NG3	190	105	53	42	12	7	2	1	412	id

NB : Les essences commerciales les plus importantes sont soulignées. Elles représentent environ un tiers du total des 3 groupes NG1, NG2, NG3 (arbres ⩾ 10 cm). Par contre elles représentent près de la moitié des arbres ⩾ 60 cm (162 arbres sur 340).

Source: FAO Assistance à l'institut d'inventaire forestier et de planification du Vietnam, B. Rollet, Rome, 1984

DETAILS OF DOMINANT TIMBER SPECIES IN THE FORESTS OF DONG NAI

DONG NAI. Dominance des espèces (basée sur le nombre d'arbres) dans différentes catégories de diamètre (cm)

FORET DENSE MOYENNE 6 ha		≥10	10-18	40-59	≥ 60
Eugenia spp.	Tram	208	80	30	
Dipterocarpus alatus	Dau rai	177	45	57	25
Hopea odorata	Saodenh	76	35	24	
Vitex pubescens	Binh Linh	63	25		
?	Than tau	57			
Dipterocarpus intricatus	Dau chai	53	25		
Polylathia	Nhoc	54	35		
Parinarium		50	30		
?	Tram sung	47	30		
Knema conferta	Mau cho	46			
Diospyros rubra	Thi rung	42			
?	Dau da	35	30		
Shorea vulgaris	Chai	35	30		
?	Sua nui	35	20		
Paviesia	Nho noi		20		
	Truong mat		20		
?	De do		20		
Lagerstroemia	Bang lang			29	8
Irvingia Malayana - Oliver	Cay (Ko-nia)				10
TOTAL		978	425	140	43
GRAND TOTAL		1904	825	251	73
Nombre d'espèces dominantes		14	14	4	3
Inconnus (nombre d'arbes)		318	135	15	8

FORET DENSE PAUVRE 54 ha		≥10	10-18	40-59	≥ 60
Eugenia spp.		700	480	59	
Diospyros rubra		460	170		
Dipterocarpus alatus		420	330	131	42
Vatica dyeri		415			
Vitex pubescens		340	230	55	
?	Trung vai	280			
Diospyros		260			
Polyalthia		240			
Cratoxylon formosum		240	210		
Paviesia		235	225		
Shorea vulgaris		195	205	89	
Anisoptera cochinchinensis	Van Van	190		54	
Lagerstroemia		285		144	73
Hopea odorata			195		
Irvingia Malayana - Oliver	Cay (Ko-nia)			64	95
TOTAL		3975	2330	596	210
GRAND TOTAL		7735	4605	1120	383
Nombre d'espèces dominantes		13	8	7	3
Inconnus (nombre d'arbes)		1245	450	75	23

FEUILLUS + BAMBOUS 40 ha		≥ 10	10-18	40-59	≥ 60
Diospyros rubra	Thi rung	685	120		
Eugenia spp.		673	255	26	
Dipterocarpus alatus		376		110	68
Vitex pubescens		370	210	19	
Vatica dyeri		328	180		
Polyalthia		220	120		
Lagerstroemia		196	30	39	76
Dipterocarpus intricatus		185		37	
Knema conferta			40		
Paviesia			30		
?	Sung			30	
Shorea vulgaris				28	
Sterculia lychnophora				19	
Irvingia Malayana - Oliver	Cay (Ko-nia)				42
TOTAL		3033	985	308	185
GRAND TOTAL		5830	1955	614	387
Nombre d'espèces dominantes		8	8	8	3
Inconnus (nombre d'arbes)		429	160	39	26

Source: FAO Assistance à l'institut d'inventaire forestier et de planification du Vietnam, B. Rollet, Rome, 1984

DETAILS OF DOMINANT TIMBER SPECIES IN THE FORESTS OF NGHE TINH

NGHE TINH. Dominance des espèces (basée sur le nombre d'arbres) dans différentes catégories de diamètre (cm)

FORET DENSE RICHE 55,5 ha		≥ 10	10-18	40-59	≥ 60
Vatica tonkinensis	Tau mat	1805	435	390	269
Vatica fleuryana	Tau muo	1594	425	318	223
Canarium	Tram	1094	665		
Gironniera	Ngat	971	410		
Paviesia	Truong mat	635	220	77	
Polyalthia	Nhoc	490	205		
Knema conferta	Mau cho	471	280		
?	De gai	439	150		
Quercus pseudoindica	Gié xanh	413	150		
?	Tan lina	395	270		
Cryptocarya	Mo go	385			
?	Dai bo	341	215		
Diospyros rubra	Thi rung		175		
Aglaia sp.	Coi		140		
	De Do			72	
	Re			71	
Talauma gioi	Gioi			76	53
TOTAL		9033	3748	1004	545

FORET DENSE MOYENNE + PAUVRE 54 ha		≥ 10	10-18	40-59	≥ 60
Vatica fleuryana		1651	760	203	183
Gironniera		1410	910	45	
Knema conferta		1178	770		
Canarium		913	615	41	
Eugenia spp.	Tram	693			
Aglaia sp.	Coi	638		75	45
Cryptocarya		615	540		
?	De gai	538		66	23
Vatica tonkinensis		534		106	46
Cinnamomum sp.	Re	427		60	24
Pavesia		385			
Ormosia sp.	Rang Rang			58	
Engelhardtia	Cheo			37	22
TOTAL		8702	3595	691	343

FEUILLUS + BAMBOUS 34 ha		≥ 10	10-18	40-59	≥ 60
Gironniera		958			
Knema conferta		273	115	15	
Canarium		268	115	25	8
?	Ha Tap	233	170		
Paviesia		219			
Ormosia sp.		213	75	30	6
Wrightia	Thung mue	182	85		
Mallotus (+ Trema ?)	Hu	166	140		
Quercus pseudoindica		149	60	26	
Cinnamomum	Re	130		29	
Symplocos laurina	Dung giay	114			
?	Ngai		310	71	
?	Truong Vai		65		
Polyalthia			50		
?	Trung mai			42	8
Endospermum	Vang			17	
Erythrophleum	Lim xanh			19	13
Vatica fleuryana	sen			15	7
?	Da				15
Talauma gioi					8
					8
TOTAL		2905	1185	289	73

GRAND TOTAL	17696	7355	1892	1045
Nombre d'espèces dominantes:	12	13	6	3
Arbres inconnus (nombre d'arbres)	2313	1205	159	81

GRAND TOTAL	17356	6185	1360	629
Nombre d'espèces dominantes:	11	5	9	6
Arbres inconnus (nombre d'arbres)	1405	685	83	83

GRAND TOTAL	5788	2355	577	147
Nombre d'espèces dominantes:	11	10	10	8
Arbres inconnus (nombre d'arbres)	480			

Source: FAO Assistance à l'Institut d'inventaire forestier et de planification du Vietnam, B. Rollet, Rome, 1984

ANNEX II
Appendix D

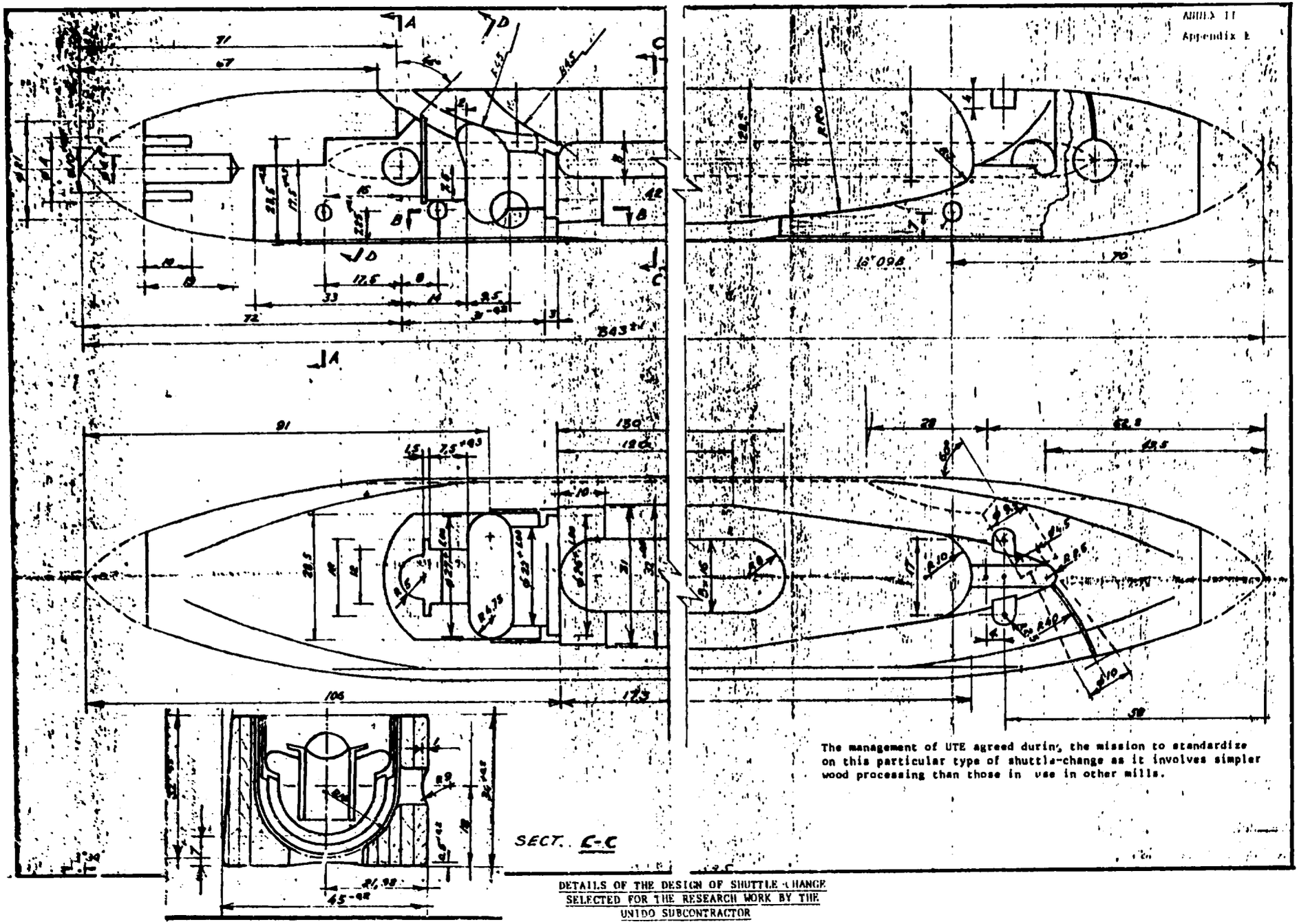
AVERAGE YEARLY TEMPERATURE AND HUMIDITY IN VIET NAM

Location \ Year		1976	1979	1980	1981	1982
VĨNH PHÚ	C°	22,9	23,8	21,1		
	HUM.	83	83	82	82	
HÀ NỘI	C°	23,1	23,9	22,5	23,8	
	H.	81	81	83	82	
NAM DINH	C°	22,6	23,8	24.2	23.7	23,5
	H.	85	85	86	86	86
NGHE TINH	C°	23,2	24,2	23,3	23,3	
	H.	85	84	86	86	
DA MĂNG	C°	25,4	25,9	25,6	26,2	25,6
	H.	82	80	82	81	81
NHA TRANG	C°	26,4	26,8	26,6	26,6	26,5
	H.	79	77	77	77	78
THANH PHO HOCHIMINH	C°	27,1	27,6		24,6	
	H.	78	75		78	

Average Monthly Temperature and Humidity in Selected Locations

	Month	1	2	3	4	5	6	7	8	9	10	11	12
A - Nam Dinh (1982)	C°	18,0	16,5	19,8	22,8	26,6	29,2	29,8	29,6	26,7	25,7	22,1	15,5
	H.	87	91	95	89	85	82	82	87	91	90	88	79
B - Hanoi (1976)	C°	16,1	18,1	19,0	22,4	26,9	28,4	29.3	27,9	27,5	24,7	18,6	18,1
	H.	78	86	85	87	83	80	78	84	81	83	73	79
C-Ho Chi Minh (1976)	C°	24,9	26,3	27,9	29,1	27,9	27,4	27,3	27,0	27,3	27,5	26,4	26,4
	H.	73	74	73	71	80	83	82	84	83	82	77	74

Source: Union of Textile Enterprises, Hanoi



DETAILS OF THE DESIGN OF SHUTTLE-CHANGE SELECTED FOR THE RESEARCH WORK BY THE UNIDO SUBCONTRACTOR

The management of UTE agreed during the mission to standardize on this particular type of shuttle-change as it involves simpler wood processing than those in use in other mills.

ANNEX III

UNITED NATIONS DEVELOPMENT PROGRAMME

Project of the Government
of Viet Nam

PROJECT DOCUMENT

TITLE	:	Establishment of a pilot plant for the wood-processing of finished loom-shuttles
NUMBER	:	
DURATION	:	14 months
PROGRAMME CLASSIFICATION	:	Industry (05)
SUB-PROGRAMME	:	Manufacturing Industry (0520)
GOVERNMENT IMPLEMENTING AGENCY	:	Ministry of Light Industries, Union of Textile Enterprises
EXECUTING AGENCY	:	United Nations Industrial Development Organization (UNIDO)
ESTIMATED STARTING DATE	:	
GOVERNMENT INPUT	:	In kind
UNDP INPUT	:	US$ 732,000.-

_____ Date: _____

Signed on behalf of Government

_____ Date: _____

Signed on behalf of UNDP

PART I. LEGAL CONTEXT

This project document shall be the instrument envisaged in Article I, paragraph 2 of the Agreement between the Government of Viet Nam and the United Nations Development Programme concerning assistance under the special fund sector of the United Nations Development Programme signed by the Parties on 27 March 1978.

PART II. THE PROJECT

A. Development Objective

To contribute towards improving the operative efficiency and productivity of the weaving industry in keeping with the priority assigned in the current five-year State Plan (1981-1986) to the development of the manufacture of clothing and other essential consumer goods.

B. Immediate Objectives

To establish a pilot wood-processing unit at the Nam Dinh Textile Plant for the efficient and cost-effective manufacture of loom shuttles.

C. Special Considerations

The project is expected to generate multiplying effects on the development of the secondary wood-processing as a whole, in that in the process of establishing the pilot shuttles plant, it will bring about the introduction of some critical modern wood-processing techniques in the country. It would also make the country self sufficient in pirn-change shuttles.

D. Background and Justification

The Government places great emphasis on the development of the country's textile industry towards meeting the basic needs of the population in terms of clothing. In this context a project has been included in the Country Programme to help improve and expand the production of loom shuttles and other wooden textile industry accessories.

Some 230,000 shuttles (of the shuttle-change type) are produced annually by four shuttle plants attached to main textiles mills (three in the North and one in the South) and operating under the Union of Textile Enterprises (UTE). The shuttle-blocks supplied to the shuttle plants are manufactured in two ply mills located respectively in the North and South, with the Can Duong mill, near Hanoi, being responsible for the bulk of shuttle-blocks production as well as of picking sticks

and side levers. The totality of pirn-change shuttles is imported at a rate of 50,000 to 60,000 pieces per year.

Although loom-shuttles, pirns and picking sticks have been produced in the country since 1960, a number of constraints have developed in their manufacture - especially in connection with the supply to the weaving industry of shuttles of appropriate quality. This has affected the productivity and quality of cloth productions and reduced considerably the life in use of shuttles as compared with imported ones. In fact the consumption of locally-made shuttles is of about 2.2 pieces per 1,000 linear meter of cloth as against 1.7 pieces and lower for imported shuttles.

The major source of the defective quality and limited service-life of wooden shuttles is to be traced to outdated processing methods and machinery.

Taking the existing Nam Dinh shuttle plant as an example, over fifty wood processing steps are required to machine and hand-finish the wooden shuttle blocks into finished shuttles. Of these, thirty-eight are machining operations, many of which could be eliminated and/or combined if more modern (not necessarily sophisticated) machines were available, so as to streamline the process, increase precision and quality, and minimize hand-scraping operations.

A major problem in the performance of the woodworking equipment is its age (25 and 20 years old in the case of 8 March and Nam Dinh shuttle plants respectively), particularly in the case of Nam Dinh whose equipment was manufactured locally using only locally available materials.

This project is to provide the services of an overseas shuttle manufacturer (with experience in the production of shuttles on the basis of modern yet unsophisticated working methods and equipment) to help convert the existing shuttle plant in the Nam Dinh Textile mill, the largest in Viet Nam[1/], into an efficient shuttle-making operation.

E. Outputs

1. A pilot shuttle plant for the wood-processing of available shuttle blocks into finished shuttles, and of sawnwood strips into pirns -- with the project providing all the additional machinery of appropriate and efficient type not already available in the existing shuttle plant, or not obtainable locally.

2. A full and efficient use of the production equipment -- with 4 processing supervisors and 24 production workers

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1/ Production of cloth in 1984: 34 million meters

trained to manufacture to an appropriate quality standard of the two main types of loom shuttles used in Viet Nam (the shuttle-change and the pirn-change types).

3. Attainment of an appropriate maintenance standard concerning wood-processing cutting tools - with 2 maintenance supervisors and 6 maintenance technicians trained in the subject.

4. Management trained in appropriate production control and cost-accounting system as applied to shuttle manufacture.

5. Set of simple Reference Data Sheets covering critical aspects of wood-processing maintenance, production control, quality control and cost-accounting as applied to shuttle manufacture.

6. Exposure of the managers of the four UTE shuttle plants to modern streamlined methods of shuttles manufacture of the type that can be introduced in Viet Nam.

F. Activities

All the activities of the project will be carried out under a contract to an overseas plant with experience in producing loom shuttles by modern but yet unsophisticated methods and equipment. In the first phase of the project a preparatory training programme will be conducted at the Contractor's plant. In the second phase a contractor's team will assist to establish the pilot plant. The following activities will be carried out:

1. Training at the contractor's plant of 4 Vietnamese woodworking supervisors in the general aspects of the manufacturing process concerning the conversion of shuttle blocks and pirn dimension stock into finished products (duration of the activity: 2 months).

2. Assisting UNIDO in the drawing up of specifications for the production equipment to be purchased under the project.

3. Carrying out a 3 week preparatory field mission at the Nam Dinh Shuttle plant in order to:

   (a) inspect the existing building (see plan in Appendix A) made available for the pilot production unit;

   (b) inspect locally-made equipment of the type which is expected to be incorporated in the production unit

   and help determine any required maintenance work and/or spare parts.

(c) prepare with the management of the Nam Dinh plant a draft plant layout of the production area (with indication of equipment position) and space requirements for various services;

(d) prepare with the Vietnamese project counterpart authority a schedule of preparatory work - concerning building facilities, power and water supply, etc. which will have to be carried out before the equipment supplied under the project is delivered and the contactor's personnel arrives in the field to start-up the plant.

4. Preparation at the contractor's main office, on the basis of the field mission, of a detailed plant layout of all the building facilities related to the operation of the project including auxilliary facilities. A detailed plan shall also be prepared of the electrical installation concerning the operation of the equipment and the lighting of work stations, as required.

5. Installation and commissioning of the new equipment for the wood-processing of the shuttle blocks and pirns (including kiln seasoning of pirns dimension-stock).

6. Development of required production fixtures aimed at attaining accurate machining of workpieces and increasing productivity.

7. Establishment of a rational sequence of manufacture working methods and production procedures.

8. Elaborating basic quality control procedures for work in process.

9. Introduction of tool maintenance techniques based on the use of appropriate sharpening machines, and of preventive maintenance schedules for the production equipment.

10. Introduce kiln drying of the timber used in pirns manufacture.

11. Conduct training of the plant personnel (as well as of personnel from the other UTE shuttle plants) under actual production conditions in all the above tasks.

12. Organize and conduct a three-week tour of overseas shuttle plants for the benefit of management staff of the UTE shuttle plants.

Activities 5 to 11 will be carried out at the Nam Dinh textile plant by a contractor's team consisting of: wood-processing expert (12m/m); tool-maintenance expert (6m/m); kiln-drying expert (6m/m); wood-finishing expert (2m/m); cost-accounting expert (2m/m).

G. Inputs

1. Government inputs

1.1 Assignment of counterparts

- counterpart to woodworking expert (12m/m)
- " to tool-maintenance expert (6m/m)
- " to kiln drying expert (6m/m)
- " to wood-finishing expert (2m/m)
- " to cost-accounting expert (2m/m)

1.2 Support personnel

All the support personnel necessary for the implementation of the project will be provided by the Government including a secretary/typist and a driver.

Full time interpreters will be assigned to the project to help communications between the sub-contractor's field personnel and national counterparts.

1.3 Training

Wages, salaries and allowances of personnel on project training and/or associated with project activities.

1.4 Government-provided building and equipment

- raw material inputs
- shuttles and pirns hardware
- finishing materials[1/]
- hand tools, except for a set of general purpose tools to be provided by the project

1.5 Non-expendable equipment

- office furniture and workshop furniture;
- the existing woodworking machinery, which have been selected for utilization in the project as a complement to the equipment to be supplied under the UNDP budget;
- transportation for the international staff to and from the plant for their residence

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1/ Except for supplies which will initially be needed for trial work and determine the best suitable surface-finishing material, and will therefore be provided under the project.

- the Government will be responsible for any necessary addition to and of modifications of the existing facilities as required for the proper operation of the project.

1.6 Operation and maintenance of equipment

The maintenance cost of the UNDP supplied machinery will be borne by the UNDP budget for the duration of the project, with the exception of any labour cost involved which will be borne by the Government.

The entire operative and maintenance cost of premises and government-supplied equipment will be borne by the Government.

1.7 Sundry

All sundry expenses concerning the operation of the plant will be borne by the Government unless directly related to the activities of the international staff in the project. The Government will also assume the cost of reproduction of reference and training material prepared by the project.

2. UNDP inputs

2.1 Project personnel

Travel and mission cost of a UNIDO staff member from Headquarters — US$6,000

2.2 Subcontract

Contract requirements: — US$294,000

The contactor shall be an overseas shuttle manufacturer with experience in modern yet unsophisticated working methods

- duration: 16 months
- place: contractor's head office and Nam Dinh

2.3 Training — US$63,000

(a) Fellowships

Four Vietnamese woodworking supervisors (one from each of the four UTE shuttles plants) to receive pre-project training by the contractor.

- duration of training: 2 months
- place: at contractor's own shuttle plant

(b) Study Tour

The tour shall be limited to visits of overseas shuttle plants whose working methods can be adapted to suit Vietnamese conditions. The participants shall include the managers of the four UTE shuttle plants, the senior officers of the UTE Head Office dealing with shuttle manufacturing and an interpreter, if so required.

- duration of tour: 3 weeks

2.4 Equipment (as per Annex IIIB) US$366,000

(a) Expendable equipment

Including miscellaneous production supplies and tools

(b) Non-expendable equipment

Including production machinery and office equipment

Requirements:

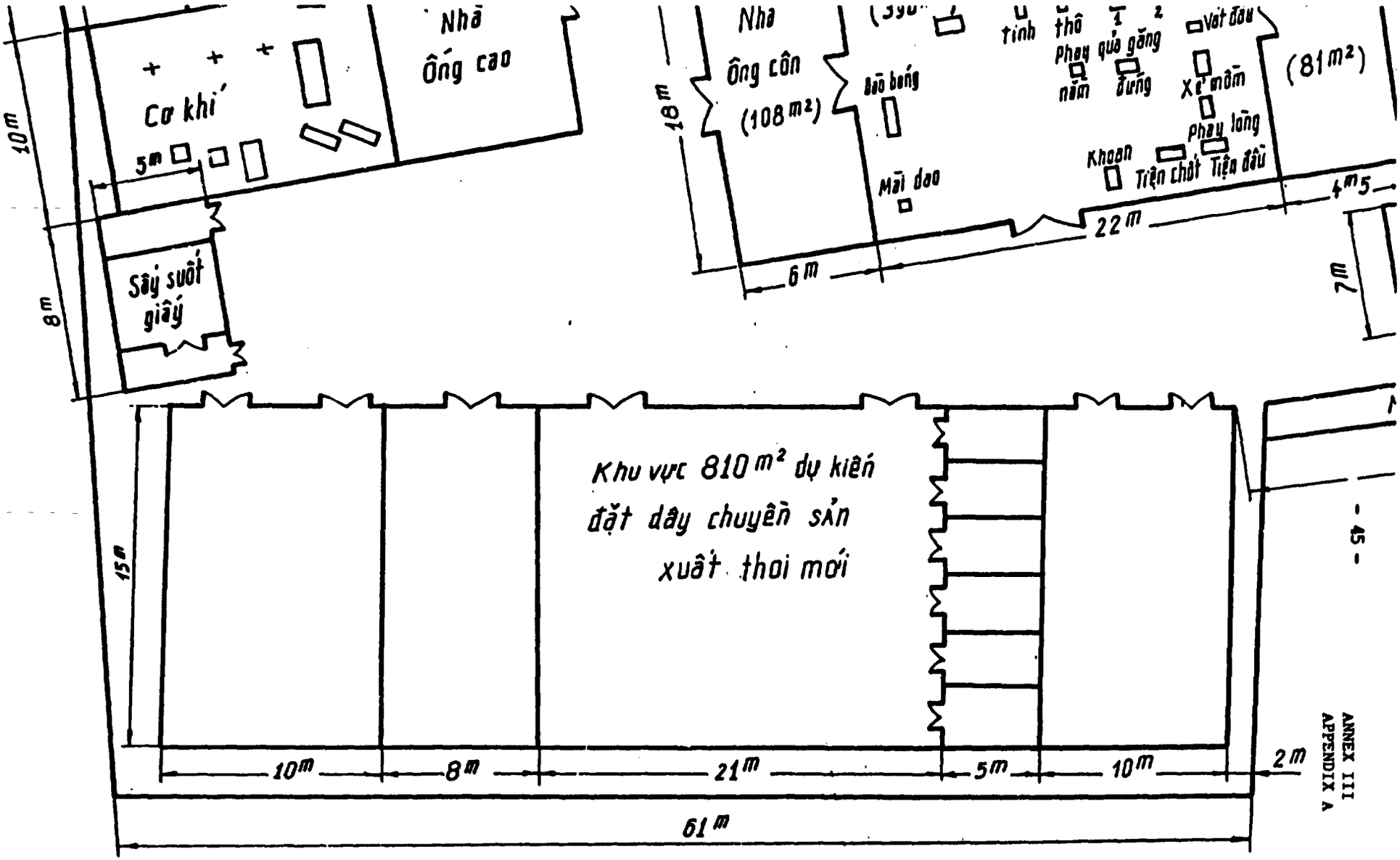
No equipment shall be based on hydraulic or pneumatic operation. Spindles of milling and boring heads shall be such as to allow the use of straight-shank cutting tools. All machines to be provided with overload switches and tropically insulated motors.

2.5 Miscellaneous US$3,000

(a) Operation and maintenance of equipment purchased under the project

(b) Sundry

Grand Total UNDP inputs US$732,000



PLAN LAYOUT OF EXISTING BUILDING SPACE ALLOCATED
AT THE NAM DINH TEXTILE FACTORY AS MACHINING AREA
FOR THE PROPOSED PILOT SHUTTLE MFG. UNIT
(area 15 m x 61 m)

ANNEX III
APPENDIX A

ANNEX IV

VIETNAMESE TEXTILE INDUSTRY

SELECTED DATA

Plants	Year Establ.	Man-Power	No. Spindles	No. Looms	Cloth production '84 (million) 1/
NAM DINH	1889	13,783	135,376	2,300	34
8 MARCH	1965	7,000	70,000	1,360	25
VINH PHU	1977	5,500	53,000	2,000	27,5
OTHERS		4,575		990	16,5
Sub-Totals-North		30,858	258,376	6,650	103,0
VIET THANG	1960		66,208	1,569	23
PHONG PHU	1964		20,000	470	9
THANG LOI	1962		128,000	995	13
DONG A	1962			477	7
PHUOC LONG	1965			708	11
THANH CONG	1974			136	4,5
Sub-Totals-South		N.A.	214,208	4,355	67,5
GRAND TOTALS			472,584	11,005	176

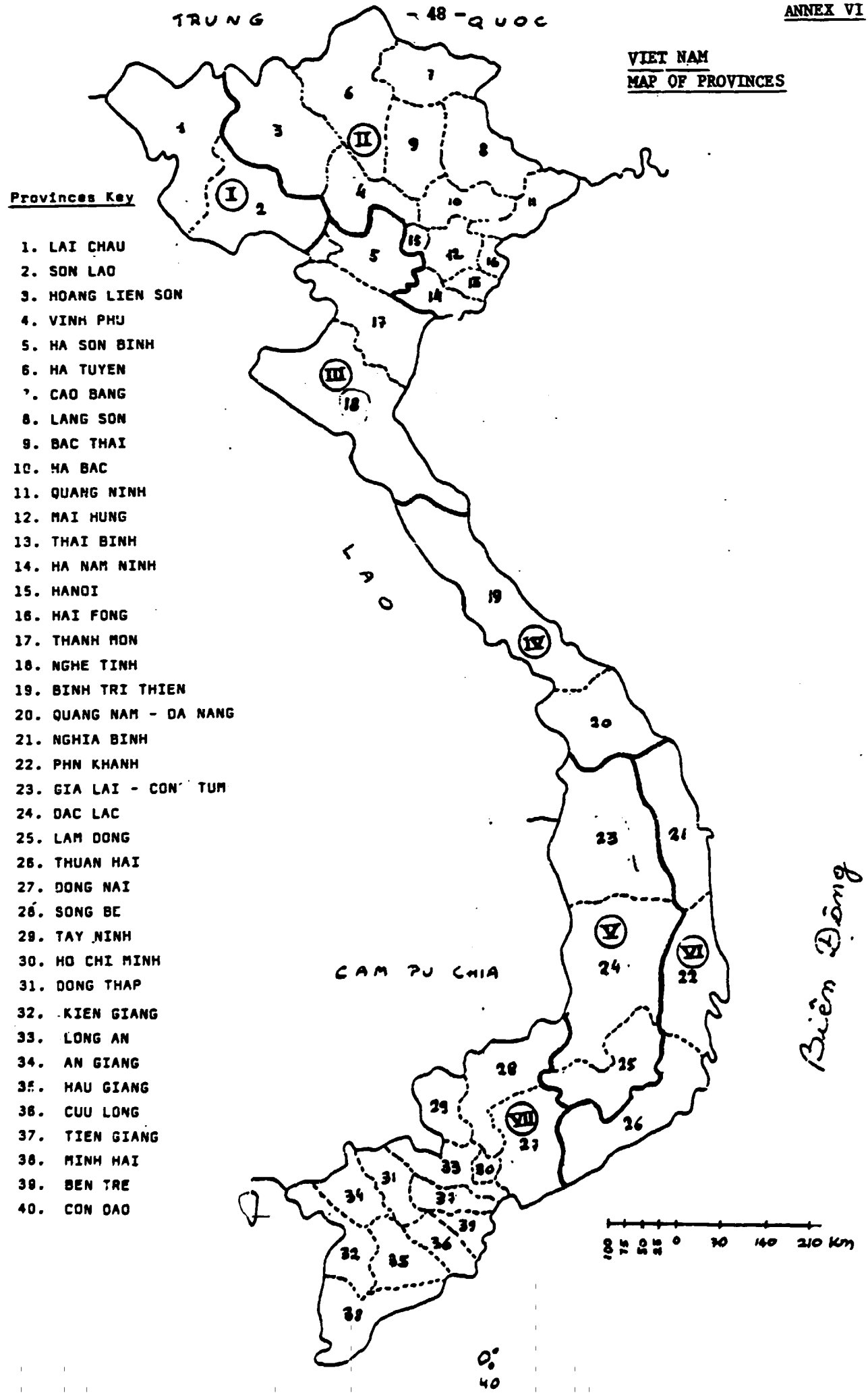
1/ Million linear meters

VIETNAMESE LOOM SHUTTLE INDUSTRY - SELECTED DATA

Data \ Plants	8 MARCH	NAM DINH	VINH PHU	VIET THANG	Totals
1. Location	Hanoi	Ha Nam Ninh	Vinh Phu	Ho Chi Minh	
2. Year Est.	1965	1960	1983	1979	
3. Manpower total	123	140	98	64	
- Shuttles MFG.	87	78	56	53	274
- Pirns MFG.	36	62	42	11	151
4. Production (1984)	(2 shifts)	(2 shifts)	(1 shift)	(1 shift)	
- Shuttles	84,000 pcs.	88,000 pcs.	12,000 pcs.	42,000 pcs.	226,000 pcs.
- Pirns	300,000 pcs.	N.A.	N.A.	78,000 pcs.	

ANNEX VI

VIET NAM
MAP OF PROVINCES



Provinces Key

1. LAI CHAU
2. SON LAO
3. HOANG LIEN SON
4. VINH PHU
5. HA SON BINH
6. HA TUYEN
7. CAO BANG
8. LANG SON
9. BAC THAI
10. HA BAC
11. QUANG NINH
12. MAI HUNG
13. THAI BINH
14. HA NAM NINH
15. HANOI
16. HAI FONG
17. THANH MON
18. NGHE TINH
19. BINH TRI THIEN
20. QUANG NAM - DA NANG
21. NGHIA BINH
22. PHN KHANH
23. GIA LAI - CON TUM
24. DAC LAC
25. LAM DONG
26. THUAN HAI
27. DONG NAI
28. SONG BE
29. TAY NINH
30. HO CHI MINH
31. DONG THAP
32. KIEN GIANG
33. LONG AN
34. AN GIANG
35. HAU GIANG
36. CUU LONG
37. TIEN GIANG
38. MINH HAI
39. BEN TRE
40. CON DAO