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DEVELOPMENT OF REFRIGERATION ENGINEERING

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VIET NAM

Technical report: Assistance to the Refrigeration Centre of Seaprodex-Techno-Economic Assessment of the Production of Polyurethane Sandwich Panels and a Related Approach to a Joint Venture Agreement*

Prepared for the Government 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 R. Benvenuti, expert in joint venture agreements and G. Lattanzi, expert in refrigeration equipment

Backstopping officer: J. FÜrkus, Engineering Industries Branch

United Nations Industrial Development Organization
Vienna

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I N D E X

SUMMARY

This report summarizes the work carried out by the consultants Mr. Benvenuti and Mr. Lattanzi in co-operation with the polymer technologist, Mr. Shutov during their field mission in November/ December 1988 in order to assess the type of assistanct to be provided to the Mechanical, Electrical and Refrigeration Centre of Seaprodex, an organization belonging to the Ministry of Fishing. Mr. Shutov's report is, however, issued as a separate document.

The Centre should become the focus point for the refrigeration industry in the whole of Vietnam by providing specialized maintenance services, technical assistance, design and engineering, training as well as spare parts.

In addition the Centre will design, manufacture and test the prototypes of components of refrigerating systems.

The report also includes a techno-economic assessment of the production of polyurethane sandwich type panels in Vietnam as well as a typical example of joint venture agreement.

Finally, a technological consideration on the production of insulating materials in Vietnam is provided.

RECOMMENDATIONS

1. Following the outcome of the preparatory assistance assignment it is proposed that a programme for the supply of technical assistance, training and supply of equipment to the Refrigeration Centre of Seaprodex be executed as outlined in the respective drafts of the Project Formulation Framework and Project Document.

2. Because of the specific nature of the project it is proposed that the expertise services be arranged partly under a subcontract and partly as individual experts services.

3. A draft of a joint venture agreement between the Centre and foreign technical partners has been prepared during the mission in Vietnam. It is proposed that this draft be used as example during negotiations between the Centre and foreign partners for future joint ventures.

4. The techno-economic assessment of the production of polyurethane sandwich type panels in Vietnam has shown that inter alia, the production costs are high and that the potentiality of the plant is far from being exploited completely.

   It is recommended that actions be taken in order to optimize the inputs characteristics in order to reduce production costs and that the plant be completed with the necessary equipment and instruments in order to produce international standards quality panels for potential sales abroad.

5. It is also recommended that the carrying out of a master plan for industrial development and rehabilitation of existing industries as well as of the development of infrastructures needed for industrial development (Industrial Estate, training centres etc.) in Vietnam be considered at short-medium term.

0. INTRODUCTION

The mission has been paid by the following experts :

Mr. Roberto Benvenuti
Mr. Giorgio Lattanzi
Mr. Fieodor Shutov

They arrived in Hochimincity on November 14, 1988 and left on December 2 (Mr. Lattanzi and Mr. Shutov) and on December 8 (Mr. Benvenuti).

Each expert has worked with a number of counterparts as follows :

- Mr. Benvenuti with Administrative personnel
- Mr. Lattanzi with mechanical and maintenance engineers
- Mr. Shutov with chemical engineers and production staff of the polyurethane panels plant

Cooperation provided by counterparts was excellent from any point of view.

0.1 THE PRESENT SITUATION OF THE CENTRE AND ITS DEVELOPMENT

The Mechanical, Electrical and Refrigeration centre belongs to Seaprodex, a company under the control of the Ministry of Fisheries that operates in the catching, processing and export of fish.

The "Centre" is located in Hochimincity on a area covered by the various buildings (approx. 15000 sq. mt.) is large enough for the present and future needs of its activity.

Some buildings are already completed (administrative and technical offices, foundry) others are in an advanced stage of construction (workshops, warehouse, laboratories and drawing room).

Inside the centre, the factory for the manufacture of the sandwich panels is also located.
The equipment and machineries presently available for the Center activity are as follows :

- Foundry

  . two small kilns for the production of cast iron
  . one small electric furnace, for the production of 100÷150 Kg light alloys (not yet installed)
  . one small electric furnace, of Japanese construction for the production of 200 Kg of steel (ordered, but not yet installed).

- Workshop

  . presently there are about 30 machine tools (the main items are lathes, shaping and drilling machines). All these machines are old and not reliable
  . no testing equipment available
  . the personnel consists of 60 workers and 3 welders, but quality of the tools and lack of an established tradition hinder the manufacture of parts and components of the refrigerating systems
  . welding technique, even if accettable for parts of minor importance must be well improved especially for all those plant components containing ammonia, as pipes, condenser, evaporators, receivers and so on.

Anyway in this conditions the workshop has been able to construct some equipment for ice making plant, but cannot help the center.

In addition the centre lacks of instrumentation for quality control, equipment for design and drafting, trouble shooting etc.

According to the strategies of the Ministry of Fisheries the Centre should become the focus institution for the refrigeration industry in the Country. It will be in charge of the design, constitution supervision and commissioning of all refrigeration plants, provide maintenance services and spare parts, train the operators, produce insulating panels, refrigerated trucks and, in general, supervise all activities in this field in Vietnam.

In order to assist the Centre in fulfil its goals a project document has been prepared and 9 major outputs identified.

0.2 THE PRODUCTION OF POLYURETHANE PANELS

The Centre has recently started the production of polyurethane sandwich type insulating panels. A new company has been formed, a 50 to 50% joint venture with an Australian trading company.

The production of these panels has been the object of a techno-economic analysis (Part I of this report) while detailed technological considerations on the production of insulating materials in Vietnam are provided in Part III.

The consultant was also invited by the Centre to prepare a draft of a joint venture agreement that could be used as example during the negotiations for future joint venture (the Centre is identifying suitable foreign partners for the production of fishing boats, nets etc.). Part II of this report is the text of the joint-venture agreement.

I. TECHNOECONOMIC ASSESSMENT OF THE PRODUCTION OF POLYURETHANE SANDWICH TYPE PANELS IN VIETNAM

1. MARKET

The needs of Seaprodex for the next ten years in terms of insulating materials cam be summarized as follows :

1.1 COLD STORES

The construction of 40 new cold stores have been planned.
The capacity of each store is 1,000 Tons.
Typical dimensions are 40 mt. x 25 mt. x 3.5 mt high.
The need in terms of polyurethane prefabricated panels is therefore of 2,875 sq.mt. each (100 mm thick panels).
Total for the 40 stores approx. 115,000 sq.mt.

1.2 REHABILITATION OF EXISTING COLD STORES

Seaprodex is currently operating 60 cold stores.
It is anticipated that 30 of them are obsolete and that must be rehabilitated. The rehabilitation will also include the increase the increase of storing capacity to 1,000 Tons each. Each will therefore require 2,875 sq.mt. of panels and the total amount needed is in the range of 86,250 sq.mt.

1.3 REFRIGERATED TRUCKS

An essential component of the cold chain is the refrigerated truck needed to carry the fish to the proceeding plants and then, one frozen, to the harbours for shipment presently refrigerated trucks are imported.

The availability of polyurethane panels will allow the local production of the refrigerated post.

Seaprodex estimates total <u>minimum</u> requirement is 10 trucks, 5 Tons each, each year.
Refrigerated container is 5.5 mt. long, 2.4 mt. high and 2.4 mt. wide. A total of 64.32 sq.mt. of panels are needed, therefore a total of 643 sq.mt./year or 6,430 sq.mt. on the 10 years period.

1.4 FISHING BOATS

The use of insulating panels on board is essential to maintain the quality of the fresh fish after catching. Seaprodex forecasts to produce insulating systems for 20 boats/year for the next ten years. This is considered the minimum. A requirement of 1,750 sq.mt. per year of panels has been calculated. Total over the ten years period is 17,500 sq.mt.

1.5 REFRIGERATED BOXES

A total requirement of 500 sq.mt. of panels (100 mm thickness equivalent) each year is expected for the production of refrigerated boxes, containers, stands etc.

1.6 OTHER POTENTIAL USERS

Not only Seaprodex is in need of cold stores and other equipment for the "cold chain".
Typical examples are the cold stores for fruits, municipality cold stores etc.

The demand from sectors other than Seaprodex has been estimated, in a conservative way, to be 30% of annual requirement for the fishing industry, say approx 70,000 sq.mt./year of panels.

1.7 SUMMARY OF NEEDS FOR NEXT 10 YEARS

Seaprodex	- new stores	115,000 sq.mt.
	- rehabilitation	86,250 sq.mt.
	- trucks	6,432 sq.mt.
	- boats	17,500 sq.mt.
	- boxes	5,000 sq.mt.
		230,182 sq.mt.
Other fields (30% of above)		70,000 sq.mt.
	TOTAL	300,000 sq.mt.

Yearly requirement should therefore be in the range of 30,000 sq.mt., without taking into account any potential export.

1.8 CONSIDERATIONS ON THE POLYURETHANE PANELS VERSUS STYROFOAM INSULATING FROM THE MARKET POINT OF VIEW

Both systems are presently used in Vietnam.
Polyurethane sandwich panels are imported from Japan and other countries at a price ranging between 101 and 130 $/sq. mt. (C.I.F. prices) while polystirol granules are imported and panels produced locally by sintering process (heating in a mould) by private shops.

The centre has bought such panels for some cold stores at a price of 8 $/sq.mt. Unlike the polyurethane sandwich panels, anyway, styrofoam must be assembled on bricks/cement double walls, covered by galvanized iron sheets, PVC coated and bitumed.
It has been calculated that the cost of a complete sq.mt. of insulated wall using polystirol is approximately 35$. It is therefore less expensive than polyurethane panels but the following points must be considered:

- Experience in using styrofoam in Vietnam has been very poor because of local environmental conditions. Extremely high humidity, particularly in North Vietnam and on the sites close to sea (where the majority of fish processing units are located).
  Humidity is rapidly deteriorating the insulation made by styrofoam, particularly if the construction is not well done and after few years (2-5) replacement and major maintenance works are needed.

- Erection time for polyurethane panels are much lower than the one needed for styrofoam.

- The "centre" has noticed a trend toward the use of polyurethane sandwich panels by many customers not happy with other materials.

As a general consideration it can be said that the use of polyurethane sandwich panels recommended for large stores (like the ones planned by Seaprodex) and where the most critical operating conditions are expected, while styrofoam can have a large application for small cold

stores, refrigerating boxes, situations of non-severe conditions etc.

2. THE PLANT AND CONSIDERATIONS ON ITS OUTPUT

The polyurethane sandwich panels manufacturing plant installed by the Refrigeration centre has been sold by KORASIA Co., Australia, and is claimed having a maximum production capacity of 480 sq.mt/day on one shift. This production capacity seems indeed to be too high and difficult to attain. In addition, according to the experts, a number of equipment, and particularly control instruments are missed.

There is also a discrepancy between the claimed maximum output of the plant and the forecast needs for the domestic market, while a comprehensive survey of the export potential has not yet been carried out.

In agreement with the Centre, therefore, it has been decided to make calculations on the feasibility of the plant on the basis of the output needed to satisfy local needs only, i.e. 30,000 sq.mt/year. This output will be attained the third year of operation as follows:

1989:	50%	output	15,000 sq.mt
1990:	70%	output	20,000 sq.mt
1991:	100%	output	30,000 sq.mt

- The raw materials type and cost have been considered according to the information provided by Korasia. There are, anyway, changes that can be introduced in future, for instance the replacement of PVC coated steel (very expensive) by galvanized iron or aluminium sheets for the production of panels. This material is widely used worldwide for this application.

- It has been assumed that, in future, chemicals will be stored in refrigerated rooms so that their characteristics will not deteriorate as it is the case now.

- Metal fasteners will be produced by the Refrigeration Center and will not be imported, Equipment and appropriate design/technology is already (or will be soon) available.

- Consumption of raw materials has been increased by 5% to take into account losses, wastes, control quality rejections etc.

- Spare parts consumption has been estimated on the basis of the characteristics of the machinery installed at the Refrigeration Centre.

- Energy and water consumptions have been estimated on the basis of actual operating characteristics of the plant.

3. FINANCIAL ANALYSIS

3.1 INITIAL INVESTMENT

- fixed capital exp.	
. civil works	150,000 $
. production equipment	595,000 $
. utilities and erection	95,000 $
. engineering	70,000 $
. new equipment needed (quality control etc.)	300,000 $
sub-total	1,210,000 $
- pre-operational expenses	
. production testing	80,000 $
. training	30,000 $
. legal and other expenses	5,000 $
. salaries	16,830 $
. insurances and other changes	4,170 $
sub-total	136,000 $

Total initial investment: 1,346,000 $.

3.2 PRODUCTION EXPENDITURES

The following costs have been reckoned taking into consideration the following points:

	$
. raw materials cost (imported) 36.81$/m² CIF	1,104,000
. import duty 5%	55,000
. transportation (inland freight)	30,000
. production wastes	55,000
. fasteners	60,000
. other production/usable materials	62,000
. direct personnel (37 workers)	160,000
. indirect personnel (10 staff)	24,000
. spare parts	36,000
. land rent	32,000
. energy and water	5,000
. general expenses (advertising, insurance etc.)	127,000

	1,750,000

3.3 DEPRECIATION

The total fixed capital expenditures have been estimated in the range of 1,346,000 $. The operating life of this kind of plant is usually over 10 years but this figure has been taken as actual industrial life in order to be on the conservative side.

Depreciation will be equal on the 10 years period for the machinery and equipment and other fixed assets while will be 5 years only for pre-operational expenses.
By rounding-up the values the following depreciation values have been considered:

1989 - 1993: 135,000 $/year
1994 - 1998: 120,000 $/year

3.4 WORKING CAPITAL

The following assumptions have been made:

- raw materials: 3 months stock
- local materials: 1 month stock
- payment terms of output: 50% at contract signature
  50% at 180 days from delivery

Therefore:

- imported raw materials:	326,000 $
- local materials	5,000 $
- delay in payment terms from customers:	437,000 $
	768,000 $
Rounded to	770,000 $

Taking into consideration the production programme (30% in 1989, 70% in 1990), the working capital requirements (in terms of working capital increase) will be as follows.

1989 :	385,000 $
1990 :	155,000 $
1991 :	230,000 $
	770,000 $

The financing of the working capital for the first year will be assured by a loan that has been granted to the Refrigeration Centre with the following terms: 5 years, 6,5% interest.

The following table can therefore be drafted:

	Principal reimbours. $	interest $
1989	77,000	25,000
1990	77,000	20,000
1991	77,000	15,000
1992	77,000	10,000
1993	77,000	5,000

3.5 PRODUCTION COST

At full production (30,000 sq.mt/y) the unit production cost of the panels will be:

- production expenditures	1,750,000 $
- depreciation	120,000 $
	1,870,000 $

= 62.3 $/sq.mt.

This unit cost will be slightly high during the first years due to the higher depreciation and the loan interest as follows:

1989:	69	$/sq.mt.
1990:	69	$/sq.mt.
1991:	63.33	$/sq.mt.
1992:	63.2	$/sq.mt.
1993:	63	$/sq.mt.

3.6 NET INCOME STATEMENT

The following table shows the net income statement for all 10 years of the industrial life of the plant. Taxes have been considered 25% of gross profit, according to the Vietnamese law. No tax holiday has been considered even if the new company could be entitled to for a maximum of two years.

The following assumptions have been made :

- no salvage value has been considered because the most expansive equipment cannot be reconverted for other uses and the possible salvage value of the civil works is very little;

- the selling price of the sandwich panels has been fixed at 72 $/sq.mt. by the board of directors of the joint venture. This value has been chosen in order to attract customers and it is the minimum that the plant can afford with the present and forecast production cost. The use of less expansive raw materials (particularly the replacement of steel by galvanized iron) can decrease the production cost of 10-15% increasing, in turn, the competitiveness of polyurethane panels versus the styrofoam.

It is highly recommended that a "value analysis" of the panel by carried out as soon as possible.

NET INCOME STATEMENT TABLE

YEAR	EXPENSES	INTEREST	DEPRECIATION	TOTAL COSTS	REVENUES	GROSS PROFIT	TAXES	NET PROFIT
1989	875,000	25,000	135,000	1,035,000	1,080,000	45,000	11,000	34,000
1990	1,225,000	20,000	135,000	1,380,000	1,510,000	130,000	32,000	98,000
1991	1,750,000	15,000	135,000	1,900,000	2,160,000	260,000	65,000	195,000
1992	1,750,000	10,000	135,000	1,895,000	2,160,000	265,000	66,000	199,000
1993	1,750,000	5,000	135,000	1,890,000	2,160,000	270,000	67,000	203,000
1994	1,750,000	-	120,000	1,870,000	2,160,000	290,000	72,000	218,000
1995	1,750,000		120,000	1,870,000	2,160,000	290,000	72,000	218,000
1996	1,750,000		120,000	1,870,000	2,160,000	290,000	72,000	218,000
1997	1,750,000		120,000	1,870,000	2,160,000	290,000	72,000	218,000
1998	1,750,000		120,000	1,870,000	2,160,000	290,000	72,000	218,000

PAY BACK PERIOD = NET PROFIT + DEPRECIATION / INITIAL INV. = 4.8 Y

NET RETURN ON FIXED CAPITAL ON 6° PROD. YEAR = 16.2%

3.7 CASH FLOW TABLE AND CALCULATION OF INTERNAL RATE OF RETURN BY DISCOUNTING TECHNIQUE

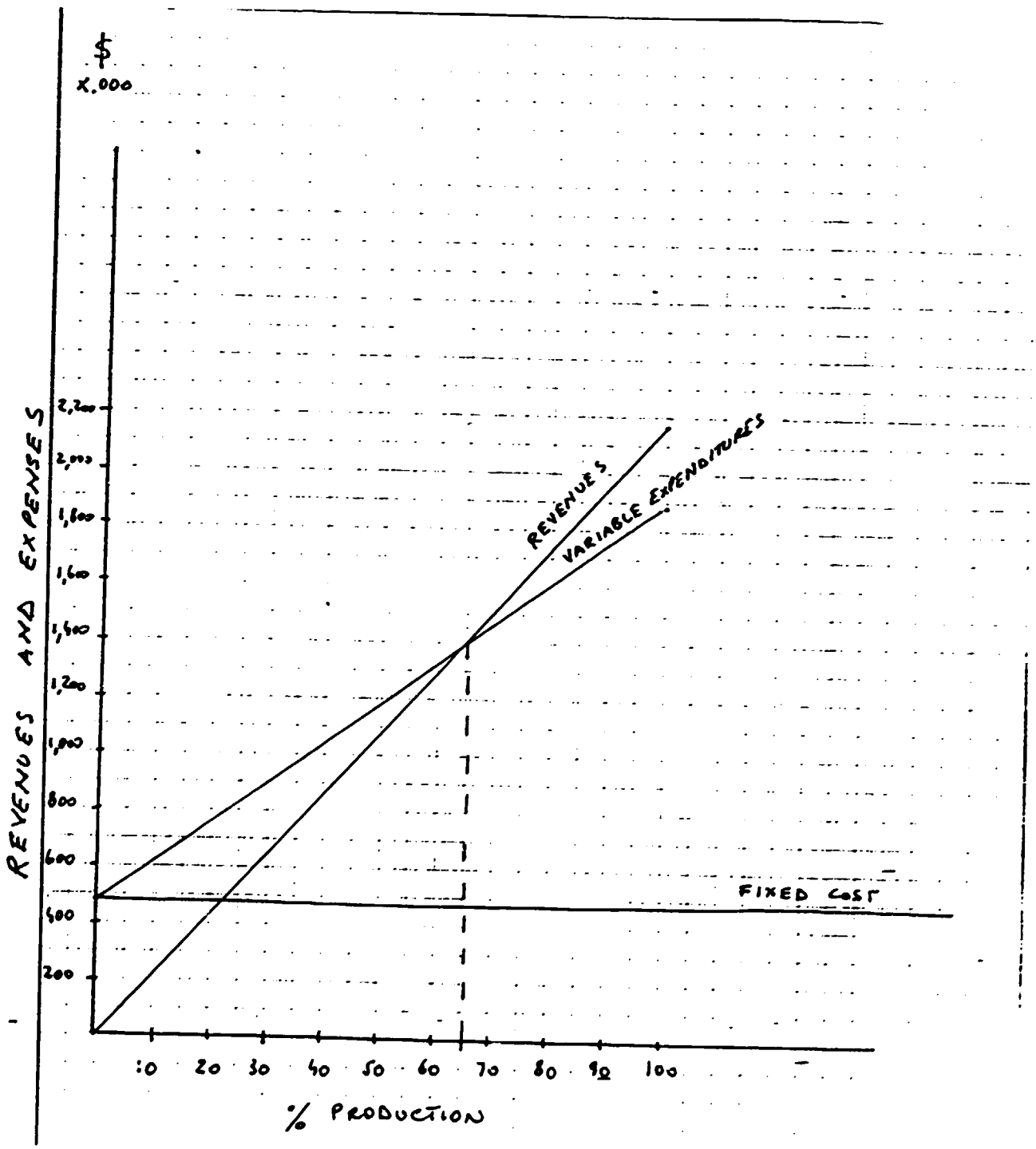
ALL VALUES X '000 US$

YEAR	INITIAL INVEST.	WORKING CAPITAL INCREASE	LOAN REIMBURS. AND INTEREST	EXPEND.	TAXES	TOTAL	REVENUES	NET CASH FLOW
1988	1,346	-	-	-	-	1,346	-	(1,346)
1989		-	102	875	11	988	1,080	92
1990		155	97	1,225	32	1,509	1,510	1
1991		230	92	1,750	65	2,137	2,160	23
1992			87	1,750	66	1,903	2,160	257
1993			82	1,750	67	1,889	2,160	261
1994				1,750	72	1,822	2,160	338
1995				1,750	72	1,822	2,160	338
1996				1,750	72	1,822	2,160	338
1997				1,750	72	1,822	2,160	338
1998				1,750	72	1,822	2,160	338

INTERNAL RATE OF RETURN I.R.R. = 8.5%

3.8 BREAK-EVEN POINT BASIC OPTION

5°YEAR OF PRODUCTION



FIXED EXPENSES = 485,000 $ = 22.4 % OF REVENUES

BREAK EVEN POINT = 65% OF 30,000 SQ. MT. = 19,500 SQ. MT./Y

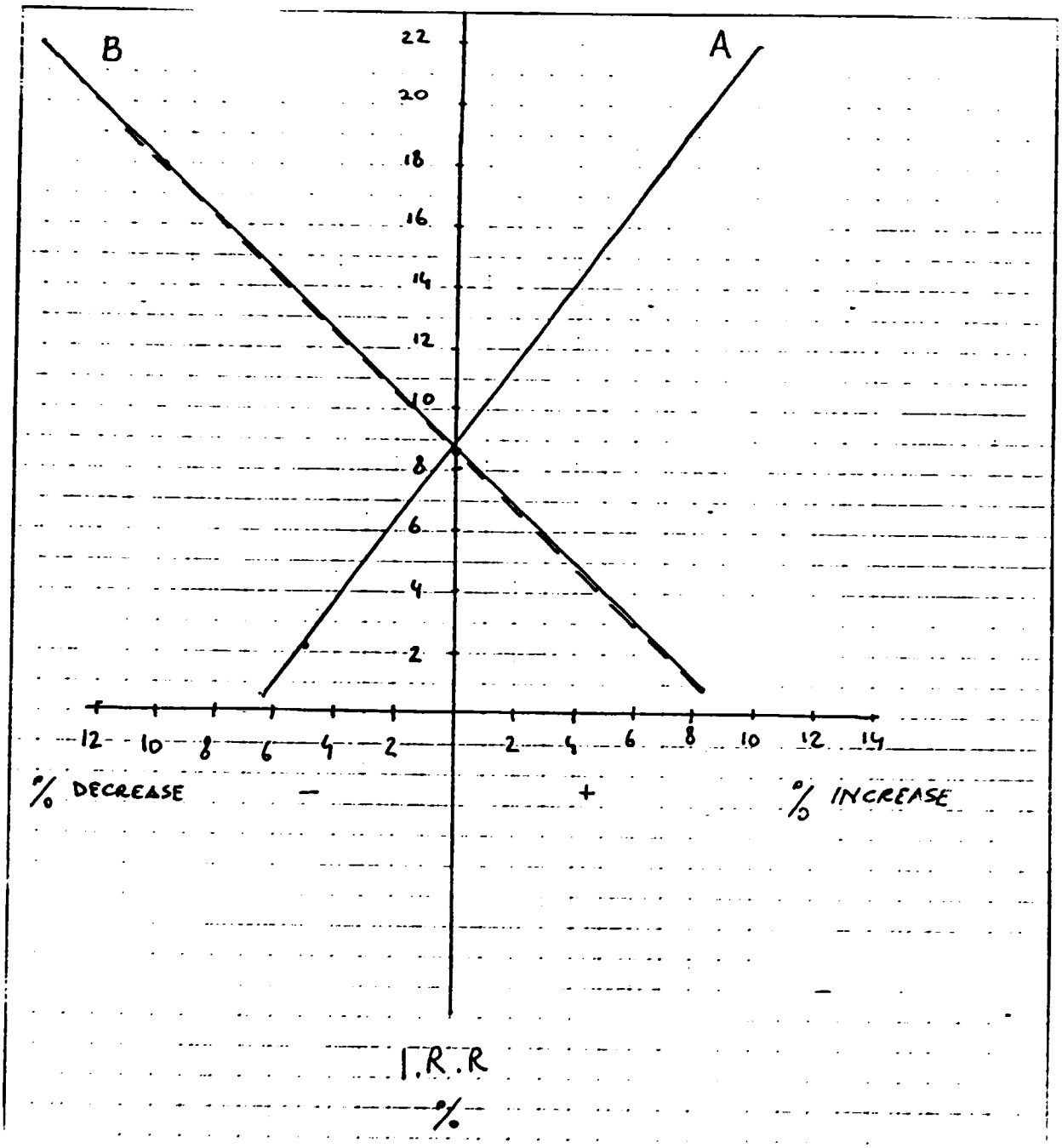
3.9 SENSITIVITY ANALYSIS

The sensitivity analysis has the goal to study how the profitability of the project, expressed in terms of I.R.R. varies with the variation of the most important parameters, i.e. the cost of the inputs and the selling price.

The exercise has been carried out for both variables and the results are shown in the following graph.
The project is very sensitive : a decrease of the selling price of only 5% brings down the I.R.R. to 2% while an increase of the raw materials cost of 5% is reducing the I.R.R. to approx. 4%.

Once again the accurate control of the type and cost of raw materials is suggested in order to keep the project a profitable one.

SENSITIVITY ANALYSIS



A : VARIATION OF I.R.R. FOR CHANGES OF SELLING PRICE BASIC OPTION = 72 US $ / SQ.-MT.

B : VARIATION OF I.R.R. FOR CHANGES OF RAW MATERIAL COSTS

4. NATIONAL PROFITABILITY

4.1 PRICE ADJUSTMENT

In principle the outputs and inputs of an investment project should be valued at actual market prices. However, market prices prevailing in a Country at any particular time may not represent their real social cost and some adjustments have to be made before making an appraisal of the national profitability. The following rules have been adopted for this study :

- Panels are domestically marketed at present but they are actually import substituting. The establishment of this plant will lead to the discontinuance of imports of the same product. Therefore such product should be valued at actual C.I.F. prices since this value represents the real cost for the country. Being, at present, the minimum value of imported panels 101$, this figure has been used to calculate the revenues.

- Imported inputs are valued at actual C.I.F. prices plus internal charges for transport, insurance etc. No significant changes, therefore, from the financial analysis already carried out.

- If there are two prices for electricity the higher should be used. No changes have been introduced taking into consideration to extremely low value of this component.

4.2 VALVE ADDED CALCULATION

Valve added is one of the basic criteria for the overall effect of a project on the economy.
It represents the difference between the output value and the value of inputs purchased.

$$NVA = O - (MI + I)$$

where : (in US $) :

NVA = expected net value added generated by the project
O = sales revenues
MI = value of inputs
I = total investment

or, in this case :

$$NVA = 27,876,000 - (14,260,000 + 1,346,000)$$
$$= 12,266,000 \$ \text{ or } 44\% \text{ of output value}$$

The net value added comprises two major components : wages and salaries and social surplus. The wages and salaries express the level of employment and the average wages of the people employed. The social surplus expresses the earning capacity of a project. It comprises taxes, interest, dividends, etc and undistributed profit that is being used by the firm for expansion funds, reserve funds, social welfare funds etc. In this case the NVA can be divided as follows :

wages : 1,840,000 $
social surplus : 10,426,000 $

NOTE : In case of the financial analysis the NVA is of course different and would amount to 4,260,000 $ of which 1,840,000 $ salaries and 2,420,000 $ social surplus. The NVA on output would be 21.44%.

4.3 NET FOREIGN - EXCHANGE EFFECT

An essential part of the overall economic evaluation of the investment project is the assessment of the effects of its implementation on the foreign exchange position of the Country, particularly when, like in Vietnam, the shortage of foreign exchange is a key obstacle to the economic development.

For this reason the net foreign-exchange flow of the project has been computed in the following table.

ALL VALUES X'000 $

YEAR	FOREIGN INVEST. PORTION	IMPORTED RAW MAT.	INTEREST & LOAN REIMS.	REPATRIATION OF PROFITS	IMPORT SUBSTITUTING	NET FOREIGN EXCHANGE FLOW
1988	1,160	-	-	-	-	(1,160)
1989		663	102	17	1,515	733
1990		929	97	49	2,121	1,046
1991		1,327	92	93	3,030	1,518
1992		1,327	87	100	3.030	1,516
1993		1,327	82	101	3,030	1,520
1994		1,327		109	3,030	1,594
1995		1,327		109	3,030	1,594
1996		1.327		109	3,030	1,594
1997		1,327		109	3,030	1,594
1998		1,327		109	3,030	1,594

TOTAL NET FOREIGN EXCHANGE FLOW = + 13,143,000 $

Then the present value of the net foreign exchange flow over the whole economic life of the project is calculated at a discount rate of 10% and this is a significant figure because it measures the project's net contribution to the foreign exchange of Vietnam over this period.

Present value (10% D.R.) 7,268,000 $.

4.4 SUPPLEMENTARY CONSIDERATIONS

The output of the plant is used to increase the capabilities of the Country in storing, processing and export fish, fruits and other products, increasing its earning in terms of foreign exchange. In addition the social implications are extremely important, allowing the storing and distribution of food within the Country and decreasing losses with consequent consistent savings.

In addition the project can permit to decrease considerably the expenses in foreign currency needed to implement the cold stores programme.

The construction of cold stores, refrigerated trucks, refrigerated fishing boats etc can considerably decrease the heavy post-harvest losses now experienced (25-30% of the total catch). For instance the reduction of post harvest losses by 10% only on the basis of total catch can make available additional 90,000 Tons/y of marine products for local consumption or export.

5. FINAL CONSIDERATIONS

- The project has a relatively low financial profitability but high impact as far as the National profitability.

- The production costs are high and any efforts should be done to decrease them by replacing some of the expensive products by others that can perfectly fulfil local requirements.

- The potentiality of the plant is far from being exploited completely. Potential for exports should be explored.

- The present considered selling price of 72 $/sq.mt. is considered high if compared with other insulating materials that (like Styrofoam) can, if well used and applied, give similar results for many applications.

- The quality of the panels presently manufactured is far from being acceptable according to international standards and steps must be taken to improve it.

- The plant need additional investment in terms of production equipment and, especially, in terms of quality control equipment.

- Personnel training must be upgraded.

II. DRAFT OF A JOINT VENTURE AGREEMENT

This agreement is made the ..... (DATE).
In accordance with the principle of equality and mutual benefit and on the basis of the law of foreign investment in Vietnam promulgated on Dec. 29, 1987 and of the context of the letter of intent signed between the Company ..... located in ..... Vietnam, hereinafter referred to as party A and Company ..... registered in ..... and located at ..... (hereinafter referred to as party B)

WHEREAS

A. Both parties wish to promote industrial and economic development in Vietnam;

B. Party B has experience and know how in the production of ..... through the world and desires to establish a Company (hereinafter referred to as Joint Venture Co.) in Vietnam for the purpose of manufacturing ..... (hereinafter referred to as "the products") in Vietnam;

C. Party A believes that the establishment of the Joint Venture Co. is a viable venture which will contribute to the industrial and economic development of Vietnam as evidenced by the Feasibility Study annexed hereto as Annexe I, and has agreed to participate in the incorporation and the equity capital thereof;

D. Both parties have agreed jointly to incorporate and participate in the Joint Venture Co. for the purpose of carrying out their objectives;

E. It is proposed that the Joint Venture Co. shall construct a plant in ..... through the application of information and know-how provided by the Party B;

F. It is proposed that the plant will produce ..... using various types of raw materials and inputs ..... purchased in ..... (COUNTRY) or ..... (FROM SUITABLE SOURCES);

G. It is proposed that the J.V.C. shall market the products in Vietnam and in the export market;

H. It is proposed that the J.V.C. shall be operated as a commercial enterprise having regard to profitability, future growth and the need to ensure long term stability;

I. It is proposed that both Parties shall be represented on the board of directors of the J.V.C. in the proportion hereinafter mentioned;

J. It is proposed that the authorized capital of the J.V.C. shall be ..... (AMOUNT);

K. The financing requirement for the completion of the Plant according to the attached Feasibility Study, including the necessary working capital and pre-operational expenditure, is estimated at .....;

L. Party A has agreed to use best efforts to procure the granting by the Government of Vietnam of all certificates, permissions, consents, permits, licenses and authorities necessary for the implementation and operation of the Plant;

M. Both Parties have agreed to give effect to the above objectives in the manner appearing below.

NOW IT IS HEREBY AGREED AS FOLLOWS

ARTICLE 1 - INCORPORATION OF THE J.V.C.

1. Both parties hereby agree to form and maintain a corporation for the purpose of accomplishing the objectives set out above.

2. Party A shall assume full responsibility for all necessary or incidental formalities for the incorporation of the J.V.C.

3. The purpose of the J.V.C. shall be to manufacture the Products in Vietnam and to market to products within Vietnam and abroad. The J.V.C. shall undertake to construct, commission and operate the Plant for that purpose. The J.V.C. may enter into contracts for the purpose of constructing, commissioning and operating the plant.

4. The Company name for the J.V.C. shall be .....
The J.V.C. shall be incorporated under the law of Vietnam. The J.V.C. principal place of business shall be .....
The duration of the J.V.C. shall be 20 years according to the law of Vietnam. If any changes occur in the duration both Parties will discuss and agree on a report to be presented to the State Agency for management of foreign investments in Vietnam for approval.

ARTICLE 2 - EQUITY SHAREHOLDING

1. Immediately after the incorporation of the J.V.C. and upon receipt of sufficient evidence by both Parties that the conditions mentioned in Article ..... hereof have been satisfied, each Party hereby agrees to make irrevocable application to the J.V.C. to participate to the capital as follows:

   - Party A .....%

   - Party B .....%

2. The participation to the capital will be given as follows.
   (Example) Party A to provide buildings for a value of ....
   Party A to provide cash for a value of .....
   Party B to provide know-how evaluated at ..... $
   Party B to cash ..... paid in US $
   The exchange rate between US Dollar and Vietnam Dong shall be calculated on the exchange rate issued by the Bank of Vietnam on the date of said paid-down.

3. The payment in cash derived from the investment of each Party shall be fully made within four calendar mouths after the coming into force of this contract.

4. The J.V.C. does not issue shares or securities.
   The J.V.C. shall issue the certificate of investment for each party when each party has fully paid-down his own share if investment.

5. If and in any case, either of the two Parties intends to sell either wholly or partially his own paid down capital, he must notify in writing the other party 60 calendar days in advance and the other Party thereby notified shall have the priority of purchase option. No Party of this contract can transfer, either wholly or partially, his investment mentioned above to any third party without the approval by both parties to this contract and by the Vietnamese Authorities concerned.

ARTICLE 3 - THE BOARD OF DIRECTORS OF THE J.V.C.

1. The Board of Directors of the J.V.C. shall be composed of ..... members and shall be nominated immediately after the incorporation of the J.V.C. and elected in accordance with the Articles of Association of the J.V.C. Each Party hereby agrees to vote in favor of the directors nominated by the other Party. The number of Directors so to be nominated by each party is as follows :

Party A .....
Party B .....

2. The Board of Directors is to be formed within two calendar mouths after the coming into force of this contract

3. All directors shall serve for 2 years and may be renominated and re-elected indefinitely. in the event that one Party wishes to remove and replace his nominee in the Board of Directors, the other Party hereby agrees to vote in favor of removal and in favor of the replacement nominated by the Party

4. Meetings of the Board of Directors shall be held at least twice a year and at such other times as may be requested by the Directors. Written notice to all Directors shall be mailed at least 30 days before meeting, and specifying the time and place of the meeting, and indicating all matters to be considered. Notice may be waived by the unanimous consent of all directors. Unless otherwise agreed by a majority of the directors, all meetings shall be held at ..... (town).

5. A quorum of a meeting shall consist of ..... Directors. A simple majority of the directors present shall suffice to adopt a resolution except where a special majority is required by this agreement or by the Certificate of Incorporation or by the Law of the J.V.C.

6. The Board of Directors shall be the power to decide all matters relating to the routine and regular business operations of the J.V.C. At any rate, the following special matters shall be subject to the approval of a shareholders' meeting :

(1) Amendment of the Articles of Incorporation
(2) Increase or decrease in authorized capital
(3) Election or removal of directors and auditors
(4) Merger or dissolution of the J.V.C.
(5) Transfer, assignment or lease of the business of the J.V.C
(6) Acquisition, disposal, transfer or lease of important assets; and
(7) Remuneration for directors and auditors

7. The Board of Directors may delegate the execution of matters relating to the routine and regular business operations of the J.V.C. to duly appointed officers of the J.V.C.

8. All Board of directors members shall be given equal right and shall adopt the principle of agreement thought discussion when they solve problems within their scope of power. Vote may be adopted if and in case the majority of Board of Directors demand. Any Board of Directors decision shall be written in both Vietnamese and English (or other .....) languages, each being copied as the meeting record, be signed by both President and Vice President(s), and be distributed to and kept by each party of the J.V.C.

9. The Board of Directors shall appoint the President, nominated by Party A, with an office term of two calendar years. The President shall report to the Board of Directors and shall carry out the decisions of the Board of Directors and take care of the daily management and production activities of the J.V.C. The Board of Directors shall appoint a Vice President appointed by Party B (or more Vice President and the Party nominating should be indicated)

10. The dividends of the J.V.C. shall be declared by the Board of Directors. (A clear statement of the Policy of dividends distribution and/or reinvestment should be formulated at this point)

ARTICLE 4 - SHAREHOLDERS' MEETING

1. The annual shareholders' meeting shall be called by the Boards of Directors one a year during ..... (Mouth). Extra ordinary shareholders' meetings shall be called by the Board of Directors when so requested in writing by one of the Parties. Notice of the Annual and all Extraordinary shareholders' meetings shall be given by the President of the J.V.C. at least 4 weeks before the meeting. The notice shall specify the time and place for the meeting, and indicate all matters to be considered.

2. The shareholders' meeting resolutions shall be adopted by two-thirds of the votes except for the following matters, which shall require the unanimous consent of all Parties :

   a) Merger and dissolution of the J.V.C.
   b) Transfer, assignment or lease of the business of the J.V.C.
   c) Acquisition, disposal, transfer or lease of assets having a value over .....$.
   d) Contracts of the J.V.C. involving payments or indebtedness of over .....$.
   e) Settlement on behalf of the J.V.C. of claims against it in excess of .....$.

ARTICLE 5 - AUDITORS

1. The statuory auditors of the J.V.C. shall be elected and appointed pursuant to a decision of the Shareholders' meeting.

2. In addition to all statement and requests required by law, the statuory auditors shall prepare annual reports for both Parties on the financial situation of the J.V.C. These reports will be included in the notice of the annual Shareholders' meeting.

ARTICLE 6 - CONDITIONS OF EQUITY SUBSCRIPTION

1. The conditions referred to in section 1 of Article 2 are as follows :

   a) that an agreement between the parties on the memorandum and articles of Association of the J.V.C. has been reached.
   b) That all required approvals from the Governmental Agencies have been obtained for the formulation and operation of the J.V.C. and that the J.V.C. has been incorporated under the laws of Vietnam under the name of .....
   c) that the marketing agreement, the management agreement and the plant specifications and performance agreement are signed and, if necessary, approved by the Government of Vietnam
   d) that the Vietnam immigration department has agreed in principle to issue work permits to all necessary expatriate staff
   e) that written confirmation on the sources and terms of financing (loans, overdraft etc.) external to the Parties have been received
   f) that the authorized capital of the J.V.C. has been established at .....$.

ARTICLE 7 - FINANCING

The list of loans that will be granted and relevant terms should be clearly indicated.

ARTICLE 8 - OVERRUN FINANCE

In the event of J.V.C. plant cannot be completed with the budget specified in the feasibility study herewith attached as Annexe A the Parties agree as follows :

- the overrun costs shall be provided by both parties prorate to their overall equity participation

ARTICLE 9 - PROJECT IMPLEMENTATION

1. The Parties hereby agree that the J.V.C. shall construct and commission a plant in conformity with the project description and budget set up in Annexe I. Upon commissioning the Plant shall conform with the specifications and performance Agreement set out in Annexe II. The Parties hereby agree that the J.V.C. may enter into contracts with independent third parties or with one of the Parties (or both)(hereinafter referenced to as "Contractor") to realize all or part of the construction and commissioning of the Plant and the pre-opening management of the J.V.C.

2. "The details of the rights and duties of the J.V.C. and of the "Contractor" in connection with the construction and commissioning of the plant shall be stipulated in a Project Implementation Agreement between the J.V.C. and the

contractor. A copy of this agreement is annexed hereto as Annexe III".

IN CASE THE CONTRACTOR IS ONE OF THE PARTIES THE FOLLOWING SECTION SHOULD BE ADDED :

3. The Contractor, hereby undertakes to construct and commission the plant in accordance with the Project Description and budget set out in Annexe A and warrant that upon commissioning the Plant shall conform with the Plant Specifications and Performance Agreement set out in Annexe II. The contractor may enter into contracts with independent third parties to realize all or part of the construction and commissioning of the plant. Contracts with third parties shall be subject to competitive bidding unless the Board of Directors of the J.V.C. permits a contract to be granted without such competitive bidding.

4. For the services rendered under this article a contractor's fee shall be paid to the contractor as a lump sum in the amount of .....$.

5. Any major alteration in the Plant or any expenditure exceeding the budget annexed hereto (Annexe I) shall be subject to the approval of the Board of Directors of the J.V.C.

6. The contractor shall obtain prior written approval of the Board of Directors of the J.V.C. in respect of any contracts to be concluded pursuant to this agreement with consultants, building contractors, the suppliers of machinery and equipment or other independent third Parties.

ARTICLE 10 - EXCEPTIONAL ADVANTAGES

1. The Parties agree that in all transaction with the J.V.C. no party will receive or benefit from any unfair profit either directly or indirectly, either by the Party himself or by any Company or person associated with the Party, including the Party's directors and employees.

2. To eliminate unfair profit to a Party both in the case that he is supplier of raw materials, equipment, facilities etc to the J.V.C. and in the case where one of the Parties is the purchaser of the Products from the J.V.C., the Board of Directors must unanimously approve obtaining any supplies from or selling any Product to the Parties or any company related to the Parties.
   Furthermore, the J.V.C. management must, when so requested by one of the Parties, provide evidence thought quotations from alternative sources or purchasers that the price of the supplies obtained from or Products sold to one of the Parties is reasonable. Management shall in all cases adopt the overall most profitable solution.

ARTICLE 11 - FEES FOR USE OF SITE AND RENTING TERMS

1. The joint venture shall pay the Vietnamese Government (or concerned Agency) fees for the use of site where the J.V.C. is located. The J.V.C. shall only have the right to the use of the site rather than the ownership

2. A fee for each square of the site will be charged equal to .....$/year. Method and timing for payment shall be agreed upon with concerned Authorities.

ARTICLE 12 - LABOUR MANAGEMENT

1. The employment, dismissal, wages and salaries, welfares etc shall be based on the Board of Directors decisions in accordance with the regulations of the Socialist Republic of Vietnam.

2. Vietnamese citizens shall be given priority in the recruitment of personnel

3. Where high technical qualifications are required for which Vietnamese personnel are not available, the J.V.C. may recruit expatriate personnel. But Vietnamese staff members must be earmarked as potential counterparts to take over each key post. The anticipated time of takeover of local personnel shall be established for each key post, indicating a maximum and a minimum period of training on the job.

4. The right and obligations of the Vietnamese personnel working in the J.V.C. shall be guaranteed by their labour contracts.

ARTICLE 13 - PRODUCTION AND SALES

1. The J.V.C. shall first try the Vietnamese domestic market for necessary raw materials, fitting, tools etc., when the price, quality and delivery are satisfactory.

2. As to materials necessary for the J.V.C. yet unavailable in Vietnam, the J.V.C. may directly purchase from abroad or entrust a Vietnamese Foreign Trade Firm to purchase on his

behalf, provided that the clauses of Article 10 are respected.

3. Party A will endeavour to help the J.V.C. obtain supplies of water, electricity, transportation, raw materials and other inputs, the price terms being made on the basis of domestic regulations in Vietnam.

4. The Parties hereby agree that the marketing of the Products be the sole responsibility of the J.V.C. The Parties hereby agree that the J.V.C. may enter into contracts with independent third parties or with one of the "Parties" to realize all or part of the marketing of the products.

AT THIS POINT NOTES ON HOW THE MARKETING IS CARRIED OUT, WHICH IS THE TARGET FOR BOTH EXPORT AND DOMESTIC SALES ETC. SHOULD BE PROVIDED.

ARTICLE 14 - MUTUAL RESPONSIBILITIES

All responsibilities of the parties must be stated, for instance the supply and commissioning of equipment, the training of personnel, etc.

ARTICLE 15 - FINANCE AND ACCOUNTING

1. The J.V.C. shall open its account(s) in Vietnamese currency and in foreign currencies with the Bank of Foreign Trade of Vietnam or with branches of foreign banks established in Vietnam as may be approved by the State Bank of Vietnam.

2. The J.V.C. shall keep its books of accounts following generally accepted international principles and standards

approved by the Ministry of Finance of the Socialist Republic of Vietnam and shall be subject to control by the financial authorities of Vietnam.

3. All the receipts, account books and report forum shall be written in Vietnamese language while the quarterly reports forms and the year end forms (balance sheet, profit and loss statement, production cost calculation statement) shall be written in both Vietnamese and ..... (foreign language).

4. The daily account books of the J.V.C. shall be kept in Vietnamese currency and in US Dollars individually and the exchange rate shall be based on the current foreign exchange rate issued by the state Bank of Vietnam.

5. The management of the J.V.C. shall provide to both parties:

   a) quarterly unaudited Balance sheets and Profit and loss accounts and quarterly progress and Financial Reports relating to the Venture, together with any other document of general interest in relation thereto, within 4 weeks of the end of each accounting quarter; and
   b) certified copies of the annual audited Balance sheet and trading and Profit and Loss Account of the J.V.C. within 30 days after the date where the same are approved by the Board; and
   c) prompt information of the happening of any event likely to affect adversely and in a substantial manner the J.V.C. profits and business.

ARTICLE 16 - TAXATION AND PROFIT

1. The Joint Venture Company shall be liable to pay a corporate income tax amounting to ..... of the earned profit.

2. The J.V.C. might be exempted by the State Organ for management of foreign investment from payment of income tax for a maximum period of two years counting from the first profit making year and allowed a 50% reduction of income tax for a maximum period of two succeeding years. The Party A shall contact the relevant State Organizations and shall apply to obtain these tax holidays (in full or partially).

3. In the course of its operation, losses incurred by the J.V.C. in any tax year may be carried over the next tax year and made up with the profits of the succeeding years but not exceeding 5 (five) years.

4. After payment of its income tax, the J.V.C. shall use 5% of its profit to set up a reserve fund. Such reserve fund shall be limited to 25% of the prescribed capital of the venture.

5. ..... OTHER SPECIFIC PROVISIONS LIKE SOCIAL FUNDS, PENSION SCHEMES ETC., ACCORDING TO SPECIFIC AGREEMENT

6. Upon Repatriation or remittance of their profits abroad the Party B shall be liable to pay a tax which amount shall be indicated by the law in force at that time (Presently it ranges between 5 and 10%).

7. The employees of the J.V.C. shall pay individual income taxes according to the individual income tax low of the Socialist Republic of Vietnam.

ARTICLE 17 - GENERAL

1. Both parties hereby agree that the J.V.C. shall agree and undertake upon incorporation:

   a) that the whole of the moneys to be raised pursuant to this agreement shall be expended exclusively in carrying out, with all due dispatch, the objectives referred to in this agreement; and
   b) that the Board of Directors of the J.V.C. shall monitor and limit the cost of constructing and Commissioning the Plant by supervising the tendering of bids and by other suitable means; and
   c) that the Board of Directors of the J.V.C. shall at all times use its best efforts to ensure that all costs of the Plant are kept within the budgetary limits; and
   d) that the J.V.C. shall at all times insure the property of the Company against all appropriate risks, taking all relevant factors into account and making sure that the insurance cover is sufficient

2. Each Party hereby agrees not to exploit commercially trade secrets, and other confidential information divulged by one Party pursuant to this Agreement and not to disclose the same to any corporation, firm or person whatsoever, except to directors, officers and employees of the J.V.C., as may be required in the normal course of their duties or employment.

ARTICLE 18 - CONTRACT APPROVAL, VALIDITY AND TERMINATION

1. This contract is subject to approval by the concerned Governmental Authorities of Socialist Republic of Vietnam and will become effective once approved of therefrom and duly registered.

2. The Contract termination may be effected ahead of time if and in case the following situations take place :

   a) the joint venture encounters with severe loss amounting half of the paid-down capital or/land fails to recover;
   b) either one of the two parties fails to carry out his responsibilities as stipulated in the contract;
   c) and if and in case the J.V.C. encounters with difficulty and finds no ways to continue because of "force majeure".

   When the above happens both Parties shall contribute their effort to overcome all difficulties in order to avoid the Contract termination.

ARTICLE 19 - ARBITRATION

1. Any dispute shall be first resolved through mutual consultation and amicable settlement. If, however, the two Parties to a dispute fail to reach an agreement, the dispute shall be referred to the Vietnamese economic arbitration body or any other arbitration or law-enforcement institution as may be mutually agreed upon.

NOTE : IT IS BETTER TO MENTION THE NAME OF THE INSTITUTION AS ..... THE INTERNATIONAL CHAMBER OF COMMERCE ETC.

ARTICLE 20 - LAW

1. In the event that any clause of this contract becomes void or unenforceable for any legal reason, the remaining clauses of this contract shall continue in full force and effect.

2. Any clauses that become void or unenforceable as aforesaid may be renotiated by the investors.

3. All amendments to this agreement (or contract) must be in writing.

4. This Agreement (Contract) is subject to the law of the Socialist Republic of Vietnam which shall govern its interpretation and effects.

IN WITNESS WHEREOF, the parties hereto, acting through their duly authorized representatives, have caused this Agreement (Contract) to be signed in their respective names and delivered in .....(number) original copies, as of the day and year first herein written.