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THE STATE OF BAHRAIN

Technical report: Pre-diagnostic study of the furniture
and joinery industries of Bahrain*

Prepared for the Government of the State of Bahrain
by the United Nations Industrial Development Organization
acting as executing agency for the United Nations Development Programme

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ABSTRACT

Bahrain's industrial policy is to encourage foreign investors to set up industrial enterprises in Bahrain. Incentives provided include tax exemptions, cheap electricity and land. Vocational training programmes are run to meet the industry's needs for trained manpower. So far at least six industrial zones have been created with infrastructural facilities. Industries both up and downstream, have to be created in the future to meet the inputs of the furniture industry. A 20 million population in the GCC region creates a medium size market with relatively high GDP per capita (about US\$ 7,500.--). Bahrain's furniture imports alone amount to between BD 12 and 15 million, of which about 80 percent are met by imports. Imported furniture cost at least twice as much as that of comparable quality made locally. Modern designs with glossy white and pastel colours and dominant ornaments are preferred. Bahrain's furniture industry consists of about 50 small manufacturers, who, with the exception of one, produce mainly copies of popular modern designs. Almost all raw and ancillary materials are imported. The workforce is mainly expatriates from the Far East. Production methods, quantity and designs as well as production management skills have to be improved in the coming decade in order to have a larger share of the furniture market both in Bahrain and in the GCC region.

EXPLANATORY NOTES

The United Nations operational rate of exchange of the Bahraini Dinar (BD) to the United States Dollar (US\$) in May 1990 was D 0,376 = US\$ 1,00.

The following abbreviations have been used in this document:

BD	Bahraini Dinar
CSO	Central Statistical Office
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
HPL	High Pressure Laminate
HSS	High Speed Steel (for tools)
IDC	Industrial Development Centre
LCA	Low Cost Automation
LPL	Low Pressure Laminate
MFPB	Melamine Faced Particle Board
NC	Nitro Cellulose (lacquer)
TCT	Tungsten Carbide Tipped (saws)
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
U.S.A.	United States of America

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INTRODUCTION

The manufacturing sector in Bahrain is dominated by the energy and capital intensive industries. These include the oil refinery, the aluminum smelter and its downstream industries such as aluminum extrusion, aluminum powder and aluminum cable plants, and the ship repairing facilities. Traditional light industries such as pearling, fish processing, dhow building and furniture and joinery production are operating on a smaller scale using artisan skills and manual and semi-mechanical methods.

The Government, in view of the country's limited oil resources, is committed to a policy of future growth in a diversified economy. As a result of this, the non-oil based manufacturing sector has grown rapidly since the early 1970s and its share in exports is growing. The private sector is concentrating on the light industries including furniture and joinery production.

The furniture and joinery industry of Bahrain is at its embryonic stage. The estimated number of manufacturers is about 50. With the exception of two, the workshops are small in size and employ between 5 and 30 persons.

Those companies that used to depend on the orders from the construction companies are shrinking, while those manufacturing for sale through retail shops or according to special customer's designs of furniture as an alternative to imports are expanding. There are many firms that are considering expansion, some have even placed orders for new machinery.

More and more people prefer to buy locally produced furniture for two reasons:

- Individuality/uniqueness of the designs they can get, and
- cheaper price.

As a direct result of this, and as a result of the recession in the economy, the value of imported furniture is decreasing.

However, the technological level of all the manufacturers (except for one or two) in terms of equipment, production methods and materials is very low. In order to capture a bigger share of the imported furniture market, they have to be upgraded so that they can match their quality and designs to the imported items both in Bahrain and other GCC countries.

In view of the above, the Government of the State of Bahrain requested UNIDO's assistance through the United Nations Development Programme Office in Manama to undertake a pre-diagnostic rehabilitation study of the furniture and joinery industry, among other industries, to examine and analyse the factors limiting or hindering the sector from achieving its full potential, and advise on remedial action.

Within the framework of the government's request, UNIDO assigned Sinan Cinar, an expert in furniture production, on a one month mission (from 10 May to 7 June) to Manama to carry out the study. His terms of reference are given in the job description in Annex I.

This report covers the expert's findings, conclusions and recommendations during his visits to furniture manufacturers, and retailers

and to suppliers of woodworking equipment and materials, in Bahrain. The list of firms visited and the persons met are given in Annex II. Notes on the companies visited are given in Annex III.

Upon completion of his mission, Mr. Cinar presented his report to the Government counterpart agency, the Industrial Development Centre at the Ministry of Development and Industry, and to the Resident Representative of the UNDP on 6 June 1990.

I. FINDINGS

A. Industrial strategies and policies:

1. Industrial Policy

The Government of Bahrain wants to develop a diversified industrial base other than the oil-based industries. To achieve this, it has adopted a policy to provide opportunities for its people and for investors from overseas to set up industries. As part of this policy, the Government:

- provides incentives to the private investors to encourage the establishment of small to medium size firms capable of producing competitive products to substitute for the existing high level of imports of consumer and industrial goods;
- encourages investments in upstream and downstream projects for the existing industries;
- promotes Bahrain as the most suitable location for overseas companies wishing to establish manufacturing units in the Gulf to serve the GCC countries;
- encourages the transfer of technology and know-how from overseas through joint-ventures, licensing and technology transfer agreements, and investment in overseas joint research and development projects.

2. Incentives to the industry

Incentives to industry are provided in several forms. These include:

- Lower rents for land and premises.
- Cheaper electricity.
- Exemption from certain local taxes.
- Exemption from import duties on capital goods and raw materials.
- Help in conducting market studies.
- Unconditional profit and capital repatriation.
- Labor permits for expatriate technicians and workers.

There is no personal or corporate income tax in Bahrain.

These manufacturing operations which have "local added value" of 40 percent or more on the imported raw materials are granted duty-free import license for capital equipment and raw materials.

There are no restrictions on capital and profit repatriation.

In certain cases, the Government provides assistance to selected investors to undertake market studies and synthesize project components. Those overseas companies seeking local partners and investment capital are put in touch with local investors.

3. Industrial manpower training

In Bahrain, there is a good supply of university graduates in technical and commercial fields. These graduates take up jobs in either private and public sector industries or start their career as civil servants.

Training in technical, commercial and electronic fields are conducted by technical colleges. They attract a good number of students. One of the least popular courses is carpentry. Because of a lack of students, the three-year carpentry courses run by the four technical colleges were canceled by the Ministry of Education and replaced by a two year vocational training course for school drop-outs. The minimum entry requirements for these courses is the ability to read, write and do the four basic mathematical operations. During the course, the following subjects are taught:

- Wood technology,
- Technical drawing,
- Costing and estimating,
- Woodworking tools and equipment,
- Practical training.

The existing course syllabus does not cover such subjects as upholstery, varnishing and polishing. The contents of the existing subjects are based on a similar course run in Egypt, and do not cover the up-to-date materials, techniques, tools and equipment. Graduates of these courses are far from meeting the requirements of the industry, as the courses aim at training of craftsmen and not of industrial woodworkers.

The two technical schools visited by the expert, had training workshops equipped with standard woodworking machinery. Equipment for upholstery and surface finishing was missing.

The Vocational Training Centre (VTC) run by the Ministry of Labour and Social Affairs, also has evening courses in carpentry and upholstery. The carpentry course has three options, and the duration of each option differs as follows:

<u>Options in carpentry course</u>	<u>Duration</u>
General furniture making	450 hours
Carpentry for construction	315 hours
Advanced course in furniture making	300 hours

VTC's carpentry training workshop is also equipped with good quality standard woodworking equipment. Previously, VTC also ran a three-year apprenticeship programme in furniture, but this programme has been canceled in 1989. The aims of the existing evening courses are to meet the needs of the labour market for skilled craftsmen by training school drop-outs, the unemployed and those who want to upgrade their skills.

The unpopularity of carpentry as a profession among Bahrainis is affecting the furniture and joinery industry adversely by creating a local

labour shortage. In all the companies visited, with the exception of two, there were either no or only one or two local workers. The reasons behind this, partly based on the points highlighted by the owners/managers met, are as follows:

- Carpentry and joinery is not regarded as a noble profession by the society and receives less respect and value as a result.
- Companies require fully trained and experienced carpenters and are not willing to have apprentices/trainees.
- The working environment in woodworking plants is not very pleasant as the majority of firms visited had no dust extraction units and no attention is paid to the noise levels of the equipment operated.
- Social benefits of work and the facilities of the workplace are inadequate. None of the woodworking companies give a free lunch and only one had proper canteen facilities.
- Financial rewards for the work done do not permit the workers to lead even a modest life style.
- Companies are generally small in size and are not financially strong. They cannot promise job security.

Due to the above factors, the woodworking companies depend heavily on expatriate labour. Because of the short supply of local labour, and restrictions on the issuance of new work permits for expatriate labour, the woodworking industry is likely to have difficulties in the future.

4. Industrial Zones

Bahrain has a policy to contain most industries within industrial zones. As a result of this policy, the following industrial zones were created:

- Mina Suliman Industrial Zone
- North Silra Industrial Zone
- South Alba Industrial Zone
- Arad Industrial Zone
- Ma'amir Industrial Zone
- North Refinery Industrial Zone

These industrial zones are of a general nature and several different industries can be found in each. The largest furniture factory, Tylos, belonging to BLICO, is situated in South Alba and a number of small carpentry workshops can be found in the Arad Industrial Zones. Other woodworking units are scattered in and around Manama and Muharraf.

5. Upstream and downstream industries

One of the main weaknesses of the furniture and joinery industry in Bahrain is the lack of supporting industries that can produce the raw or semi-finished materials, hardware and fittings, glues and varnishes, and upholstery materials.

Currently, it seems that only PVAC white glue, and low density polyurethane foams are produced locally.

Import of all the raw materials puts much pressure on the furniture manufacturing firms and importers in terms of large sums of money being invested in raw material stocks. Consequently, the cost of stock carrying is reflected on the price of the final product.

The range of raw materials available through importers/traders is also narrow. This aspect is discussed in more detail in Section C.7 of this report.

B. Market for furniture and joinery

1. Market size:

In terms of population, the market in Bahrain is rather small. According to CSD estimates, the total population in 1990 is about 515,000. About 35 percent of these are non-Bahrainis. According to one "guesstimate" about 70 percent of the total population occasionally buys furniture of some kind, but the size of the segment making bigger investments in furniture is about 100,000. In 1988, there were 3,110 marriages, which normally means that they all bought new furniture for their new houses. As a matter of principle, brides do not accept to have used furniture.

The total population of GCC member countries make up a medium size market having a total population of about 20 million in 1990.

Estimated GNP (in 1988) and population of each GCC country in 1990 and projections for the year 2000 are shown in Table 1 hereunder.

Table 1: Estimated GNP (1988), present and projected population of the GCC countries.

<u>Country</u>	<u>1990¹</u>	<u>2000 (projected)²</u>	<u>GNP 1988³ (million US\$)</u>	<u>1988 GNP/Capita US\$</u>
Bahrain	515,000	653,000	3,027 ⁴	6,610 ⁴
Kuwait	2,090,000	2,969,000	26,250	13,680
Oman	1,468,000	1,909,000	7,110	5,070
Qatar	367,000	469,000	4,060	11,610
Saudi Arabia	14,131,000	18,864,000	86,527	6,170
U.A.E.	1,588,000	1,916,000	23,580	15,720
Total GCC	20,159,000	26,780,000	151,054	7,493

¹ Source: "Bahrain in figures - 1990" by CSO

² Source: "Industrial Opportunities in Bahrain" by IDC

³ Source: "The World Bank Atlas 1989"

⁴ 1987

Bahrain is a recognized regional business centre and as a place for stop-over for international travellers. It has a reasonable hotel industry with about 40 hotels of which 26 are in the three to five star category.

Currently, renovation and extension is going on in three of the five-star hotels. In terms of value, the total spending will be between BD 2.5 million and BD 4 million. Normally, it is assumed that five-star hotels renew their furniture and other furnishing items every five years.

The new exhibition centre which is under construction, will also create sustained business for furniture and decoration companies as the exhibition stands are normally renewed for each exhibition.

The construction industry, once played an important role in generating business for all sectors of industry, but is at a stand-still at the moment.

The market for furniture and furnishings in Bahrain can be divided into the following segments:

- Contract furnishing of hotels, banks, public and private offices, hospitals, university hostels, defence force facilities, etc.
- Retail furnishing of private houses and offices, etc.
- Specialty decoration of villas, palaces, mosques and offices, etc.

2. Consumption of furniture

It is estimated that the value of furniture consumed in Bahrain both imported and locally made is between BD 12 million and BD 15 million pe year. This includes both the domestic and contract furniture as well as specials and decoration work. Joinery items such as doors and windows are not included in the above estimate.

Based on the trade data compiled by CSO, the value of imports fluctuates between BD 10 million and BD 12 million per annum. The annual values of the furniture imports in Bahrain for the past four years are shown in Table 2.

Table 2: Value of Bahrain's furniture imports

<u>Year</u>	<u>Value</u> <u>(million BD)</u>
1986	12.011
1987	9.633
1988	10.711
1989	9.717

These figures do not indicate the types of furniture imported.

Bahrain is one of the smallest markets for furniture in the GCC region. Bahrain's imports of furniture constitutes about 7,5 percent of the total furniture imports of all GCC countries from the OECD countries.

According to the OECD trade data, imports of furniture by GCC countries from OECD member countries is somewhere between US\$ 400 and 500 million. Import figures for 1983 to 1987 are shown in Table 3.

Table 3: Imports of furniture from OECD by GCC countries.

PRODUCT (and BTN code)	Value (US\$ '000)				
	1983	1984	1985	1986	1987
1. Chairs and other seats (82111)	120,851	104,205	94,704	56,888	74,597
2. Parts of chairs and other seats (82119)	3,181	3,384	4,468	2,739	6,944
3. Mattresses supports (82122)	14,485	20,481	19,335	15,469	21,475
4. Wooden furniture (82192)	444,959	417,881	397,625	111,632	314,887
Total	583,476	545,951	516,132	186,728	417,903

3. Market prices for selected furniture and joinery items

Prevailing average market prices for various furniture, imported and locally made are as follows:

- Upholstered sitting room set complete with four single seaters and one three-seater:
Imported: from BD 400 to BD 1500
Locally made: From BD 250 to BD 700
- Bedroom set finished with white pigmented gloss lacquer, complete with: one dressing table, one double bed with mattress, one wardrobe unit with six doors, and two bedside tables.
Imported: From BD 750 to BD 1500
Locally made (with white HPL): From BD 250 to BD 750
- Dining room set finished with white pigmented gloss lacquer, complete with: one dining table for eight persons, eight dining chairs, one side cupboard with three doors.
Imported: From BD 600 to BD 1000
Locally made: (no price available since it is not commonly found.)
- Clothes hanger finished with pigmented gloss lacquer, complete with mirror, hanger unit, and shoe storage unit:
Imported: BD 425
Locally made: (no price available since it is not commonly found.)

- Kitchen furniture complete with 15 storage units and worktop (carcasses are MFPB, doors and drawer fronts with solid wood frames and veneered panels, warp top with HPL surface).
Imported: From BD 1500 to BD 4000
Locally made (with HPL surfaces): From BD 300 to BD 500

4. Marketing channels

Marketing of furniture in Bahrain is largely carried out through showrooms owned by either local manufacturers or importers. To a lesser extent, some of the importers also act as wholesalers to other smaller retailers who do not have the resources and personnel to import by themselves.

According to the expert's findings, there are about 40 furniture dealers in Bahrain.

Those manufacturers who do not have a showroom produce only to order.

5. Terms of payment

Terms of payment for furniture sales in Bahrain, whether it is imported or locally made, are strictly cash on order, as long as it is delivered from stock. If the order is to be manufactured, the customer must be ready to pay at least fifty percent of the total price as a down-payment. It is only after this payment is made that the manufacturing starts. The remaining fifty percent is paid by the customer when the order is ready at the factory. No delivery takes place unless the goods are fully paid for.

The system of payment by monthly installments is not accepted by the furniture manufacturers and retailers in Bahrain.

Delivery and installation services are provided by the seller and the fee for such services is included in the price of the item.

Sale of furniture in the retail business normally takes place through showrooms or word of mouth recommendations by old customers and friends.

All the prices of furniture which are displayed on labels or tags include a margin for bargaining and/or discount.

6. Styles, materials and finishes preferred:

The majority of furniture in Bahrain is now European or American styles. Individual items with Chinese, Scandinavian, or traditional Arabic styles can also be found.

Upholstered living room furniture is dominated by contemporary European styles with heavy construction. American traditional styles of rugged and heavy construction are also popular, although to a lesser extent. A modernized version of traditional Arabic seating furniture comprising individual cushions on the floor, a high back rest with a 90 degree angle and small cushions on sides to serve as arm rests is produced by local furniture makers only.

Bedroom furniture styles are dominated by traditional Italian and Spanish styles with dominating ornaments. Traditional "Arab style" beds with

turned legs which continue to half the height of the ceiling to support a canopy over the bed, can be seen in the showrooms selling locally made furniture. It seems that beds with upholstered head boards and bed supports in the British style are also popular.

Kitchen are exclusively in contemporary European styles paying much attention to functionality.

Occasional furniture items are in Chinese, American and Scandinavian styles.

The dominant colour for both imported and locally produced furniture is white and pastel colours with a high degree of gloss. Natural or stained wood colours are not popular. HPL's are widely used by the local furniture manufacturers, and melamine faced panels are gaining more acceptance.

Furniture having high solid wood content is preferred by the customers. Among the wood based panels, particle board is the one least commonly used.

C. The furniture and Joinery Industry

1. Structure and location

The number of woodworking companies in Bahrain is estimated to be about 50. Out of this number, only about 10 can be classified as established furniture manufacturers. The remaining 40 companies are only general carpentry and craft workshops who produce from coffee tables to staircases and carry out palace and mosque decorations on a custom-made basis. These small workshops do not contribute greatly to the total output.

Furniture manufacturing workshops are mostly off-shoots of furniture retailers and showrooms.

The largest furniture factory employs 94 persons in production, while the rest employ between 5 and 30 workers.

The majority of production units are situated outside of the city centre of Manama, mainly in the industrial areas where rents are cheaper and suitable buildings are available both from the private sector and the Government. However, they are not clustered in certain areas.

2. Product mix and designs:

The products manufactured by the companies visited may be classified in the following four groups:

- Upholstered items such as armchairs and sofas with and without showwood and beds and headboards.
- Case goods such as cupboards and wall units and bedroom furniture with HPL and painted surfaces.
- Joinery items such as flush and panel doors and windows.
- Contract furniture and decorations such as filled hotel, institution and domestic furniture, carved and routed decorative items, stair components.

Upholstered items and case goods comprise the main products of the manufacturer/retailer companies, and in most cases the firms do both product groups at the same time. Without exception, all firms are inclined to undertake the manufacture of various items as long as they are within their competence.

3. Product development and designs

None of the furniture manufacturing companies visited had their own designs. Those companies which provide interior decoration tend to develop their own designs by taking into account the wishes of the customers.

Domestic furniture manufacturers copy the popular European and American designs especially in the case of upholstered furniture.

Product development efforts are mainly based on consumer specifications, followed by adaptations from existing designs.

Most joints are of the mortise and tenon type. These joints became loose in use because of the high moisture content of the timber when machined. Nails are also widely used, especially by the smaller manufacturers. With the exception of one firm, wooden dowels are not used.

Ergonomic aspects are usually overlooked.

4. Availability of manpower

All the workshops visited with the exception of one, were being managed by the owners or by their family members. Only two firms were employing university graduates and qualified technicians. The upper management is dominated by the Bahraini nationals. It seems that those companies which are in the process of expansion, would have no difficulty in finding well educated managers and engineers locally, provided they are willing to bear the cost of investment in time and resources to train them. However, the situation is completely different at the middle management and shop-floor levels. All of the firms visited, with the exception of two did not have more than two Bahraini workers. In fact, most of them had a fully expatriate workforce.

As the obtention of working permits for expatriate workers is becoming more difficult, it is likely that, especially the small woodworking firms which are not attractive to Bahraini workers in many respects (see section A.3 "Industrial Manpower Training") will have a serious labour shortage in the years to come if the Government's policy remains unchanged.

5. Production methods

A great majority of the firms visited had equipped their workshops with general purpose woodworking machinery such as radial-arm saws, circular saws, bandsaws, spindle moulders, routers and turning lathes to carry out the basic operations such as cutting, shaping, routing and turning. However, detailed and fine work as well as fitting of the parts together are carried out manually using simple hand tools. This is due to the fact that machinery available is used for rough cutting only and very little or no use is made of jigs.

In general, the level of mechanization increases as the size of the company gets bigger. But even in large and semi-mechanized firms, the manual work is an indispensable part of the production process.

Among the firms visited, only one had material handling equipment in the form of gravity rollers and pallets.

A number of firms had portable dust extraction units, and only two had stationary equipment.

Choice of new machinery to be bought is based on the owner's experience and/or the advice given by the salesmen.

Protective guards for exposed saw blades and spindles, push sticks for circular saws, eye protection goggles, ear protection muffs and respiratory filters are commonly not used.

6. Maintenance of equipment and tools

In most companies visited the importance of cleaning and oiling the machines after a day's work is recognized by both management and the workers. Such mechanical maintenance as changing of bearings etc. is carried out in all firms at any time convenient or when a breakdown occurs.

Most of the medium to large size companies visited normally have their own tool sharpening equipment for bandsaw blades and planer knives of HSS quality. Those companies which do not have any tool sharpening equipment or the special equipment for TCT cutters, like circular saw blades and profile cutters get their cutters sharpened by one of the two trade sharpeners in Manama. One of them can even repair the broken TCT (TCT circular saw blades are widely used).

7. Availability of raw materials and supplies:

Almost all the raw materials required for the production of furniture and joinery are imported into the country.

General purpose paints, wood screws, nails and polyurethane foam are manufactured locally.

There are large companies that keep stocks of timber, wood based panels, varnishes, glues, hardware and fittings.

Sawn wood is the principal raw material used for furniture and joinery. Species preferred by the customers are teak, red meranti, ramin and pine. Such species as beech, mahogany and oak, which are widely used in Europe, are used only selectively in Bahrain. The quality used is adequate for joinery, but poor if quality furniture is to be produced.

In the field of joinery, doors are the biggest end use for wood in construction. Wooden doors are widely used, but windows for housing and shops and office partitions in commercial buildings are made of aluminum or iron. The use of wood in naval construction is declining since the number of wooden dhows built is declining.

The imported timber is shipped "shipping dry" which has a moisture content anywhere under 25%, but likely above 15 percent. Timber having a moisture content above 10 percent is not suitable for producing furniture or internal joinery to be used in the relatively dry climate of Bahrain and without further drying. Some manufacturers air dry the timber before using it but this means tied up capital in stocks and consequently will be reflected in the final price of the product. None of the companies visited checks the moisture content of wood using an electric moisture meter before processing. Therefore, all types of faults due to the use of wet wood can be seen on the finished products.

Widely used wood based panel materials are plywood and blockboard usually with a decorative face veneer (eg. teak) and melamine LPL. At present wood particle board is not readily accepted by the end users. MDF is used only by selected manufacturers. Compressed fibreboard (hardboard) is not used at all.

The use of wood veneer and veneering is not very common while the use of HPL is extensive on all kinds of furniture. Polyurethane foams and synthetic fibres are commonly used filling materials for upholstered furniture. All types of upholstery fabrics from light weight to heavy weight are used. Leather, both natural and artificial, is not used.

Use of imported hardware such as concealed hinges, piano hinges, butt hinges, metal handles and castors are popular and are easily available from importers and retailers in Bahrain.

The glues used are appropriate.

The majority of manufacturers visited were using NC type of lacquers and they preferred it because of its quick drying and relatively cheaper purchase price. Instead of NC thinner, acrylic thinners were used to dilute the NC lacquer. General purpose or automobile-paints are used instead of pigmented furniture lacquers.

8. Production planning and control

Among the furniture manufacturing companies visited, only two had some kind of production planning system. Small to medium size plants do not use a system to record the relevant production planning and control data. As soon as the order is received, the material and manufacturing time needed is estimated and on the basis of this a price is quoted. No standard and systemized procedure or documentation such as production planning sheets, route sheets, and parts lists, etc. are used to record the relevant data and to communicate the instructions to the production. A sample production planning sheet is given in Annex IV. The most widely used form of communication with the production workers is verbal instructions. In some cases verbal instructions are complemented with sketches. Only two companies were using scaled production drawings.

9. Product costing

As indicated under the previous heading "production planning and control" all the firms estimate the direct materials and labour with some degree of accuracy. Application of overhead costs in a "guesstimate" especially in the smaller workshops. Instead of using the amount of direct

material or labour or machine time as a basis of overhead calculation, a lump sum figure is used.

As in production planning, such documentation as cost sheets are not used by the majority of firms. As all the manufacturers produce to order, a standardized or modified job cost sheet could be used for recording all the cost elements for accurate cost calculation and for reference in the future.

Annex V gives a sample of a job cost sheet.

10. Quality control

Some kind of systemized quality control for raw materials and manufacturing processes which can also be called process control is exercised by only two of the firms visited. They had quality controllers who checked some of the quality features of products at certain stages of production. In all other firms there were no quality control procedures and standards. The quality achieved in the final product depended on the production workers' ability and mood to check the quality of their workmanship which is taken as a matter of pride.

II. CONCLUSIONS

1. The estimated total number of woodworking establishments, big and small, is about 50. The largest one employs about 100 workers, while the others employ between 5 and 50 workers. Estimated average capacity utilization by the industry is 30 percent.
2. Production plants are scattered in and around Manama wherever a piece of land or building is available at a reasonable cost. Most of the plant facilities are inadequate in terms of size.
3. Bahrain has a small but strong market for good quality and well designed furniture with high quality surface finish which can reflect the local taste and traditions.
4. Despite the recent stagnation in the economies of the countries of the GCC in general, a large amount of imported furniture is still consumed. It is estimated that the share of imported furniture in the total furniture market of the GCC countries is 75 percent.
5. Locally produced furniture is more readily accepted by the consumers than in the past. However, as the market is very competitive, the local manufacturers cannot sell what they produce unless the finished product is comparable to the imports both in quality of surface finish and of design.
6. Ruggedly constructed heavy furniture for living rooms and bedrooms with dominant ornaments finished in white and other pastel colours are popular among consumers with local culture and traditions.
7. Such lines as entrance furniture, wall storage units, chairs and sofas with carved show-wood, space saving furniture, modular occasional furniture, using curved laminated components and children's and baby furniture with safety features are not manufactured by the local manufacturers in any noteworthy quantities.

8. The majority of consumers prefer individual designs of their own and the furniture is regarded a status symbol. The manufacturers of furniture cater for special designs. However, ergonomic aspects of furniture design are overlooked.
9. Furniture sales in Bahrain are generally on a strictly cash basis. Payment by installments is not accepted.
10. Trained local manpower at the middle management and shop-floor level is not readily available. Existing training courses in carpentry and furniture making are geared towards vocational craft training.
11. Despite the existence of general purpose woodworking equipment in the majority of workshops, the amount of manual work is high. Use of machining and assembly jigs is not common. Little attention is paid to sanding prior to surface finishing.
12. Preventive maintenance of equipment and the control of its precision is not done regularly - in some cases never. Sharpening of cutting tools is also very much neglected.
13. Kiln dried timber is not readily available. In fact, there is only one firm which has a timber drying kiln. The use of wet timber in the production of furniture and internal joinery causes serious quality defects in the products later in use.
14. Local supporting industries to the furniture industry which are specialized in the manufacture of such auxiliary inputs as surface finishes and stains, hardware and fittings, glues, etc. have not yet been created. This will confine the producers to what is available through importers and reduce their flexibility in production and the variety of styles and designs.
15. The majority of firms do not use systematic production planning and control, product costing and quality control. Appropriate documentation for recording information and for communication between the management and the shop-floor does not exist. Proper quality control of raw materials, production processes and finished products against established standards of the furniture and wood processing industries is essential for local manufacturers in order to capture a bigger share of the market.
16. Productivity of labour is relatively low due to the non-existence of production planning and control, the use of manual working methods, non use of jigs and LCA, poor work stations, non-specialization of work, and use of inappropriate materials.
17. Most of the small workshops lack the necessary capital to invest in new machinery and equipment. However, they all indicated that they would do so if they could get loans from banks and an appropriate building or land at a favourable rate from the government. Productivity could however be increased with relatively small but appropriate investments.

18. Contacts between the manufacturers and between manufacturers and government institutions and schools are either very weak or non-existent.

III. RECOMMENDATIONS

A. Recommendations addressed specifically to the Government

1. The majority of small manufacturers visited are considering the possibilities to find suitable land or building to relocate their plants as existing buildings are inadequate in size. The feasibility of establishing a specialized industrial estate ("industrial village") with infrastructural facilities where the furniture manufacturers can be concentrated should be studied. The creation of such a village will benefit the industry through technology transfer and information exchange among firms and collective use of common service facilities such as tool maintenance, wood drying, wood impregnation, etc.
2. In order to promote mechanization and specialization, a programme should be launched by extending credit in the frame of development financing for smaller size firms to acquire new equipment and technology to enhance their competitiveness. In turn these firms will be able to turn out better products and create more demand by all classes of consumers. Furthermore, this would generate good market potentials for supporting industries to be set up in Bahrain, the more so if they could market their products in the GCC countries.
3. Vocational training institutions should play a more aggressive role in developing a sandwich or a day release course to provide technically skilled machine woodworkers through closer contacts with industry, similar training institutes in developed countries and by the introduction of more modern teaching methods and aids. New courses should enable students to specialize in one of the following areas:
 - joinery production,
 - cabinet making,
 - upholstery,
 - surface finishing.

Sanding, surface finishing and upholstery should be given more emphasis in the courses as it is these operations, when well done, that make the furniture sellable. The existing teaching workshops should be equipped with additional equipment as listed in Annex VI. An option for furniture design should be introduced in Sh. Abdulla Bin Isa Al-Khalifa Technical Secondary School.
4. Existing furniture design courses should be modified to emphasize design for industrial production and correct construction principles.
5. A regularly held trade fair for locally made furniture should be promoted. Such a trade fair will contribute to improving the quality of products, encourage the development of new and original designs which would enable the manufacturers to acquire the design capability, disseminate information and further connections between manufacturers, attract attention from neighboring GCC countries, and create awareness among the public about the capability of the local industry.

Competitions in design and quality can be organized on standard and new types of furniture which would have a leading effect in upgrading technology, improving design and new material usage.

6. Extension services in areas of equipment selection, plant layout, production planning and control, quality control and costing should be provided to those firms who do not have qualified staff through a specialized institution.
7. A nine-day technical workshop should be held to familiarize the management on new developments and available options in materials, equipment and marketing techniques, while such topics as production technology and methods, quality control, costing, production planning, surface finishing etc. will address the needs of the technicians and managers responsible for production. Details of such a workshop are given in Annex VII. UNIDO could provide assistance in providing expertise for such a seminar.

B. Recommendations addressed specifically to the industry

1. An association of furniture manufacturers should be formed to act as a legal body to look after the interests of its members and present the views and problems of industry to the appropriate organs of the government, and act as a link between government and industry. It can also act as a medium for dissemination of information to its members on the trends in industry on a global basis, export enquiries as well as a joint purchasing power of raw materials and supplies. It can also eventually set quality standards and introduce a quality labeling system.
2. Adequately qualified and experienced personnel at middle management level should be employed to attain higher productivity and efficient management.
3. Effective measures should be taken by all manufactures to overcome the rapid turnover of local workers and to maintain a stable position in the long run. To a certain extent, in-plant apprenticeship schemes could help attract unemployed youngsters.
4. Consideration should be given to the possibility of allocating jobs which require less physical strength but require attention (like sanding, staining, painting, polishing and upholstering) to female workers. This will help alleviate the local labour shortages.
5. The tendency to produce as wide a range of products as possible should be replaced by specialization. The production of a wide range of products puts much pressure on the already weak middle management and usually causes the equipment to be under-utilized. Manufacturers should ascertain their strong points and the capacity of their equipment prior to the selection of products to be manufactured. Product specialization will also reduce competition among manufacturers.
6. Innovative local designs should also be developed for products alongside with the adaptation from existing European and American

designs. This may stimulate more interest among local customers and furniture importers in the GCC region.

7. With the help and support from the government, the industry, through its association, should organize and promote technical seminars on production processes, designs, markets and marketing, management for the entrepreneurs and their managers and foremen in order to keep informed of the new developments in the sector. (Assistance from such international organizations as UNIDO and ITC can be requested through the appropriate government department.)
8. Medium size producers who have standard woodworking equipment and are involved in job order production should improve their production techniques by reducing manual work and increasing the use of jigs rather than purchase more advanced machines. Application of low cost automation (LCA) will improve their productivity.
9. When purchasing new machinery, attention should be focused not only on its usefulness and applicability but also on its serviceability and operation. Its functional requirement and scale of output need to be examined meticulously and should be of the same order of magnitude as other existing equipment. Assistance in this respect could be sought from international institutions (eg. UNIDO) through the appropriate government channels.
10. The importance of quality control should be in the mind of both the management and workers. Quality requirements of the customers and the market should be understood clearly and matched. Quality standards should first be set. When setting quality standards, customer's expectations, manufacturing capability, price and market requirements should be considered. Production management should be able to detect faults as early as possible and take appropriate measures for their correction. Quality awareness should be created among workers and employees. They must be made to realize that only quality products can ensure the firm's survival.
11. Whenever and wherever possible, simple material handling aids such as pallets and hydraulic pallet transporters should be used by all firms. The non-use of such aids affects productivity negatively and often keeps the equipment idle. No value is added in moving pieces of wood, and internal transport costs should be kept as low as possible through small investments in materials handling equipment.
12. Those designs and articles that are not suited to the existing production capability of the plant, especially in the case of larger plants, should not be manufactured for economic reasons. Special request of customers should be met through subcontracting.
13. Maintenance of machinery, equipment and cutting tools should be given more importance by the management. Regular and proper maintenance increases the useful life of equipment and tools, ensures precision and consistency of product quality and avoids disruption of production.
14. Plant layout should be studied in depth to ensure a smooth flow process of production.

15. Low-cost dust collection systems should be used to improve working conditions quality of machining, life of equipment and tools and the overall working conditions of the labour force. (A healthier atmosphere might reduce labour turnover.)
16. Protective guards should be used on all machinery which has fully or partially exposed cutters.
17. Properly kiln dried timber should be used in the production of furniture and internal joinery to avoid quality problems developing in finished products. The supply of kiln dried timber will also lift an unnecessary financial burden off the producers and the financing of large stocks of timber during air drying can be avoided. The wood's moisture content should be checked before use.
18. Appropriate sanding equipment should be used for both the solid wood and panel parts. A thorough sanding is essential to obtain a smooth surface leading to good surface finishing.
19. Varnishing, painting and polishing of products should be carried out with appropriate equipment in an area where there is no dust. This applies equally to the drying of finishes. It is necessary to install water-wash spray booths and drying chambers to eliminate the polluted air and to make the working environment harmless to the workers.
20. A joint marketing, promotion and confidence building campaign should be started by the industry through their yet to be formed associations to convince customers and public authorities to buy locally made furniture and joinery. It will take time until local manufacturers prove their ability to produce in time the required designs with the expected quality in the required quantity.
21. Besides conventional raw materials modern raw materials such as wood based particle board, hardboard and MDF overlaid with natural veneers, melamine LPL's and finish foils in various designs should be used more widely. Through appropriate jointing and processing techniques and appropriate fittings these materials are fit for most purposes.

ANNEX I

JOB DESCRIPTION

SI/BAH/89/801/11-03

Post title: Furniture industries adviser

Duration: 1.2 months (36 days)

Date required: As soon as possible

Duty station: Manama (Bahrain), with possible short trips to the GCC countries.

Purpose of project:

To provide high level policy advice of trouble-shooting nature with regard to the present problems faced by the sectors selected (building materials, aluminum and furniture production) such as over-capacity, marketing problems, product diversification, backward and forward linkages of production lines including management and training.

Duties:

The adviser will be assigned to the Ministry of Development and Industry to assist its senior managers and engineers in analyzing and reporting on the development possibilities of the furniture and joinery industries sector. In particular, the adviser will be expected to:

1. Analyze and report on the industrial strategies and policies dominating the development conditions including those related to incentives, manpower development and restructuring of the sectors in question, taking into consideration the regional approach and possible linkages within the different sub-sectors.
2. Assess the trends in the furniture and joinery industries in the region, with the aim of identifying the problems facing the sector at national and regional level, as well as to elaborate forecasts for the future trends and demands in the sector.
3. Develop new product ideas to complement the existing production or to augment the output of the furniture and joinery sectors and update their marketing policy.
4. Give proposals for a strengthening of the quality control system in support of the local production in order to enhance the marketing efficiency locally, regionally or internationally.
5. Assess the training situation in selected enterprises and advise on how to improve both the technical and the commercial management.

6. To the extent possible, provide ad hoc assistance to the local furniture and joinery industries.

7. Elaborate a report on findings and recommendations, including proposed remedial action for the furniture and joinery sector.

Qualifications: Wood technologist or engineer with experience in the production of furniture and joinery in developing countries at policy making level.

Language: Arabic preferred, English acceptable.

Background information:

After a decade of steady growth fuelled by oil revenue in the 1970s, more recent economic growth remains subdued. Despite a slowdown in economic activity, the country's industrial base continues to widen along the path of economic diversification, necessitated by the depleting oil reserves and falling hydrocarbon revenues. Now the economy has been severely affected by the depressed international oil prices and the GNP is estimated to have fallen in real terms during recent years. As a consequence, the Government has encouraged the establishment of small and medium enterprises to broaden the industrial base. To some extent this is helping to mitigate the economic difficulties. The opening of the causeway joining Bahrain with mainland Saudi Arabia is already having a marked effect on the economy.

The impact of the fall of oil prices has forced the government to adopt a policy of diversification. The four year economic and social development programme adopted by the government of Bahrain started the following correctives:

- Diversify the economic base away from an oil-based economy into industry and introducing new industries and joint ventures;
- Optimize the use of the remaining resources;
- Increase the degree of self-sufficiency in food production;
- Expand and strengthen public services;
- Develop human resources.

The Government encourages and supports the involvement of the private sector and is calling upon it to take the leading role in the development of the manufacturing industry.

At present, the manufacturing sector comprises seven large projects and approximately 189 small/medium scale concerns.

The large companies (mainly with GCC government involvement and in partnership with large overseas companies) are in oil refining, aluminum petrochemicals, iron and steel and ship repairs. They all have international market access.

The small and medium scale private companies produce construction materials, engineering products, food products, plastics, chemicals and furniture. They sell predominantly on the national market. The recession in the Gulf region and reduction in government spending, as a consequence of the oil price fall, have placed many of them in difficult trading positions.

The 13 furniture plants have contracted significantly in the past three to four years, both at the national and the regional level due to the reduction in oil revenues. The results of this situation is that there is a considerable overcapacity.

Another fact is that 70 percent of all industrial firms in Bahrain employ less than 30 employees. This situation means that many of these companies lack the management and financial resources to engage in product development, export marketing and planning and cannot avail themselves of the benefits of economies of scale. In analyzing the market in which the private companies are selling, one finds that despite the very small size of the Bahraini market, only 31 percent of the private companies are exporting their products and even those companies which are exporting, with the exception of the major companies are still exporting only a small proportion of their production and mainly to GCC markets. The government of Bahrain has identified sectors of building materials, aluminum processing, food and food processing and furniture as suffering from overcapacity with accompanying problems in marketing (both internal and external), efficiency and in product development. It therefore wishes to undertake a pre-diagnostic rehabilitation survey with a view to examine and analyze the factors limiting or hindering the mentioned sectors from achieving their full potential and with the purpose of advising, inter alia, on remedial action. The government of Bahrain has consequently requested UNIDO's assistance in providing three experts who will cooperate with national counterparts to achieve the objectives indicated so that further action may be determined.

ANNEX II

LIST OF PERSONS MET

A. United Nations Development Programme, Manama

- Mr. Ahmed Botan Dhakkar, Officer in Charge
- Mr. Guiseppe Musico, JPO

B. Industrial Development Centre,
Ministry of Development and Industry

- Mr. Sager S. Shaheen, Director
- Mr. Hmood Khalifa Al-Khalifa, Head, Industrial Promotion Section
- Mr. Abdul Aziz Ali Al-Ka'abi, Head, Strategic Planning
- Mr. Lo'ay Mohd. R. Al-Tajer, Industrial Engineer, Strategic Planning Unit
- Mr. Tareq Ishaq Kooheji, Senior Financial Analyst, Project Evaluation Department
- Mr. Is'haq Amin, Mechanical Engineer, Strategic Planning Unit.
- Mr. N. Ravi Shankar, Adviser.
- Mr. Brian Garvan, Adviser
- Mr. Akbar Jaffari, Adviser

Sh. Abdulla Bin Isa Al-Khalifa Technical Secondary School

- Mr. Mohammed Salman Kamal, Headmaster

Al-Jaberiah Technical Secondary School

- Mr. A. Hameed Bucheeri, Headmaster.
- Mr. Ahmed Yousif, Teacher.

Directorate of Manpower Development,
Ministry of Labour and Social Affairs

- Mr. Majid Moh'd Al-Binali, Principal, Vocational Training Centre.

C. Furniture and Joinery companiesGazelle Furnishing Company W.L.L.

- Mr. Michael Donald, Managing Director

Alawi Furniture Works

- Mr. Mohamad Yousif Alawi, Proprietor
- Mr. Abdul Ghaffar Alawi, Manager

Bahrain Bedding Factory (Al-Ansari)

- Mr. A. Jaleel Al-Ansari, Director

Al Ma'awdah Est. for Construction Materials

- Mr. Qassim Hamad Al Ma'awdah, Proprietor

Al-Mukhaeq Furnishings

- Mr. Yousif A. M. Al Mukhareq, Managing Director
Jalal Furniture Co.
- Mr. Ali Hassan Habib Al Saffar, Managing Director
Asia Trading Co.
- Mr. Abdul Rahman Hassan Taki, Director
Green Glove Furniture Co.
- Mr. Abdulla Al Koheji, Manager
Bahrain Estate Co.
- Mr. Sulaiman Y. Hansiya, Director
Usman C. Baluch Co.
- (Sales staff)
Bukanan Furnishing Co.
- Mr. Abdul Hameed Ali Bukanan, Managing Director
Afaq Furniture Workshop
- Mr. Ahmed Yousif, Proprietor
The Kitchen Co.
- Mr. Jaffer Ebrahim Ahmed, Sales Manager
Al-Salah Furniture Factory
- Mr. Mohammed S. Al Salah, Director
Al-Aamer Carpentry Workshop
- Mr. Abdul Wahab Al-Aamer, Proprietor
Kooheji Furniture Co.
- Mr. Jamal Kooheji, Director
Tylos Furniture Factory (BLICO)
- Mr. Hamed Faleh Al-Abdulla, General Manager
- Mr. Hussain A. M. Al Leathy, Technical Manager
- Mr. Seena Rahma Jaber, Sales Manager

Al Shomely Furniture Workshop

- Mr. Mohamed Essa Shomeli, Proprietor

Safa Co. Ltd.

- Mr. Shawqi Adham, Manager, Hardware Division
- Mr. Fouad Al Adham, Manager, Timber Products Division

Abbas Biljeek and Sons

- Mr. Abbas Biljeek, Director

Biljeek Decor Co.

- Mr. Abbas Biljeek, Director

A. Al Nooh Co.

- Mr. Hassan Al Nooh, Manager

ANNEX III

NOTES ON COMPANIES AND TRAINING INSTITUTIONS VISITED

1. Gazelle Furnishing Co.
P.O.Box 2249
Manama, Bahrain

Founded in 1984 as a furnishing and upholstery company. Run by a British expatriate. Currently suppliers and manufacturers of custom made curtains, upholstered bed supports, head boards, sofas, chairs for customers in the upper segment of the market, such as banks, foreign companies, expatriates and embassies.

Total workforce: 9 expatriates for curtain sewing and upholstery, wooden frames of upholstered furniture are supplied by subcontractors.

2. Alawi Furniture Works
P.O.Box 313
Manama, Bahrain

One of the oldest carpentry workshops in Bahrain. Manufactured items include custom designed furniture items such as tables, chairs, wardrobes, beds and joinery items such as solid wood doors, windows with arches and grilles, partitions as well as carved woodwork for palaces, villas and mosques.

Workforce: 30 expatriates.

Equipment: Good quality, German origin.

Comments: Existing premises are inadequate in size. The firm is very strong in the manufacture of specialty items for palaces, villas and mosques.

3. Bahrain Bedding Factory (Al-Ansari):
P.O.Box 5648
Manama, Bahrain

Produces more than 200,000 mattresses per year using springs manufactured in house. As a complementary line, upholstered bed supports, head boards, side tables and sofas are also produced on a smaller scale. Claimed to be the only mattress factory in the GCC region. About 60% of the total mattress production is exported. The largest market is Saudi Arabia.

Comments: Good management combined with good production control ensures worker satisfaction and products meeting contractual requirements both with respect to quality and delivery dates.

4. Alma'awdah Establishment for Construction Materials:
P.O.Box 1154
Manama, Bahrain

Established as a joinery factory in 1989 to produce solid and panel doors and windows. The existing equipment includes such specialized machines as a wide-belt sander, a four-side planer/moulder, an automatic moulder (all

of Chinese- Taiwan province - origin), as well as standard woodworking equipment of Italian origin.

Workforce: 14 expatriates.

Comments: The plant is currently under-utilized. Estimated capacity utilization 20 per cent. Main problems are inadequately trained workforce for such relatively sophisticated equipment, depressed market, expensive sawnwood and plywood. Quality level: low.

5. Al-Mukhareq Furniture Co.
P.O.Box 348 and 2949
Manama, Bahrain

Manufacturer of upholstered chairs, sofas as well as HPL laminated cupboards, bedroom furniture and baby cots. Selling also imported furniture alongside with their own production. Only the showroom was visited.

Workforce: 31 expatriates, 2 Bahrainis.

Comments: Quality level of own products is low, addressing the low income customers. Main problems are claimed to be inadequate workshop spare and restrictions on expatriate labour.

6. Jalal Furniture
P. O. Box 5512
Manama, Bahrain
(Mr. Ali Hassan Habib Al-Saffa)

Manufacturer of mainly bedroom and living room furniture. products are of medium to high quality when compared with other local manufacturers, intended for medium income group of consumers. Estimated capacity utilization is about 80%. Production plant is equipped with universal woodworking equipment of good quality and in good condition.

Workforce: 19 expatriates and 6 Bahrainis.

Comments: One of the few well managed companies which maintain a constant quality level. Existing premises are inadequate in size, especially the carpentry and surface finishing sections. Nitro cellulose thinners should be used for N.C. lacquer thinning instead of acrylic thinners.

7. Tylos furniture factory (BLICO group)
P. O. Box 26700
Manama, Bahrain.
(Mr. Hamed Faleh Al Adulla, General Manager
Mr. Hussain A. V. Alleathy, Technical Manager
Mr. Seena Rahma Jaber, Sales Manager)

Belongs to Bahrain Light Industries Company (BLICO). Started its operations in 1984. Claimed to be one of the largest furniture factories in the GCC region. Total area of the premises is 12,000 sq. m. Has four distinct sections/lines: Panel processing line, solid wood processing line, surface finishing line, upholstery line. Equipment suitable for production in large series. Origin of equipment" Germany and Italy.

Currently manufacturing to customer orders and specifications as well as to own designs such as office furniture, kitchen furniture, dining room, bedroom furniture and upholstered furniture.

Workforce: 64 expatriates, 30 Bahrainis.

Comments: large premises, good quality equipment and qualified personnel should enable them to produce average quality furniture in series. however, market share both in Bahrain and in GCC region should be increased drastically.

8. Usman C. Baluch & Co.:
P. O. Box 64, Manama Bahrain

One of the largest furniture importers in Bahrain. Quality of products is medium to high. Showroom well stocked and organized.

9. Green Glove Co.:
P. O. Box 169, Manama, Bahrain
(Mr. Abdulla Al-Koheeji, Managing Director)

Operates as importer, retailer and manufacturer of domestic furniture, excluding kitchens. Quality level and prices are low. Their workshop was not visited by the expert. According to the managing director's statements, they have universal woodworking machinery.

Workforce: 18 expatriates and 2 Bahrainis.

10. Bahrain Estate Co.:
P.O.Box 805
Manama, Bahrain
(Mr. Sulaiman, Y. Hansiya, Director)

Importer and through its showrooms, retailer of domestic furniture of medium quality.

11. Asia Training Co.
P.O.Box 394
Manama, Bahrain
(Mr. Abdul Rahman Hassan Taki, Director)

Importer and, through its showroom, retailer of office furniture of low to medium quality.

12. Bukanan Furnishing Co.:
P.O.Box 536
Manama, Bahrain
(Mr. Abdul Hameed Ali Bukanan)

One of the largest importers, retailers and manufactures of domestic and office furniture in Bahrain. Products are presented to customers in a large, multi-story showroom.

The existing production workshop is equipped with universal machinery for processing solid wood and standard upholstery equipment.

Establishment of a large workshop with modern equipment with separate solid wood processing, panel processing, upholstery and finishing lines is in progress. The surface area of the new plant will be 3000 sq. meters. The quality of existing products is medium to high.

Workforce. 27 expatriates, 3 Bahrainis.
Estimated capacity utilization of the existing workshop: 60%

Comments: The company has a good reputation. Management's positive attitude towards quality and new developments will enable them to become a leading furniture manufacturer in Bahrain. The expert made suggestions for the improvement of the new plant layout and equipment selection.

13. Afaaq Furniture workshop:
P. O. Box 24833
Manama, Bahrain
(Mr. Ahmed Yousif, Proprietor)

A small workshop producing various decorations, fitted furniture and joinery to customer orders only.

Workforce: 5 expatriate carpenters.

Workshop established in 1987. Have only a few stationary woodworking equipment.

Comments: The proprietor is professionally well qualified but needs bank loans to expand and mechanize the plant.

14. Al-Shomeli Furniture Workshop
P. O. Box 570
Manama, Bahrain
(Mr. Mohamed Essa Shomeli)

Manufacturer and retailer of domestic furniture such as bedrooms, kitchens, wall units, divans, etc. for the low income customers. Production equipment consists of portable machines.

Workforce: 10 expatriates working on a two shift basis.

Comments: Urgently needs upgrading of construction details of furniture and advice on selection of production equipment. Advice as to most essential additional equipment and use of dowels and jointing hardware given by the expert.

15. The Kitchen Co.:
P.O.Box 530
Manama, Bahrain
(Mr. Jaffer Ebrahim Ahmed, Sales Manager)

One of the largest importers and retailers of high quality system kitchens.

16. Al Salahy Furniture Factory
 No. 1182 Road, 133, Toobli 701
 Manama, Bahrain
 (Mr. Mohammed S. Al Salah, Director)

Manufacturer of doors, windows and fitted furniture for the construction industry and custom made furniture for high income customers. The production plant is well equipped with modern woodworking machinery such as a panel saw, double end tenoner, an edge bander, a wide-belt sander, a laminating press, paint spraying equipment and an assembly press.

Workforce: 55 expatriates.

Estimated capacity utilization 30%

Comments: One of the larger capacity factories, but greatly under-utilized because of the decline in the construction industry.

17. Al-Aamer carpentry Workshop
 P.O.Box 22005
 Muharraq, Bahrain
 (Mr. Abdulwahab Al-Aamer, Proprietor)

Manufacturer of bedroom and kitchen furniture using solid wood, blockboard, and HPL. Quality level is low. Workshop has one five-operation universal woodworking machine.

Workforce: 4 expatriates.

18. A.J.M. Kooheji and Sons
 P.O.Box 74
 Manama, Bahrain
 (Mr. Jamal Kooheji, Director)

Importer, manufacturer and retailer of domestic furniture of medium quality. Production consists mainly of upholstered furniture items such as armchairs, sofas and divans. Other items manufactured are dining chairs, dining tables, coffee tables, etc. Designs are mostly copies of American ones. Apart from American designs for their showroom, special designs are also produced at the request of customers. The existing production workshop is very small and rather congested. Equipment currently used consists of a universal woodworking machine and upholstery equipment.

Workforce: 18 expatriates.

Comments: This firm also enjoys a good reputation among customers and is planning to expand their furniture production plant by moving to new premises and by purchasing additional equipment.

19. Safa Co. Ltd. (Building Materials Division)
P.O.Box 1920
Manama, Bahrain
(Mr. Fouad Al Adham, Manager)

Importer and retailer of all kinds of timber products. They also have a small wood machining shop to prepare parts and components for the customers who buy the material from them.

Workforce: 7 expatriates

Comments: Their main problem is difficulty in getting kiln dried timber and non-existence of a timber drying kiln.

20. Safa Co. Ltd. (Hardware Division)
P.O.Box 1920
Manama, Bahrain
(Mr. Shawqi Adham, Manager)

Importer and retailer of portable and small size woodworking equipment, furniture and joinery hardware of medium and high quality.

21. A. Al-Nooh & Co.
P.O.Box 5389
Manama Bahrain
(Mr. Hassan Al-Nooh, Managing Director)

Importer of building materials, logs, timber and wood based panels as well as sawmillers, wood machinists. Through his well equipped saw doctoring centre, provides tool sharpening services to the woodworking companies in Bahrain.

In terms of equipment inventory, this company has the second largest wood processing complex in Bahrain. Production lines include a sawmill, a moulding/routing/turning department, and general carpentry shop where they produce mouldings, parts and components according to customer specifications, especially for construction and decoration companies.

Workforce: 23 expatriates and 2 Bahrainis.

Comments: Claimed to be the only sawmiller on the island. New buildings and reorganization of workshops are in progress.

22. Abbas Biljeek and Sons
P.O.Box 308
Manama, Bahrain
(Mr. Abbas Biljeek, Director)

This company imports and retails all kinds of woodworking machinery and tools. One of the largest stocklists of such equipment on the island.

23. Biljeek Decor Co.
P.O.Box 308
Manama, Bahrain
(Mr. Abbas Biljeek, Director)

Manufacturer of all kinds of wooden mouldings, trims, etc. for decoration purposes. The workshop is very small and equipped with standard woodworking machinery.

Workforce: 10 expatriates.

Comments: Small-scale operation supplying specialty work to a small segment of the construction market. Stable business due to good reputation.

24. Sh. Abdulla Bin Isa Al-Khalifa Technical Secondary School
P.O.Box 33112
Manama, Bahrain
(Mr. Mohammed Salman Kamal, Principal)

Oldest technical secondary school in Bahrain founded in 1936. Among others, it runs a two-year vocational training in carpentry for school drop-outs. During the 1989-90 school year, the total number of students attending the carpentry course was 86. Training is conducted in two shifts. The training workshop is equipped with good quality standard woodworking equipment. However, there is no equipment for surface finishing and upholstery. During the two-year course, the following subjects are taught:

- Technology of wood and wood based materials.
- Technical drawing.
- Material and cost estimating.
- Woodworking machines and tools.

Comments: Teachers are enthusiastic about what they teach to students. It is a good skill training course.

25. Al-Jaberiah Technical Secondary School:
(Mr. Hameed, Bucheeri, Principal
Mr. Ahmed Yousif, Teacher)

This technical secondary school has the same status as the Sh. Abdulla Bin Isa Technical Secondary School, and runs the two-year vocational training course in carpentry. Its training workshop has more or less the same woodworking equipment as the other school. Currently, the number of students attending the carpentry course is 30, of which 18 are in the second year.

26. Vocational Training Centre
P.O.Box 32333
Manama, Bahrain
(Mr. Majid Moh'd Al-Binali)

It runs a day craft training programme in technical fields excluding carpentry and upholstery for graduates from technical secondary schools, and evening vocational training programmes including carpentry and upholstery for school drop-outs.

The training workshop is equipped with standard woodworking machinery of good quality. There are three full-time instructors for the carpentry course. The current number of students in the evening course is 14.

ANNEX IV
Production planning sheet for a small-scale
furniture manufacturing firm¹

1. Job order No. _____ 2. Customer _____ 3. Address _____ 4. Contact _____ _____ _____	5. Date received _____ 6. Volume needed _____ 7. Other information _____ _____ _____
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8. Product specifications 8.1 Standard product lines Additional specifications (moisture content, fi- nishing modifications etc.) Conditions of delivery	8.2 Made-to-order products Product design/technical drawing Breakdown of parts/ components and fittings Additional specifications (type of materials, finishing, etc.) Conditions of delivery
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9. Materials list	Unit	Quantity /piece	Total quantity required
1. Wood and lumber materials			
2. Upholstery materials			
3. Hardware			
4. Other			

¹ Source: Production Management for Small- and Medium-scale Furniture Manufacturing Firms in Developing Countries, Eduardo Q. Canela, United Nations, New York, 1983, pp. 103-104.

ANNEX VI

LIST OF ADDITIONAL EQUIPMENT RECOMMENDED FOR EACH OF THE
EXISTING TRAINING WORKSHOPS

ITEM	QUAN- TITY	EQUIPMENT DESCRIPTION AND SPECIFICATIONS
1	1	<p>Sanding machine for solid wood parts, complete with dust suction fan, 1 rigid and 1 pneumatic sanding drum.</p> <p>Length of sanding drums: 250 mm Diameter of rigid drum: 100 mm Diameter of pneumatic drum: 200 mm Power of sanding motor: 1.5 HP Power of fan motor: 0.75 HP</p>
2	1	<p>Wide belt sanding machine complete with one combined universal sanding head for calibrating and surface sanding and dust extraction fan.</p> <p>Max. sanding width: 1300 mm Feed speed (variable): 7-18 m/min. Power of sanding motor: 7.5 Kw Max. workpiece thickness: 150 mm.</p>
3	1	<p>Manual edge banding machine for straight and curved panel edges, complete with hot melt gluing unit and trimming unit.</p> <p>Max. workpiece thickness: 50 mm Min. workpiece thickness: 5 mm Min. edge radius: 25 mm. Feed Speed: 7 m/min. Total installed power: 2 kW</p>
4	1	<p>Air compressor, single stage type, complete with horizontal air receiver tank.</p> <p>Max. air pressure: 10 bar Max. working pressure: 7 bar No. of cylinders: 4 Free air delivery: 960 lit/min. Effective air delivery: 750 lit./min Tank capacity: 500 liters Power of motor: 7.5 kW</p>
5	1	<p>Set of upholstery equipment and hand tools including:</p> <ul style="list-style-type: none"> - 1 pneumatic staple gun - 1 industrial sewing machine - 1 set upholsterer needles (straight and curved) - 1 cloth cutting scissors

6	1	<p>Lacquer and paint spray booth with dry filters or water-wash back wall, complete with exhaust fan (and water pump if water-wash system)</p> <p>Working width: 2500 mm Working height: 2000 mm Air suction capacity: 8000 m³/h. Power of suction motor: 2,5 kW.</p>
7	1	<p>Conventional compressed air lacquer and paint spray gun with die-cast aluminum alloy body complete with four different spray nozzles each of 1.5 mm, 1.7, 2.0 and 2.5 mm size, air filter, air pressure regulator, 5m reinforced high pressure rubber hose and quick release couplings.</p>
8	1	<p>Universal tool sharpening machine complete with liquid cooling system and attachments for grinding of TCT circular saw blades, cutter knives, boring bits, router bits, profile knives.</p> <p>Max. grinding diameter: 500 mm Max. knife length: 330 mm Max. grinding wheel diameter: 200 mm Power of grinding motor: 0,75 kW Power of pump motor: 0.15 kW</p>

ANNEX VII

TENTATIVE TOPICS AND PROGRAMME FOR A WORKSHOP
ON FURNITURE PRODUCTION TECHNOLOGYA. Raw materials and their uses:

1. Solid wood:
 - (a) Hardwoods
 - (b) Softwoods
 - (c) Seasoning
 - (d) Grading
 - (e) Defects.
2. Wood-based panels:
 - (a) plywood
 - (b) Blockboard
 - (c) Lamin board
 - (d) Fibreboard
 - (e) MDF
 - (f) Particle board

B. Ancillary materials and their uses:

1. Varnishes
2. Paints
3. Stains
4. Thinners
5. Glues
6. Hardware
7. Veneer
8. Surface laminates (HPL and LPL)
9. Upholstery materials.

C. Joints and relevant hardware:

1. In solid wood
2. In wood-based panels
3. Hardware for mounted furniture
4. Hardware for de-mountable furniture

D. Equipment for solid wood processing:

1. Sawing
2. Planing
3. Moulding
4. Turning
5. Carving
6. Sanding
7. Assembling
8. Surface finishing

E. Equipment for panel processing:

1. Cutting
2. Calibrating

3. Veneering
4. Sizing
5. Edge banding
6. Dowel hole drilling
7. Surface sanding
8. Surface finishing
9. Assembling

F. Equipment for surface finishing:

1. Conventional air spray guns
2. Airless spray guns
3. Air mix spray guns
4. Electrostatic spray guns
5. Dry filter spray booths
6. Waterwash spray booths
7. Spray rooms and drying rooms
8. Miscellaneous spray-room equipment (lighting, exhaust fans, drying racks, etc.)
9. Surface finishing lines
10. Curtain coaters
11. Continuous drying tunnels
12. Roller coaters
13. Compressors and compressed air systems.

G. Woodworking tools and cutters:

1. Circular sawblades
2. Bandsaw blades
3. Planer knives
4. Cutter blocks and heads
5. Boring bits
6. Cutting knives for hand tools

H. Production jigs:

1. Machining jigs
2. Assembly jigs

I. Product development:

1. Technical product design
2. Preliminary technical drawings
3. Prototype construction
4. Evaluation and testing of prototypes
5. Finalization of prototype and technical drawings.

J. Production drawings:

1. Exploded views
2. Perspectives
3. Joint drawings
4. Parts drawings

K. Production planning and control:

1. Production methods
2. Production programmes
3. Production plans
4. Documentation for production planning
 - (a) for batch production
 - (b) for serial production
5. Production control
6. Material estimating and stock control
7. Cost estimating and cost control

L. Quality and process control:

1. Quality control of raw materials
2. Quality control of ancillary materials
3. Process control
4. Quality control of finished products
5. Quality control equipment

M. Equipment selection:

1. Identification of products and processes
2. Determination of quality and quantity
3. Determination of production methods
4. Evaluation of options
5. Determination of machine specifications
6. Techno-economic analysis of investment
7. Evaluation of bids and offers

N. Plant layout

1. Determination of space required
2. Block layout
3. Detailed layout

O. Markets for furniture in the Gulf:

1. Bahrain
2. Qatar
3. Oman
4. U. A. E.
5. Saudi Arabia
6. Yemen
7. Kuwait

P. Marketing of household furniture:

1. Characteristics of furniture marketing.
2. Overview of the four P's of marketing
3. The marketing department
4. Marketing aids
5. Promotional materials and activities
6. After sales services.

AFTERNOON		MORNING		TIME
				DAY
DISCUSSION PERIODS	Ancillary materials and uses	DISCUSSION PERIODS	Raw materials and uses	1
	Equipment for solid wood processing		Furniture joints and hardware	2
	Equipment for surface finishing		Equipment for panel materials processing	3
	Production of jigs		Cutters and cutter selection	4
	Production drawings		Product development and design	5
	Quality and Process control		Production planning and control	6
	Plant layout		Methodology for equipment selection	7
	Marketing of household furniture		Markets for furniture in the Gulf	8
	Drafting of a 'Plan of Action'		Round table discussion with industry representatives	9
LUNCH BREAK				