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STRENGTHENING THE TECHNICAL AND MANAGERIAL CAPACITIES OF THE CARPENTRY COOPERATIVES IN MUKALLA AND SEIYUN

SM/PDY/87/005

THE REPUBLIC OF YEMEN

Technical report: Review of the present situation in the cooperatives, work plan and training programme*

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

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* This document has not been edited.

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EXPLANATORY NOTES

A full stop (.) is used to indicate decimals.

A comma (,) is used to distinguish thousands and millions.

Reference to Dollars ($) is to the United States Dollar, unless otherwise stated.

The monetary unit of the Republic of Yemen is the Yemeni Dinar (YD). During the period covered by this report, the official exchange rate was 0,342 Yemeni Dinars to US$ 1,-.

The contraction "CSCC" has been used for the Coastal Strip Carpentry Cooperative, and "CC Seiyun" stands for the Carpentry Cooperative Seiyun.

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INTRODUCTION

The project SM/PDY/87/005, entitled "Strengthening the Technical and Managerial Capacities of the Carpentry Cooperatives in Mukalla and Seiyun" was established in order to support the Cooperatives' transition of manufacture of furniture and joinery from handicraft to developed industrial production methods.

The project document for this project was signed on 10 April 1989 by the Government of the People's Democratic Republic of Yemen (PDR Yemen), the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organization (UNIDO) as the executing agency. The Government agency coordinating the project is the Ministry of Industry, Mukalla Branch.

The furniture and joinery production expert assigned to the project as Chief Technical Adviser, Radmilo Malis, carried out his first three-month mission starting from 13 March to 12 June 1990. His duties are given in Annex I.

Originally the mission has been planned for two months, with possibility of extension by another month. Due to the required work and at the request of the counterpart, it was extended by this one month.

The expert, acting as the project's CTA, coordinated the work of the internationally appointed team, consisting of a cost accounting expert and two United Nations Volunteers.

The immediate objectives of this project are formulated in the project document as follows:

> "1. To introduce suitable management systems, techniques and methods to develop self-sustaining management capacities capable of formulating and updating simple marketing plans, cost analysis and cost accounting, applying new concepts of production planning, organization, quality and stock control to the Cooperatives and importing raw materials at the lowest possible cost.
>
> 2. To introduce new technologies and techniques and train the technical cadres of the carpentry Cooperatives in order to develop the human and technical capacities to independently introduce product and production improvements and innovations.
>
> 3. To increase the labour productivity of the manual labourers of the Cooperatives, as well as their capacity to adapt to product and production improvements and innovations through training in best woodworking skills, machine use and machine maintenance."

During this mission, the expert's work has been directed mainly towards making a survey and an assessment of the existing production situation in the two Cooperatives, programming work for the execution of the project, working out a training programme for all training activities included in the project work plan, preparing training manuals, conducting the training courses, improvement the product line, improving the manufacturing methods, and improving the workshop layouts.

Mukalla was the project site, but the expert has been requested to travel to Aden, Seiyun and some other places around Mukalla and Seiyun where the Cooperatives have their production units.

This reports consists of the following five sections:

1. Background of the project.
2. Findings.
3. Major activities.
4. Conclusions and recommendations
5. Annexes.

1. PROJECT'S BACKGROUND

The first technical assistance to the woodworking sector in the Hadhramout Governorate, People's Democratic Republic of Yemen, was provided in 1981. The project, "Training in Management and Efficiency Improvement in Industries" (PDY/81/006) provided a consultancy mission to conduct a survey of the manufacturing facilities of the Coastal Strip Carpentry Cooperative. The findings indicated the urgent need for technical assistance in order to consolidate the operations of its three production units located in Mukalla, Ghail Bawazer and Shahr. Thus, in 1982, a three-month mission under project RP/PDY/82/003 was undertaken to review this issue. This mission drew up the blueprint for a central workshop in Mukalla and advised on the necessary technical assistance to implement the plan. The current project is aimed at following up on the previous missions and providing technical assistance to the Coastal Strip Carpentry Cooperative in Mukalla and the Carpentry Cooperative in Seiyun.

The Coastal Strip Carpentry Cooperative in Mukalla was established in 1973 when 150 members associated their resources to fund the Cooperative.

Two Cooperatives operate in the Hadhramout Governorate. The Coastal Strip Carpentry Cooperative has three production units, while the Carpentry Cooperative in Seiyun has four workshops located in Seiyun, Trim, Shibam and Al-Hawta. These are small-scale production units, maintaining the typical handicraft methods of manufacturing and supplying their immediate surroundings with furniture and joinery items.

Almost all items are produced on demand and according to the customers' specifications. Production planning is totally dependent on the intake of the customers' orders. A couple of attempts to produce some items on stock were not successful because such production was not supported by adequate marketing activities. The lack of any kind of standardization and own product line results in many different sizes and designs for various products dictated by customers. Due to the lack of professional and technical know-how, the Cooperatives have only been able to achieve limited product and production innovation, thus retaining low levels of labour productivity and low quality of products.

As the wage rates in both Cooperatives are directly linked to their productivity, they have hardly increased over the last five years - in Seiyun they have actually decreased.

The Coastal Strip Carpentry Cooperative has 373 employees, while the Carpentry Cooperative in Seiyun has 187 employees. They are all share-holders

but individual workers own a varying number of shares. However, they all have equal voting rights. The sales volume did not change significantly during the last 10 years. In 1989, it amounted to YD 1,294,000 in CSCC compared with YD 1,245,842 in 1987 and YD 1,008,382 in 1981. The sales volume of the CC Seiyun amounted to YD 710,000 in 1989 compared with YD 644,348 in 1987 and with YD 455,007 in 1982.

The Cooperatives are exempt of any kind of Government taxation.

In general both Cooperatives produce low quality products at high costs. This can be attributed mainly to: poorly equipped workshops with antiquated equipment which is not properly utilized because of inadequate production methods, to low labour productivity and to the extensive use of expensive raw materials.

The present development strategy of the People's Democratic Republic of Yemen focuses on strengthening the industrial infrastructure; it concentrates on increasing the utilization of existing productive capacities through the rehabilitation of selected factories, and improving the production and managerial capacities in industrial enterprises. This project falls under these categories.

The project's budget is US$ 346,450 from the UNDP's Special Measures Fund for Least Developed Countries, in addition to the Government's inputs (in kind) of YD 20,000. The project is planned to last two years, in which period the existing artisanal manufacture should be changed to an industrial production system.

As originally planned in the project document, the technical assistance should be provided by three experts: a furniture and joinery production expert, a cost accounting expert and a marketing expert, for a total of 18 w/m and by two UN Volunteers: a wood processing engineer and a carpenter, for a total of 48 w/m.

After making a survey and an assessment of the present situation in the Cooperatives and in the local market, the CTA proposed a replacement of the three months consultancy in marketing by a consultancy in maintenance of woodworking tools with the same duration. Assistance in the tool maintenance and training tool sharpeners appears to be more beneficent for the counterpart than a consultancy in the marketing field, where present supply cannot meet demand of consumers and where competition does not yet exist. At the same time, it was agreed that some elementary consultancy in marketing will be provided by the cost accounting expert within his three month mission.

The project's implementation started in January 1990 when the two UN Volunteers arrived in PDR Yemen, and intensive work has begun in the middle of March 1990, when the CTA and the cost accounting expert started their missions.

2. FINDINGS

The findings presented in this report are the results of a survey done by the expert in the two Cooperatives, complemented with some information collected and used by the cost accounting expert and the UN Volunteers. The information used in this report and the assessment made by the expert are

aimed at providing valuable arguments for the improvements foreseen in the project document.

For more clarity the findings are broken down into twelve topics as follows:

2.01 Assessment of the local market
2.02 Production programmes of the Cooperatives.
2.03 Materials
2.04 Equipment
2.05 Plant layouts and production methods.
2.06 Organization and planning of production
2.07 Quality of products
2.08 Working conditions and safety
2.09 Maintenance of equipment
2.10 Financial results
2.11 Cadres
2.12 Management

2.01 Assessment of the local market.

The Cooperatives supply their local markets which are in the vicinity of the production units.

In both Mukalla and Seiyun many new housing units are being erected both by the Government and the private sector. Doors and windows for new houses are highly demanded. The Cooperatives take orders from, and sell the products directly to the customers. The customers do not have a choice of standardized products and they request mainly what they have seen and like in existing houses. The customers often complain of late delivery and low quality of products, but since they have no alternatives the Cooperatives have more orders than they can produce.

The use of furniture is very limited in Yemeni households, especially for groups of sitting and dining furniture, because of the tradition of sitting on the floor. However, wall units, bedroom furniture, wardrobes and kitchen cabinets are increasingly in demand despite a very limited assortment and a low quality. Actually, the Cooperatives have no standard product lines and they produce items accepting the customers' designs, which are mostly unprofessional and irrational.

There is a stable demand for institutional furniture: office furniture, school furniture, as well as furniture for restaurants. Ccoperatives also accept orders for "one off" furnishing products, such as store counters, shelves etc.

The pricing method applied by the Cooperatives is based on adding 7 percent of profit on the top of all other costs, also adding two percent on the cost of materials to cover any eventual increases of prices of these materials. The selling prices are rarely changed.

Each of the Cooperatives has a showroom where they exhibit and sell their products.

Unfortunately, the showrooms are poorly laid out. Verbal explanations about products, given by the sales personnel, and rather poor photos of

various products made in the past, are the only information available to the potential customers.

Table 1 gives the sales by item by each of the Cooperatives in 1989.

Table 1: Assortment sold in 1989:

PRODUCTS	SOLD IN UNITS BY THE Cooperatives		
	MUKALLA	SEIYUN	TOTAL
Joinery products	12601	11087	38161
Household furniture	4204	1772	5976
School furniture	8971	--	8971
Other products	2736	1614	4250
TOTAL	28512	14473	42985

Comparing his own findings and assessment with the marketing study done in 1982 by Horatio P. Brion, the UNIDO expert in project RP/PDY/82/003), the expert has concluded that Mr. Brion's study could still be accepted as current and applicable regarding market potential. This means that the local market, including neighbouring governorates, can absorb up to a three times higher production than the Cooperatives produce at present.

2.02 Production programmes of the Cooperatives.

It is noticeable at first sight that both Cooperatives in all their workshops, make products of the same types and designs. The next distinctive characteristic of most of the products is an extensive use of expensive materials. This applies especially to the joinery products made of bulky solid wood frames. Lack of standardization and interchangeability of parts is another common characteristic of all products manufactured by the Cooperatives.

The Cooperatives are not yet aware of the advantages of specialization of their units in order to manufacture a certain group of products. Though this would be the most efficient way to upgrade their production, the Cooperatives are reluctant to accept such an idea.

Product development is not organized and new products are developed in an elementary way. An axonometric sketch with, or even without, overall dimensions is given to the carpenters who make the product based on their experience. If attractive, the product is usually accepted by more customers and orders are repeated. The construction of furniture items and joining of parts is done in the most simple ways which do not require any accuracy of processing, that is by using nails or, rarely screws. Open tenons and mortises are used in the construction of joinery products, but, although parts are over-dimensioned, inaccurately machined joints lessen the strength and spoil the appearance.

Poor design and poor workmanship is, to some extent, compensated by using expensive and high quality raw materials and by applying some decorative

elements such as colourful plastic edging, mirrors, lighting fixtures etc. that are obviously considered desirable on the local market.

Some customers' orders are accepted though they workshops do not have adequate equipment to make them, and a great deal of handwork is used for manufacturing such products.

The most important conclusion could be that, after 17 years of operation, the Cooperatives still do not have any standardized product which they could successfully produce.

The creation of standardized product lines is going to be the most important, and probably the most difficult, part of the project's tasks.

More detailed data on the existing products are given in Annex II of this report.

2.03 Materials.

Almost all raw materials are imported from Singapore. The Cooperatives are required to obtain import licences from the Government for each single consignment and then they import the goods themselves.

The main imported items are:

- Solid hardwood (Red Meranti, Kempas, Sepetir, Balau, Ramin etc.),
- Plywood and blockboard,
- Melamine laminated boards,
- Glues, glass, mirrors, paints, lacquers, hardware and other metal and plastic components.

The time span between placing an order and the delivery of the goods to the workshops is about six months. Some items are already obsolete by the time of delivery. The costs of raw materials are established at the workshops' sites and include: CIF price increased by 2 percent to cover transport costs from the harbour, 1% for unavoidable losses and 2 percent for eventual price increases. Raw materials delivered are of random quality, but each quality grade is marked and priced separately.

The average CIF price of sawnwood is YD 122 (US$ 356) per cubic meter. Despite its rather high price, protection of the sawnwood is not satisfactory.

Sawnwood is stored in the open lumber yard in bundles and exposed to the direct sunrays and rain. Lower yields from the timber and a lower quality of the components made of solid wood are the normal consequences of this poor storage.

Solid wood is predominantly used for manufacturing joinery products: doors and windows.

For the furniture, the main raw material is plywood. Plywood is imported mostly in the 1220 x 2440 mm size with various thicknesses and quality grades. Prices are set per sheet and they vary significantly from grade to grade. Sides, partitions, bottoms, tops and doors of carcass furniture are mostly made of 18 mm thick plywood with melamine laminate ("Formica") board glued on the outer sides. This could be considered as over-

dimensioned and unnecessarily expensive. Blockboard 18 mm thick is a far cheaper material, compared to plywood of the same thickness, but it is imported and used to a limited extent because it is not suitable for laminating only on one side and for joining parts with nails.

With small adjustments in designs and in manufacturing methods, the Cooperatives would be able to import and use surface improved particle board with both faces laminated. Comparing the prices of surface improved particle board, which exists in the international market with the cost of plywood with one side laminated in the Cooperatives' workshops, the former is up to 40 percent cheaper. The Cooperative in Seiyun uses particle board for making bottoms of drawers and backs of carcass products. This could also be introduced in the CSCC in Mukalla.

Melamine laminate (locally called "Formica") represents a very high share of the value of total imports. It is usually glued on the outer surfaces and on the edges of already assembled furniture items. For that purpose very expensive isoprene glue is used. This kind of laminate board, which could be recommended for table tops or tops of the lower kitchen cabinets, is too expensive for other carcass furniture items. Unfortunately, the Cooperatives do not have any equipment for lamination with lower pressure laminates which are cheaper and suitable for furniture.

The other imported materials and components are: glass, mirrors, various hinges, locks, handles and other hardware items. Rather big amounts are paid for lighting fixtures and radio-cassette players which are installed in headboards. The Cooperative in Mukalla has a rather big stock of upholstery materials (foams, fabrics and vynils) though upholstered products represent an insignificant share of the value of production.

There is, in stock, a quite big number of items which have not been used in the production for the last six months.

The relative value of the major groups of materials imported in 1989 is given in Annex II.

2.04 Equipment

All the production units, belonging to the CSCC Mukalla, and two units belonging to CC Seiyun, have two machining lines each, one for processing solid wood parts, mainly for doors and windows, and the other for processing panel parts used for furniture products.

The great majority of the woodworking machines are antiquated and in rather bad shape, with worn out parts and without protective guards and covers. The machines recently bought by the Cooperatives are of the same types as those which they had before. Some capacities are over-dimensioned and not fully utilized, while for some basic woodworking operations, such as cross-cutting, routing etc. the Cooperatives have no machines at all.

None of the workshops has any dust exhaust installations.

A small compressor with an initial pipeline net for compressed air is being installed in the Mukalla workshop, and will be used soon.

The internal transport of lumber and panels is done using front forklifts, while all other inter-operational transport is done manually or at the best by a hand-cart with manual loading and unloading. None of the workshops belonging to the CC Seiyun have a hard floor which is needed to use a pallet system with hand lifting trucks, or similar transportation means.

The accuracy of the machinery is below any criteria.

The only machines available in the assembling departments are electrical hand drills. The workshop in Mukalla has bought some pneumatic hand tools which will be used in the near future for assembling operations.

The most critical situation is with woodworking tools. Sharpening is done mostly by the carpenters. The Cooperatives have no appropriate tool grinding machines and free hand sharpening is predominant. Joining of bandsaw blades is unsatisfactory though all the workshops have "IDEAL" welding equipment. Tensioning of sawblades and control of tools is non-existent.

As a normal consequence of the equipment situation, the assembling of the products requires many adjustments and extensive handwork.

The list of equipment available at present in all the workshops is given in Annex II.

2.05 Plant layouts and production methods.

At present, only the workshop in Mukalla has suitable buildings and sufficient production space. The other two workshops belonging to the CSCC are constructing additional production buildings which are nearly completed. The layout of equipment in the workshops is more or less logical and since the woodworking machines are used by the carpenters as any other tool, this is suitable for the present methods of manufacturing. But, if the Cooperatives are going to accept an industrial manufacturing method, with serial production, certain adjustments in the workshops' layouts will be needed. First of all, some operations, which are now dine in the assembling areas, should be finished in the machining phase. More attention should be paid to the organization of working areas and to the inter-operational transport. Removing of wastewood from the machines must be done in a better way than now.

The situation in the workshops belonging to the CC Seiyun is more difficult because the existing buildings, actually sheds, are too small and totally inappropriate for any serious production. The cooperative has started preparation and construction of a new site, on the outskirts of Seiyun, with an idea to concentrate all its production in that site.

When this concentration of the production will be achieved depends on the financial situation of the Cooperative, which does not seem to be promising in the near future.

2.06 Organization and planning of production.

Both Cooperatives have the production department headed by the production managers. The production managers are experienced carpenters. The workshop managers are under direct control of the production department. Most workshops have four supervisors who are in charge of: machining furniture parts, machining joinery parts, assembling furniture and assembling joinery

products. Quality control is done by the supervisors on finished products only.

Production documentation is insufficient, without constructive drawings for either products or parts.

The organization of the production departments is inadequate, and they lack the skilled people to carry out proper production planning and control.

There is no feedback information about actual quantities of materials, operational times and costs. All decisions relate on the values from the plan and production orders issued prior to the production.

The production planning and control system which is at the present used in the CSCC Mukalla is shown in Fig. 1. Operational lists or timing of production operations are not in use. There are many delays in completing customers' orders.

The organization and control of production are based on a piece-work system. The job order is assigned to a carpenter and is carried out by him throughout all machining or assembling operations. This system which is typical for small artisanal workshops is totally inefficient in workshops employing 50 to 150 workers.

2.07 Quality of products.

The level of quality of the products in both Cooperatives is unsatisfactory. The workshop in Mukalla has somewhat better quality products, but it is still far below any acceptable level.

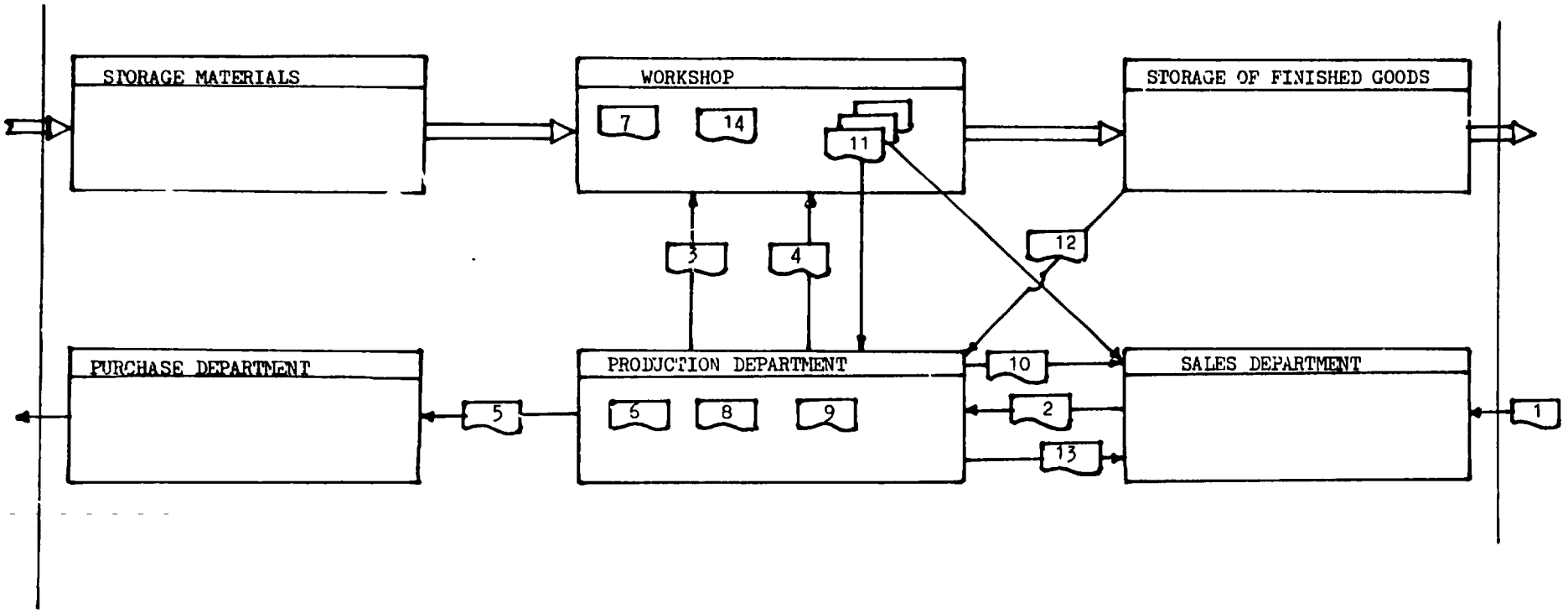
There is no organized quality control and the only quality control measure practised is that each carpenter who carries out assembling of a product is requested to sign it. In the case that the customer complains, the carpenter is responsible to fix the product. Since the quality of products depends on many factors, it is not possible to address all failures to the last men in the manufacturing process.

Total lack of quality standards, lack of some indispensable production documentation, and lack of appropriate equipment also contribute to the low quality of products.

Due to the inadequate sharpening of tools and without the use of jigs, the accuracy of machining is far from satisfactory.

The managements and the other persons concerned in the Cooperatives are aware of this situation and ready to follow up on recommendations towards improving the quality.

In general, it could be concluded that lack of competition in the local market contributes also significantly to the low quality of the products.



KEY:
1. Customer's orders
2. Request for production (for existing product)
3. Production order
4. Labour cost, separate for machining and assembly
5. Requisition of raw materials
6. Specification of auxiliary materials
7. Job card (contains specification of materials)
8. Calculation of cost of production
9. Calculation of cost for a new product (estimated)
10. Final cost and sales price accepted form
11. Completed order form.
12. Receipt of finished products.
13. Invoice from the production to the sales department.
14. Single worker production card (base of wages)

Fig. 1: The present production planning and control system.

2.08 Working conditions and safety.

Working conditions in the machining departments of all the workshops are unbearable and inadmissible. All the woodworking machines used in these workshops are without dust exhaust installations. All the machining workshops are covered by a thick layer of dust and wooden chips. Since the Cooperatives use mainly tropical wood containing various chemicals, this dust may be considered as harmful for the health of labourers. It is also, without any doubt, harmful for the machines.

Illumination in the workshops is also unsatisfactory. Ventilation is assisted through hanging fans, but in spite of these fans high temperature and humidity worsen the working conditions in the workshops.

The lack of any kind of mechanization for internal transport or for feeding machines results in strenuous work. Safety and protection of workers against injuries is at a very low level. Most of the machines do not have protective guards, covers for "V" belts etc. and all circular saws are within driving knives.

There are no written safety rules. Notwithstanding the unsatisfactory safety measures, injuries of workers are rare. Most of the carpenters have long experience and have developed a sense of precaution.

Removal of offcuts and other wastes is very slow and heaps of waste hinder the movement of materials and people. There is a feeling that these unsatisfactory working conditions do not worry the Cooperatives to any extent.

2.09 Maintenance of equipment.

Both Cooperatives have maintenance units for repairing machines and vehicles. Scarce equipment and even more scarce spare parts, especially for the very old machines make the maintenance job more difficult. Thanks to the facts that all the machinery is very simple and that the maintenance department has good mechanics, only a few machines are out of order, mostly because of lack of spare parts.

Inadequate use of some machines and use of inappropriate tools (with wrong cutting edge parameters and not balanced) and the lack of dust extraction at the machines cause breakdowns and inaccuracy of the woodworking machines.

Greasing and oiling the equipment is done regularly.

A young mechanical engineer who is the deputy manager of the maintenance unit in the CSCC Mukalla is making a noticeable progress towards the introduction of a preventive maintenance system in this Cooperative. The assistance offered by the project staff will speed up the improvement of maintenance.

2.10 Financial results.

Both Cooperatives have had a very modest growth of sales for the last ten years. Bearing in mind the inflation factor this could be considered as a stagnation over a long time. The Cooperatives follow some kind of survival

strategy, making enough money to stay in business but not for further development.

In the planning system adopted by the Cooperatives, a profit margin of around 7 percent is added on top of all other costs. In the financial statements, the profit ranges up to this planned percentage. About half of the profit is paid to the members of the Cooperatives as dividends, while the rest is foreseen for business activities.

2.11 Cadres.

A great majority of the people employed by the Cooperatives are carpenters who learned their trade from other carpenters. In this way, the old practices are followed and are still dominant in their everyday work.

The workshop managers and supervisors are also carpenters, probably selected from among the best. They also adhere to their long-time experience, mainly because they hardly had a chance to see the new working methods used in the wood processing industry. The production department staff is not capable of carrying out duties such as: product development, production planning and control, quality control and improvement of production. The organization chart of the production department does not include these tasks, though no one else in the cooperative is foreseen or available to carry them out.

In both Cooperatives there is nobody with technical education in wood processing. Since both Cooperatives employ a rather big number of people working in production, such technical professionals are indispensable. The few other professionals with university degree, working in the cooperatives are far from being enough for an establishment of this size.

2.12 Management of the Cooperatives.

The board of directors, elected by the Cooperative members (share holders), appoints the cooperative's general manager. The General Manager is concurrently a top executive of the cooperative and the chairman of its Board of Directors. Several organizational charts of the CSCC, Mukalla were shown, but none fully reflected the actual situation. The managers of the sales, production, purchase, financial and personnel departments are the first subordinates to the General Manager.

The production department is in charge of product development, production planning, manufacturing, maintenance, quality control and technical development. There is no doubt that all these duties cannot be carried out successfully by a few people working in the production department. Since they have to follow the daily routine of the production work, less attention is paid to the development tasks and to a systematic improvement of production. The management is based more on intuition of the managerial staff and less on reliable information and systematic management methods. Daily contacts and discussions among the managers compensate to some extent the lack of an appropriate information system.

There is an impression that managers do their jobs enthusiastically, but in order to reach higher efficiency, they should acquire more management skills.

3. MAJOR ACTIVITIES

The major activities performed by the expert during the reporting period can be grouped as follows:

3.01 Visiting all the workshops and making a survey of the existing production situation in the Cooperatives.
3.02 Adjusting the project's work plan to the current situation.
3.03 Developing the training programme for all the project's training activities.
3.04 Planning workshop layouts for the production units of both Cooperatives.
3.05 Preparing four training manuals for courses conducted by the expert during his mission.
3.06 Conducting the training courses.
3.07 Programming and supervising the work of the two UN Volunteers.
3.08 Studying problems and suggesting improvements of products and production methods.
3.09 Other activities.

The expert's mission itinerary is given in Annex III.

Short comments on these activities are given hereunder.

3.01 Visiting the workshops and making a survey.

A survey of the existing production situation in the Cooperatives is summarized in Section 2 of this report (findings) and some of the data collected in the Cooperatives is given in Annex II.

3.02 Adjustment of the project's work plan.

After making the survey of the production situation in all the workshops of both cooperatives the project's work plan has been adjusted to meet the assessed needs and to assure the fulfilment of the project's objectives.

The work plan has been elaborated in the form of a simplified critical path and discussed with the counterpart.

The accepted work plan is given in Annex IV.

3.03 Developing the training programme.

Starting from the project document's objectives and outputs, and from the survey made in the Cooperatives, a training programme has been designed comprising all training activities to be accomplished during the project's implementation.

The training programme is broken down into 30 main subjects and syllabuses are designed for each single subject, containing: topics, training time for theoretical and practical lessons and an expected level of competence to be reached by the trainees.

The training programme covering subjects for both, operators and managerial staff is annexed to this report as Annex V.

3.04 Planning the workshop's layouts.

During this mission, the expert has planned the layouts for two workshops:

1. The carpentry workshop in Mukalla, and
2. The Carpentry Workshop foreseen to be built in a new site in Seiyun. A general layout has also been proposed for a new site in Seiyun.

The layouts have been designed for manufacturing the same type of products which are currently being produced, but with the introduction of industrial manufacturing in small batches, and by substituting handwork with machine operations. The layouts include the machine existing in the Cooperatives and some equipment to be purchased gradually in the near future.

Both layouts have been discussed thoroughly with the counterpart's staff and corrected by inclusion of some of the good ideas of the counterparts.

The layouts are appended to this report as Annex VI.

3.05 Preparation of training manuals.

During this mission, the expert has prepared four training manuals, on the following subjects:

1. Product development in the secondary wood processing industry.
2. Wood and wood affiliated products used in the furniture and joinery industry.
3. Plant layout.
4. Panel sizing operations.

The manuals have been translated into Arabic, copied and distributed to the trainees.

The English version of these four manuals will be issued as separate technical reports.

3.06 Conducting the training courses.

The expert conducted four training courses in Mukalla and one in Seiyun. The courses held in Mukalla were attended by people from al the workshops belonging to the CSCC Mukalla; in Seiyun also, all the workshops of that Cooperative were represented.

The following number of trainees took part in various courses:

1. Product development: 13 (in Mukalla) and 8 (in Seiyun).
2. Wood and other materials: 12 (in Mukalla).
3. Plant layout: 12 (in Mukalla).
4. Panel sizing: 7 (in Mukalla).

Some practical work and work assigned to be done by the trainees complemented the theoretical lectures.

Interest for the training courses an the active participation of the trainees was well above all expectations. This proves that the training programme has a high priority and was found to be interesting. The list of trainees is given in Annex II.

3.07 Programming and supervising the work of the United Nations Volunteers.

Two UN Volunteers, one young wood processing engineer and one experienced carpenter have been assigned to the project. The expert, who is also the CTA, worked closely with them, giving them instructions and helping them in carrying out their tasks. Since some resistance towards the Volunteers' assistance was noticed, the CTA had to support them and to establish a certain level of confidence between the carpenters and the Volunteers. The problems were of a human nature: the carpenters had difficulty in accepting that somebody changes their old working methods and habits.

3.08 Studying problems and suggesting improvements of products and production methods.

Though it is unrealistic to expect some impressive improvements in production prior to the accomplishment of all the project's outputs, certain activities have been undertaken in order to increase the quantity and quality of production and to decrease production costs.

By studying productivity, quality and production costs, the following facts have been established:

- Productivity, measured in working hours per unit, shows that the Cooperatives need more than ten times the number needed for an average industrial production of similar products.

- The quality of the products are below the minimum acceptable by any criteria and cannot stand any competition.

- The costs of materials is enormously high, attaining about 50 percent of the total costs.

These facts can all be attributed to the same points of origin. These are: improperly designed and constructed products, lack of an appropriate planning of production, the use of inappropriate production methods and an inadequate seasoning and protection of sawnwood.

In order to improve this situation, a programme has been proposed and discussed with the counterpart. It can be implemented immediately.

The object of this programme is to decrease the costs of materials to 45 percent of total costs.

This objective will be accomplished through the following ten outputs:

1. Proper design and construction of products, including detailed drawings of parts.

2. Use of appropriate dimensions of raw materials and improved optimization of cutting.
3. Proper stocking, seasoning and protection of sawnwood.
4. Selection of raw materials according to the required quality of parts.
5. Substitution of expensive materials with less expensive wherever appropriate.
6. Defined optimal additions for processing.
7. Obtention of large solid wood parts by gluing smaller pieces.
8. Use of proper machines, tools, jigs and processing methods.
9. Utilization of wastewood to produce small products regularly used in households.
10. Established proper inventory control.

The activities to be carried out by the counterparts' staff (CTP), the CTA and the UN Volunteers (UNV) are listed hereunder:

No.	ACTIVITY	RESPONSIBLE	TIMING
1.1	Analyze function, design, construction, materials, price and weight of all products	CTP, CTA, UNV	Continuous
1.2	Introduce optimal constructions and dimensions of components and joints and a better selection of materials	CTP, CTA, UNV	Continuous
1.3	Work out part lists and detailed drawings of all parts	CTP, UNV	Continuous
2.1	Reduce thicknesses of raw materials in accordance with optimal sizes of parts	CTP, CTA, UNV	Continuous
2.2	Introduce cutting lists and cutting patterns to be used during sizing operations.	CTA, UNV	April/June 1990
2.3	Introduce improved cross-cutting and ripping methods for sawnwood	CTA, UNV	After purchase of a cross-cut saw.
3.1	Assure proper stacking and seasoning of sawnwood	CTP, UNV	Continuous
3.2	Provide covers for upper planks by using rejects (defective planks).	CTP, UNV	Continuous
3.3	Avoid leaving timber lying all over the timber yard and around the workshops.	CTP, UNV	Continuous
3.4	Process only well seasoned wood	CTP	Continuous
4.1	Introduce quality standards of parts based on their exposure and functions.	CTA, UNV	Until the end of 1990
4.2	Define quality standards of raw materials for each class of parts.	CTA, UNV	Until the end of 1990.
4.3	Ensure that the quality of materials is indicated in the cutting lists.	CTP	Until the end of 1990.
5.1	Analyze the prices of various species, qualities and sizes of sawnwood and introduce acceptable substitutions	CTA, UNV, CTP	Until the end of 1990.
5.2	Compare prices of plywood and blockboard, laminated by the cooperative, with prices of surface improved particle board to be imported	CTA, UNV, CTP	Until the end of 1990.

No.	ACTIVITY	RESPONSIBLE	TIMING
5.3	Analyze functions and prices of all components and make an appropriate selection	CTA, UNV, CTP	Until the end of 1990.
6.1	Define appropriate additions for processing to all parts.	UNV	Until the end of 1990.
6.2	Introduce appropriate processing methods allowing optimal additions	UNV	Until the end of 1990.
7.1	Identify the pieces which could be glued	UNV	Until the end of 1990.
7.2	Introduce an appropriate gluing technique into production	UNV	Until the end of 1990
8.1	Introduce operational lists and prescribe which machine and method have to be used for each operation	CTA, UNV, CTP	Until the end of 1990
8.2	Use adequate and properly maintained tools.	Tool expert, UNV, CTP	Until June 1991.
8.3	Wherever appropriate, introduce and use jigs.	CTP, UNV, CTA	Until the end of 1990.
9.1	Develop new household products that could be made of offcuts of solid wood and panels	CTA, CTP, UNV	Until the end of 1990.
9.2	Organize sales of these products.	CTP	Until the end of 1990
9.3	Organize the production of these products.	CTP, UNV, CTA	Until the end of 1990.
10.1	Introduce an inventory control system.	Cost account expert, CTP, CTA	Until the end of 1990.
10.2	Sell materials which will not be used in the near future.	CTP	Until the end of 1990
10.3	Establish internal standards for main materials and components.	CTP, CTA	Until the end of 1990.
10.4	Establish mini-max recording procedures for purchase of all materials.	CTA, CTP	End 1990.

(Some of these activities are already in progress such as: analysis of products, introduction of jigs, stacking of sawnwood, introduction of cutting lists and sizing schemes.)

Special emphasis has been given through the training courses to product development and better selection and utilization of materials.

Slowly but surely ideas of this programme take root in the Cooperatives. This is going to be the main task of the UN Volunteers between this and the next mission of the CTA.

3.09 Other activities.

Other activities carried out by the expert, during this mission, were mostly related to the duties of the Chief Technical Adviser.

As a result of the review of the present situation in both Cooperatives (Mukalla and Seiyun) the following conclusions were obtained and communicated

to Mr. N. Desai, Resident Representative of the United Nations Development Programme in Aden:

1. Both Cooperatives lack basic machines and equipment without which the project objectives cannot be achieved.

2. The sum allotted for equipment (on budget line 42) has been almost used up for the purchase of two cars and a photocopying machine for the project.

3. According to the assessment made by the expert, a total estimated amount of US$ 119,000 is required to permit the purchase of the machines urgently needed, as per the following specifications:

DESCRIPTION	For Mukalla (pieces)	For Seiyun (pieces)	Total pieces required	Estimated unit price (US$)	Total value (US$)
Crosscutting circular saw with working table and adjustable stops, maximum cutting width 600 mm, maximum cutting thickness 120 mm, motor min. power 4kW (Eumabois No.12.131.111)	2	1	3	5,000	15,000
High speed router for heavy woodworking, with guiding pins for various diameters of routing bits. 10000/20000 rpm. Equipped with fence and mechanical pedal. (Eumabois No.12.315.12)	3	1	4	8,000	32,000
Universal grinding machines for sharpening woodworking tools (sawblades, moulding cutters, routing bits and drills) with carbide tipped teeth and cutters. Attachment for circular sawblades up to a diameter of 400 mm.	1	1	2	10,000	20,000
Tenoning machines for heavy woodworking in hardwoods to make open 100 mm long joinery tenons with female profiles. Circular saw, with three spindles, 2 horizontal and one vertical appropriate sliding table for work pieces 2000 mm long and 100 mm thick. (Eumabois No. 82.1)	1		1	15,000	15,000

DESCRIPTION	For Mukalla (pieces)	For Seiyun (pieces)	Total pieces required	Estimated unit price (US$)	Total value (US$)
Universal narrow belt sander for sanding edges, rebates and profiled laths, with oscillating sanding belt on the vertical pulleys. Sanding belt 150 mm wide. (Eumabois No. 12.721.41)	1	1	2	4.000	8.000
Precise double blade circular saw with sliding table. Distance between the sawblades adjustable up to 2200 mm. Sawing angle adjustable up to 45°. Maximum thickness of a work piece 100 mm. (Eumabois No. 12.132.34)	1	1	2	10.000	20.000
Single spindle vertical drilling machine for heavy woodworking, with sliding work table. Maximum cross section of the workpiece 200 x 100 mm. (Eumabois No. 12.433)	2	1	3	3.000	9.000
TOTAL	11	6	17	--	119.000

4. In the above list of machines, the following have a high priority.

Crosscutting circular saw[1]	2 pcs.	US$ 10.000
High speed router	2 pcs	US$ 16.000
Universal woodworking tool sharpening machine	2 pcs.	US$ 20.000
Single spindle vertical drilling machine	2 pcs.	US$ 6.000
TOTAL	8 pcs.	US$ 52.000

5. The financing of the above mentioned eight high priority machines could be through a revision of the project's budget by reducing budget lines: 15 (project travel), and 33 (in-service training), since both could be financed by the counterpart in local currency. This matter has been discussed and fully supported by the counterpart.

6. The counterpart may also contribute in financing the rest of the machines specified in the above list, using local currency.

This request has been make taking into consideration that application of industrial methods and improvement of the quality of products cannot be fully accomplished without the above mentioned machines.

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[1] Detailed descriptions are given in the preceding list under corresponding numerical order numbers.

Another of the expert's conclusion which was also communicated to the Resident Representative in Aden, pertains to the marketing expert's mission.

As a result of re review made in both Cooperatives (in Mukalla and in Seiyun), it was found that a marketing expert, as foreseen in the project document, would not be very useful to the project.

The two Cooperatives are selling all their products on the local market and are not able to satisfy all consumers' demand. On the other hand a tool sharpening and maintenance expert is urgently needed, to provide advice and to train counterparts to select, sharpen, use and maintain tools in a proper way.

This matter has also been discussed with the counterpart who completely agreed on the replacement of the three months mission of the marketing expert by a mission of the same duration of a tool maintenance expert.

The job description for this tool maintenance expert is given in Annex VII.

In addition to the activities described in this report, the expert was also meeting, from time to time, the National Director of the Project, the General managers of the Cooperatives and other members of the management staff concerned, to discuss the project's progress, various proposals for improvements in the production or problems which had to be solved.

The other members of internationally appointed project staff were also present at these meetings.

4. CONCLUSIONS AND RECOMMENDATIONS

4.01 Conclusions.

1. The Carpentry Cooperatives in Mukalla and Seiyun are oriented to small market areas in the immediate surroundings. They produce furniture and joinery items according to the customers' orders and sell them directly to end users. Even in these small market areas, demand is higher than the Cooperatives' production possibilities. The lack of competition appears to be the factor causing a long stagnation of development.

2. The Cooperatives accept all customers' orders regardless of type, style and quantity, and maintain a typical handicraft system of handicraft system of manufacturing. In the meantime, the carpentry workshops became big production units, with over 50 employees each, and the handicraft methods are not efficient any more.

3. The equipment in the Cooperatives, consisting of old universal carpentry machines, is incomplete for the necessary machining operations. It has not been reviewed in time, hindering improvement of quality and productivity.

4. All the workshops in both Cooperatives produce items with identical or similar styles and designs, rejecting the idea of any kind of specialization and creation of their own standard production lines.

5. Inadequate design and construction of products result in a wastage of raw materials and in an enormous amount of manual work.

6. The organization of the Cooperatives is adapted to the handicraft system of manufacturing. It lacks some functions which are crucial for an advanced production.

7. The most critical point in both Cooperatives is the absence of any wood processing technician, at least with middle school education. A manufacturer of the same size in a developed country would have a dozen such people on his staff.

8. Internal transport, working conditions and safety in all the workshops are problems that have not been addressed, impending the control of production and endangering the health of the workforce.

9. Development and improvement of work is not given the priority it deserves. Managerial staff is more occupied with day-to-day production problems.

10. The Coastal Strip Carpentry Cooperative in Mukalla with its satellite units in Shahr and Ghail Bawazer is better organized and has better production facilities, produces higher quality products and from any point of view is in a much better shape. It seems to be fully prepared to utilize the assistance of the project.

11. The Carpentry Cooperative in Seiyun has no chance to develop successful production in the existing sheds; the solution would be to concentrate production in the site (as the cooperative intends to do).

4.02 Recommendations.

1. The Cooperatives should try to increase their markets by penetrating in distant areas of the Hadhramout and neighbouring governorates. They must get ready to compete with other manufacturers who will arrive soon in their traditional local markets.

2. Specialization of production within the Cooperatives would be the most efficient way to increase productivity and to improve quality, and at the same time the most efficient way with respect to yields on the investments made. It would enable the use of more productive specialized equipment, better utilization of materials and specialization of labour.

3. The Cooperatives need to develop their own standardized product lines, base don a modular system, which will enable the introduction of serial production, and organize the promotion of their products on the market.

4. The highest attention ought to be paid to the design and construction of products, because the costs, and the quality of the products are closely related to the design and the construction work. A manufacturer can offer customers satisfactory products without accepting a customer's design, especially with regard to the wastage of raw materials.

5. The workshops should not copy each other's products but try to be different and offer new products, which do not yet exist on the market.

6. The organization of the Cooperatives should be adjusted to meet their development goals, including the functions which will implement developments and improvement plans.

7. Utmost attention and priority should be given to the improvement of working conditions in the workshops by providing dust extraction installations, waste disposal, and by improving safety of work.

8. More attention should be paid to the protection and proper seasoning of timber which is the biggest cost item in both Cooperatives.

9. The government authorities should establish national standards for joinery products. This would greatly contribute to a higher efficiency and a better quality in the manufacture of these products.

10. Instead of selling their joinery products directly to end users, it would be more efficient to set these products through the existing companies that trade in construction materials for housing and other constructions.

11. The cooperative's future development and success will depend mostly on the availability of adequate professionals, first and foremost wood processing technicians, who are able to implement the development plans.

12. In order to open eyes and to get ideas for further development, the responsible persons in the Cooperatives should have an opportunity to visit some more developed furniture and joinery factories abroad, and to see he level they are expected to reach, and how this level can be achieved.

ANNEX I

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Project of the Government of the People's Democratic Republic of Yemen

Strengthening the technical and managerial capabilities of the Carpentry Cooperatives in Seiyun and Mukalla

JOB DESCRIPTION

SM/PDY/87/005/11-01 (J-12209)

Post title

Furniture and Joinery Production Expert (CTA)

Duration

12 months - split mission (6, 3 and 3 months)

Date required

As soon as possible

Duty station

Mukalla with travel to Seiyun and Aden

Purpose of project

To strengthen the Technical and Managerial capabilities of the carpentry cooperatives in Mukalla and Seiyun.

Duties

The Furniture and Joinery Production Expert, the project's Chief Technical Advisor, will lead a team comprising a cost accountant, a marketing consultant (each assigned for three months) and two United Nations Volunteers (a woodworking technician and a master carpenter), each assigned for two years.

He will undertake his assignment in three phases, the first of six months, and the other two of three months each, over a period of two years. He will be responsible for initiating and supervising all technical activities in the project, the drafting of training manuals and reports, devising systems, procedures and mechanisms as well as providing training to middle and top management of the cooperatives.

Phase I (six months)

During this phase he will be expected to:

1. Review the different systems for production planning and control, organization, procurement and inventory control, quality control, machine and tool maintenance.

2. Advise on improvements, modifications, and, where appropriate, on the introduction of new systems of production - including modifications to products, plant layout, equipment and processing technology and draw up plans for implementing his recommendations.
3. Review the current designs and the capacities for design in both cooperatives and recommend changes to facilitate the introduction of serial production methods.
4. Recommend changes to the product development and production planning and control departments.
5. Identify bottlenecks and excess capacity and suggest a product range, or modifications to the products being made, to ensure a fuller use of the installed capacity.
6. Assess the current skills of operators and suggest methods for increasing skills and productivity.
7. Assess the need for training manuals and draw up the contents of these.
8. To the extent possible draft these manuals.
9. Draw up a work plan for the two UN Volunteers.
10. Survey the state of the equipment installed and draw up a plan for the rehabilitation of existing machines.
11. Draft a technical report covering his activities during the first phase.

Phase II (three months):

During this phase, he will be expected to:

1. Supervise the implementation of the systems recommended under iten 2 of Phase I.
2. Conduct short in-country training seminars on production planning, production control, inventory control, quality control.
3. Guide the UN Volunteers in their work and, if need be, modify their work plan.
4. Review the cooperatives' procurement policies and recommend changes.
5. Review the designs prepared as a result of the recommendations made under item 3 of Phase I and suggest a rudimentary system of testing these.
6. Review the progress in the rehabilitation of machines and, if need be, modify the plan.
7. Introduce safety at work procedures and train operators in this field.
8. Supervise, and if necessary modify, the implementation of changes in plant layout, machines, etc. suggested in Phase I.

9. Introduce a more rational use of jigs in production.
10. To the extent possible, draft additional training manuals.
11. Draft a technical report covering his activities during the second phase.

Phase III (three months):
During this phase, he will be expected to:

1. Review the progress of the UN Volunteers, and, if need be, modify their work programme.
2. Review the progress of all the activities undertaken so far and complement these if need be.
3. Complement the training manuals already issued by additional ones whose need has been felt.
4. Revise, and if need be, modify all the training manuals prepared by the project.
5. Draw up technical reports outlining follow-up by the management of the cooperatives, the government and international organizations.
6. Draft the project's terminal report.

Qualifications: Engineer or wood technologist with long experience at policy making level in the management of small to medium sized furnituire plants.

Language: Arabic preferred, English acceptable.

Background information:

The woodworking sector in the People's Democratic Republic of Yemen consists of the Public Corporation for Carpentry in the Aden Governorate and two carpentry cooperatives in the Hadramawt Governorate. It employs approximately 1000 people and its sales volume reached nearly YD 2.5 million in 1985. In general the woodworking sector produces low quality products at high costs. This can be attributed mainly to low utilization of equipment, poor maintenance of production facilities, low labour productigvity and extensive use of expensive raw materials. Factories are often run without a sound orientation on the market requirements and subsequent production planning and organization lack long term perspective.

The present strategy of the People's Democratic Republic of Yemen towards industrial development, as reflected in the Third Five Year Plan, focuses on strengthening the industrial infrastructure. It concentrates on three types of measures: (a) increase the utilization of existing productive capacities, through the rehabilitation of selected factories; (b) the

establishment of a limited number of new factories to cater for the growing needs for indigenously produced goods, with a view to saving hard currency through import substitution; and (c) improving the production and managerial capacities in industrial enterprises. This project in the woodworking sector falls under the first and the last categories.

The first technical assistance to the woodworking sector in the People's Democratic Republic of Yemen was provided in 1978 through a review of the Aden Public Corporation for Carpentry. The review indicated various areas for improvement of production and management. In 1981, project PDY/81/006 'Training in Management and Efficiency Improvement in Industries' provided a consultancy mission to conduct a survey of the manufacturing facilities of the Coastal Carpentry Cooperative. The survey team's findings indicated the urgent need for technical assistance in relation to the cooperative's plan to consolidate the operations of three of its member units. Thus, in 1983, a three month mission was fielded to review this issue. This mission drew up the blueprint for a central workshop in Mukalla and advised on the necessary technical assistance to implement the plan. As no funds could be secured for this purpose, no follow-up was given by UNDP.

Two cooperatives are active in the Hadramawt Governorate: one in the area around Seiyun and one in the area around Mukalla. Each cooperative consits of a number of small scale production units, which supply their immediate environment with construction woodworking items (doors, windows) and selected furniture (beds, tables, chairs, sofas).

The cooperative of Seiyun has workshops in Tarim, Al-Hauta, Shibam and Seiyun itself. It employs 173 persons in various capacities, compared to 166 in 1977. The volume of sales of this cooperative was YD 644.348 in 1987 compared to YD 455.007 in 1982. Production is at an artisanal level, relying mainly on the individual skills of the carpenters.

The Coastal Carpentry Cooperative has workshops in Ghail, Mukalla and Shahr. The total number of employees was 366 in 1977 and 376 in 1987. Most of the people are employed by the central workshop in Mukalla. The sales volume of this cooperative in 1987 was YD 1.245.842. Production in the central workshop in Mukalla has industrial characteristics, particularly in the furniture production, but the other workshops are of the same level as those in Seiyun.

All items are produced on demand and according to the specifications of the customer. Most workshops have waiting lists for certain items which are much in demand. In Seiyun the construction woodworking items form about 72 percent of the sales volume, whereas this figure is 46 percent in Mukalla. As both cooperatives have hardly any capacity for cost accounting, it is impossible to assess which category of products has the highest added value of what the highest cost factor in production is. Prices are fixed based on global production costs and a traditional feeling of 'what the market will allow'.

Both cooperatives are weak in terms of human and physical resources and need strengthening in all aspects of their operations. With the exception of the workshops in Mukalla and Tarim, the production facilities of the workshops are cramped and poorly maintained. The machinery has reached the end of its technical life and breaks down frequently.

As most items are produced on demand, and according to customer specifications, production planning is totally dependent on the intake of orders. the Cooperatives are not producing any items for stock and so there is hardly any serial production. Therefore, production organization is geared towards meeting the consumer preferences, and relies heavily on the skills of the individual carpenters to produce the items required. Consequently, most production techniques used in the cooperatives are still at the artisanal level.

Given the lack of managerial capacities and technical knowhow, the cooperatives have only been able to achieve limited product and production innovation, thus retaining low levels of labour productivity. As the wage rates in both cooperatives are directly linked to the productivity of the individual workers, wages have hardly gone up in real terms over the last five years, and in Seiyun they have actually decreased considerably (21 percent).

Most of the cooperatives members are illiterate skilled labourers, who have either had small workshops of their own before the cooperative was established or they have been trained by their colleagues in the workshop. As both cooperatives are situated in rural areas, job opportunities are few and the well-being of cooperative members is dependent on the economic and financial position of the cooperative. The cooperative does not only provide jobs and wages, but it also provides pensions and guarantees bank loans. In this context, both cooperatives have started seif-help housing schemes for their members.

ANNEX II

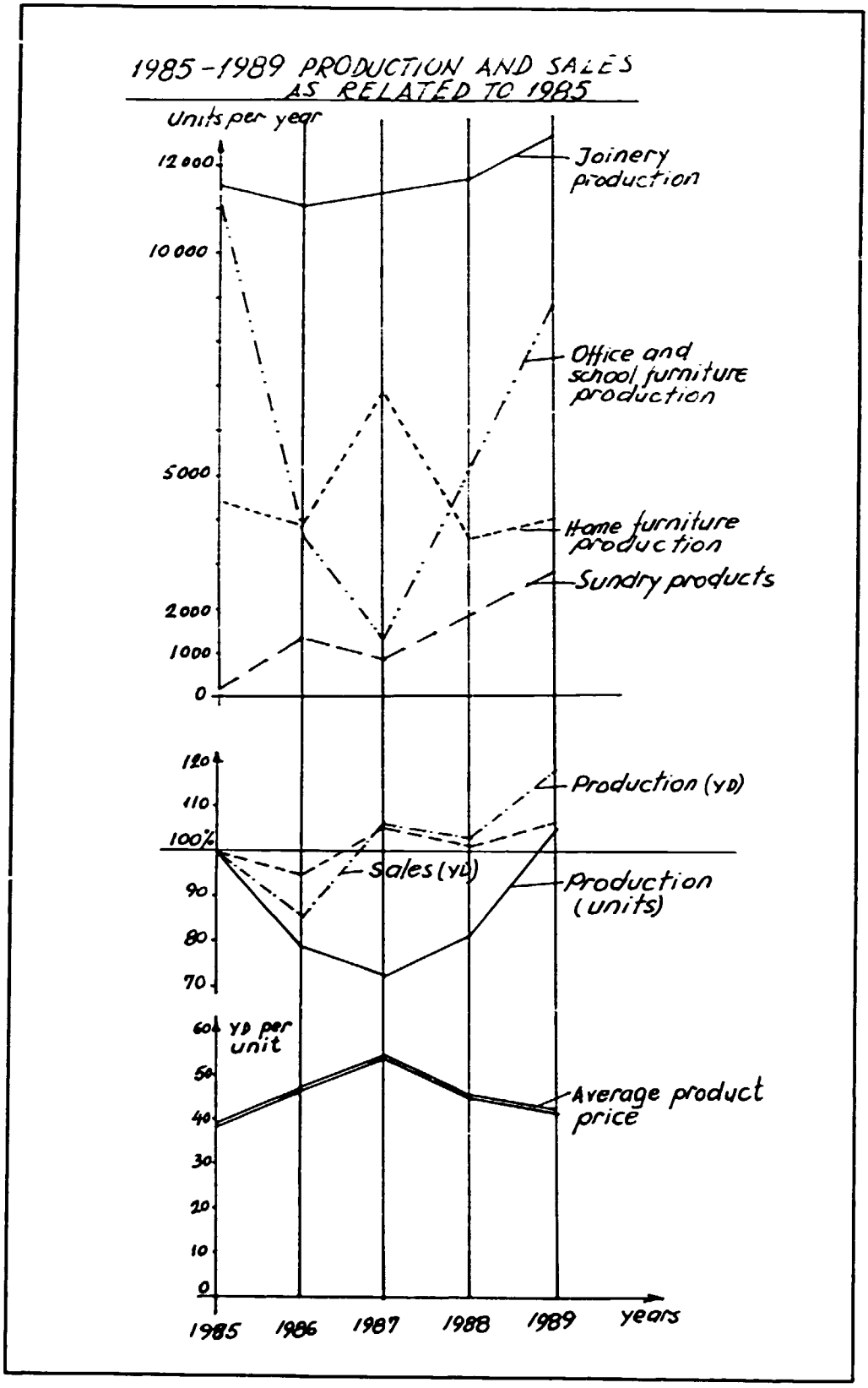
GENERAL DATA ON THE COOPERATIVES

This annex contains the following data, groups and schemes which illustrate findings presented in the expert's technical report:

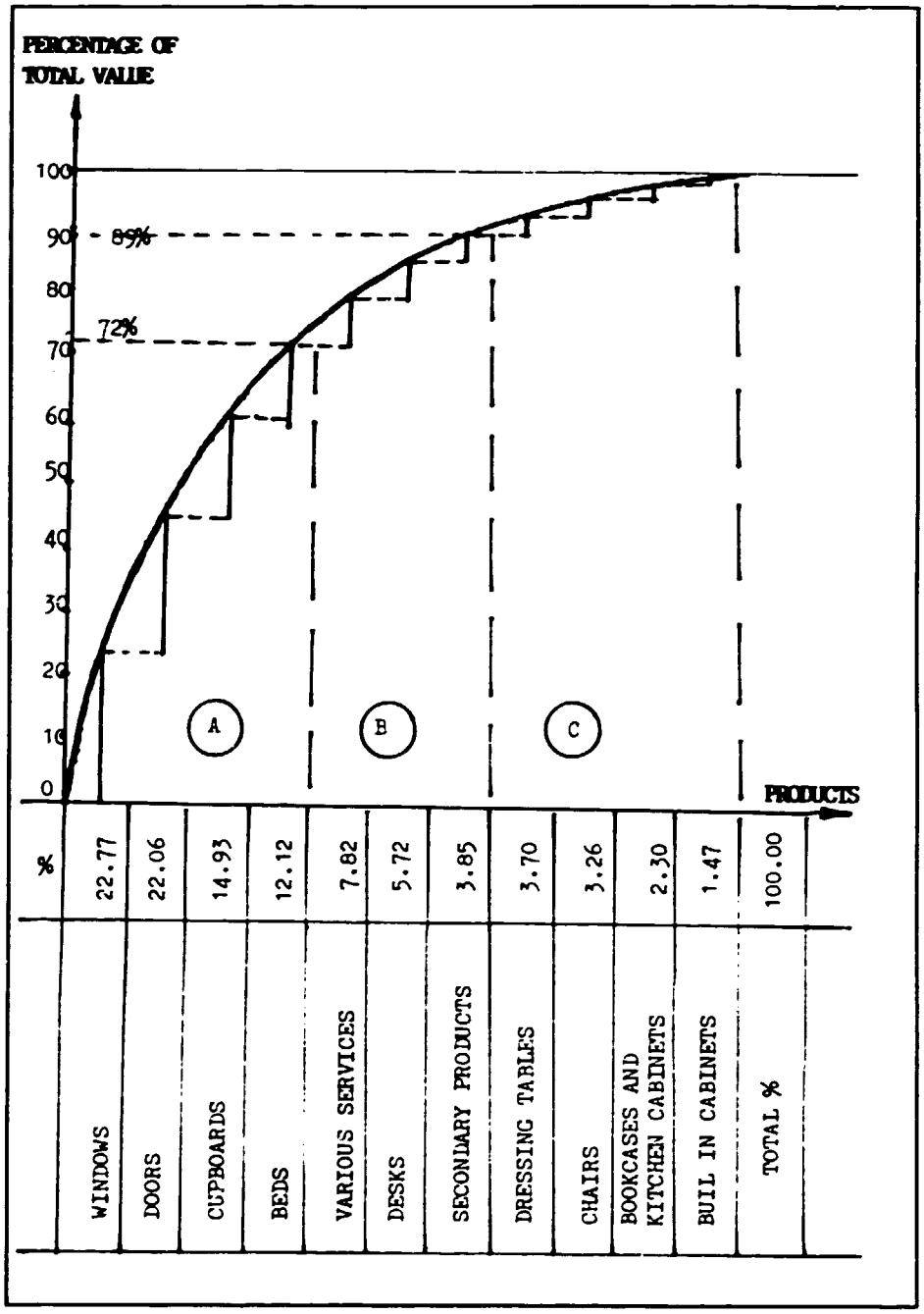
1. General data on the two cooperatives.
2. ABC graph for production programme of the CSCC, Mukalla.
3. ABC graph for materials imported by the CSCC, Mukalla.
4. Lists of woodworking an tool sharpening machines in the two cooperatives.
5. List of persons contacted during the mission.
6. List of trainees in the courses conducted in Mukalla and Seiyun.
7. Existing organizational chart of CSCC, Mukalla.
8. Macro-organizational chart for CSCC Mukalla proposed by the expert.
9. Organizational chart for CSCC Mukalla's production department proposed by the expert.

1. General data on the two cooperatives.

TYPE OF DATA	CSCC MUKALLA	CC SEIYUN
Number of production units	3	4
Number of employees	373	187
Production in 1989 (units)	29,512	14,473
- Home furniture (units)	4,204	1,772
- Other furniture (units)	8,971	--
- Joinery (units)	12,601	11,087
- Sundry products (units)	2,136	1,614
Sales in 1989 (YD)	1,294,000	710,000

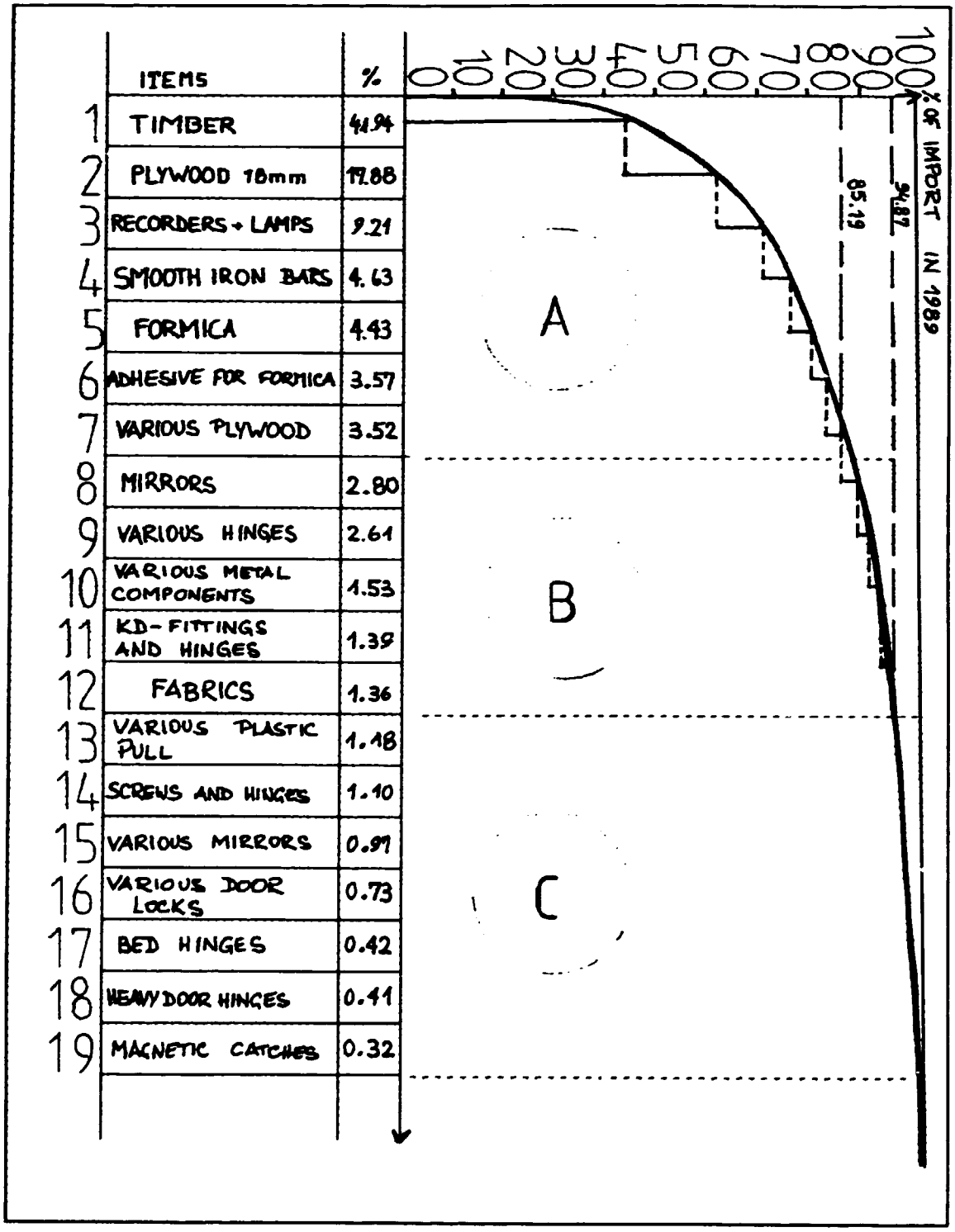

1985-1989 PRODUCTION AND SALES AS RELATED TO 1985
Units per year
12 000
10 000
5000
2000
1000
0
Joinery production
Office and school furniture production
Home furniture production
Sundry products
120
110
100%
90
80
70
Production (YD)
Sales (YD)
Production (units)
YD per unit
60
50
40
30
20
10
0
Average product price
1985
1986
1987
1988
1989
years

ABC Analysis of the product line of the Coastal Strip Carpentry Cooperative Mukalla
(based on the value of production in 1989 of YD 1,265,758)



	%
WINDOWS	22.77
DOORS	22.06
CUPBOARDS	14.93
BEDS	12.12
VARIOUS SERVICES	7.82
DESKS	5.72
SECONDARY PRODUCTS	3.85
DRESSING TABLES	3.70
CHAIRS	3.26
BOOKCASES AND KITCHEN CABINETS	2.30
BUIL IN CABINETS	1.47
TOTAL %	100.00

ABC ANALYSIS OF MATERIALS IMPORTED IN 1989 BY THE CSCC MUKALLA
(OF TOTAL AMOUNT YD 652.334)



	ITEMS	%
1	TIMBER	41.94
2	PLYWOOD 18mm	17.88
3	RECORDERS + LAMPS	9.21
4	SMOOTH IRON BARS	4.63
5	FORMICA	4.43
6	ADHESIVE FOR FORMICA	3.57
7	VARIOUS PLYWOOD	3.52
8	MIRRORS	2.80
9	VARIOUS HINGES	2.61
10	VARIOUS METAL COMPONENTS	1.53
11	KD-FITTINGS AND HINGES	1.39
12	FABRICS	1.36
13	VARIOUS PLASTIC PULL	1.18
14	SCREWS AND HINGES	1.10
15	VARIOUS MIRRORS	0.91
16	VARIOUS DOOR LOCKS	0.73
17	BED HINGES	0.42
18	HEAVY DOOR HINGES	0.41
19	MAGNETIC CATCHES	0.32

LIST OF WOODWORKING MACHINES INSTALLED IN THE COOPERATIVES' WORKSHOPS

Kind of machine	CSCC Mukalla (pieces)	CC Seiyun[2] (pieces)	Total (pieces)
Crosscut circular saw	--	2	2
Ripping circular saw	5	4	9
Narrow band saw	12	4	16
Surface planer	8	5	13
Thicknesser	7	5	12
Combined carpentry machine	5	9	14
Spindle moulder	9	6	15
Chain mortiser	4	5	9
Bit mortiser	4	3	7
Slotting machine	4	4	8
Horizontal single spindle drill	3	3	6
Tenoner for open tenons	1	--	1
Profiler for profiled lathes	1	--	1
Panel sizing machine with one circular saw	--	1	1
Panel sizing machine with scoring and sawing circular saws	1	--	1
Horizontal narrow belt sanding machine	1	--	1
TOTAL	65	51	116

[2] The CC Seiyun has budgeted for an additional 5 machines, which should be delivered soon. These are of the same types as the ones listed above.

LIST OF EQUIPMENT FOR SHARPENING WOODWORKING TOOLS

TYPE OF EQUIPMENT	CSCC MUKALLA (pieces)	CC Seiyun (pieces)	TOTAL (pieces)
Machine for welding bandsaw blades	3	4	7
Setting and sharpening machine for bandsaw blades	3	4	7
Knife grinder	3	2	5
Table wheel grinder	9	3	12
Universal grinder	1	2	3
Bandsaw grinder	4	2	6
TOTAL	23	17	40

N. B. : Most of the machines listed are worn out and many are unusable.

LIST OF PERSONS THE EXPERT MET AND WORKED WITH

A. CSCC Mukalla:

Mr. Abdulla Salim Mahroos	Ministry of Industry, Trade and Supply, Hadramout Governorate, Branch Manager
Mr. Abdulla Alwi Aideed	Supervisor in the Ministry Mukalla Branch
Mr. Mahfood Awadh Basawad	General Manager (CSCC)
Mr. Ahmed Salid Aldogail	Production Manager
Mr. Joman Ahmed Al-Hemd	Deputy Production Manager
Mr. Saleh Karama Bayashoo	Mukalla Workshop Production Supervisor
Mr. Alwi Omer Al-Jofry	Maintenance Engineer
Mr. Awadh Saleh Al-Akbary	Technical Draughtsman and English Interpreter
Mr. Ahmed Omer Amshoosh	Ghail Bawazer Workshop Manager
Mr. Awadh Mubark Mangoosh	Al-Shehr Workshop Manager

B. Seiyun Carpentry Cooperative

Mr. Awadh Saeed Khobah	General Manager/Deputy Production
Mr. Abdulla Salem Bashaib	Manager
Mr. Abdul Rahman Ali Balfageh	Personnel Manager
Mr. Rajab Hadi Motobig	Accounts Manager
Mr. Osman Saleh Bashaab	Seiyun Unit Manager
Mr. Ahmed Moberak Fegaiham	Tarim Unit Manager
Mr. Oman Saeed Jobah	Shibam Unit Manager
Mr. Breek Ashore Zubare	Al-Hawta Unit Manager
Mr. Ahmed Bashir	Production Supervisor
Mr. Ghaleb Saleh Fegaihan	Purchasing Officer

LIST OF TRAINEES IN THE COURSES CONDUCTED BY THE EXPERT

1. Wood, affiliated products and other materials used for the production of furniture and joinery.

Mr. Khames Saad Mubark	Operator
Mr. Abdulla Saeed Al-Hadramy	Furniture Assembler
Mr. Khames Saleh Bin Yomein	Machining Section Head
Mr. Hussein Awadh Bin Dohri	Joinery Assembler
Mr. Ahmed Salid Al-Dogail	Production Manager
Mr. Joman Ahmed Al-Hemd	Production Department Manager
Mr. Saleh Karama Bayoshoot	Production Supervisor
Mr. Salim Obeid Bin Al-Hamed	Joinery Maniching Supervisor
Mr. Salim Baftein	Joinery Assembler
Mr. Ahmed Ali Khomoor	Operator
Mr. Abdulla Awadh Badhreis	Bhail Bawazer Workshop Production Manager
Mr. Faraj Awadh Baweidhan	Furniture Assembler

2. Product Development in Secondary Wood Processing.

A. **Mukalla**

Ahmed Salim Al-Dogail	Production Manager
Jaman Ahmed Al-Hemd	Production Department Manager
Saleh Karama Bayashoot	Production Supervisor
Mohammed Awadh Bin Wabar	Deputy Sales Manager
Saeed Mubark Magtoof	Furniture Assembly Supervisor
Nasser Bin Silman	Joinery Assembly Supervisor
Salim Obeid Bin Al-Hemd	Joinery Machining Supervisor
Abdulla Awadh Badhreis	Ghail, Workshop Manager
Ahmed Saeed Barzeig	Ghail, Sales Manager
Joman Mohammed Baghozeih	Operator
Khames Saad Mubarak	Operator
Abdulla Saeed Al-Hadrami	Furniture Assembler
Mohammed Salim Basaleh	Shair Sales Manager

B. **Seiyun**

Abdulla Salem Basheaueb	Deputy Manager
Abdulla Ali Bahishwan	Carpenter in Tarim
Belead Ahmed Jobah	Carpenter in Hawta
Salem Bader Jaafer	Carpenter in Shibam
Salem Abdulla Azzubi	Carpenter in Tarim
Saeed Omar Belaffif	Carpenter in Seiyun
Hood Mahfood Bahishwan	Carpenter in Seiyun
Ahmed Yeslam Bashir	Carpenter in Seiyun

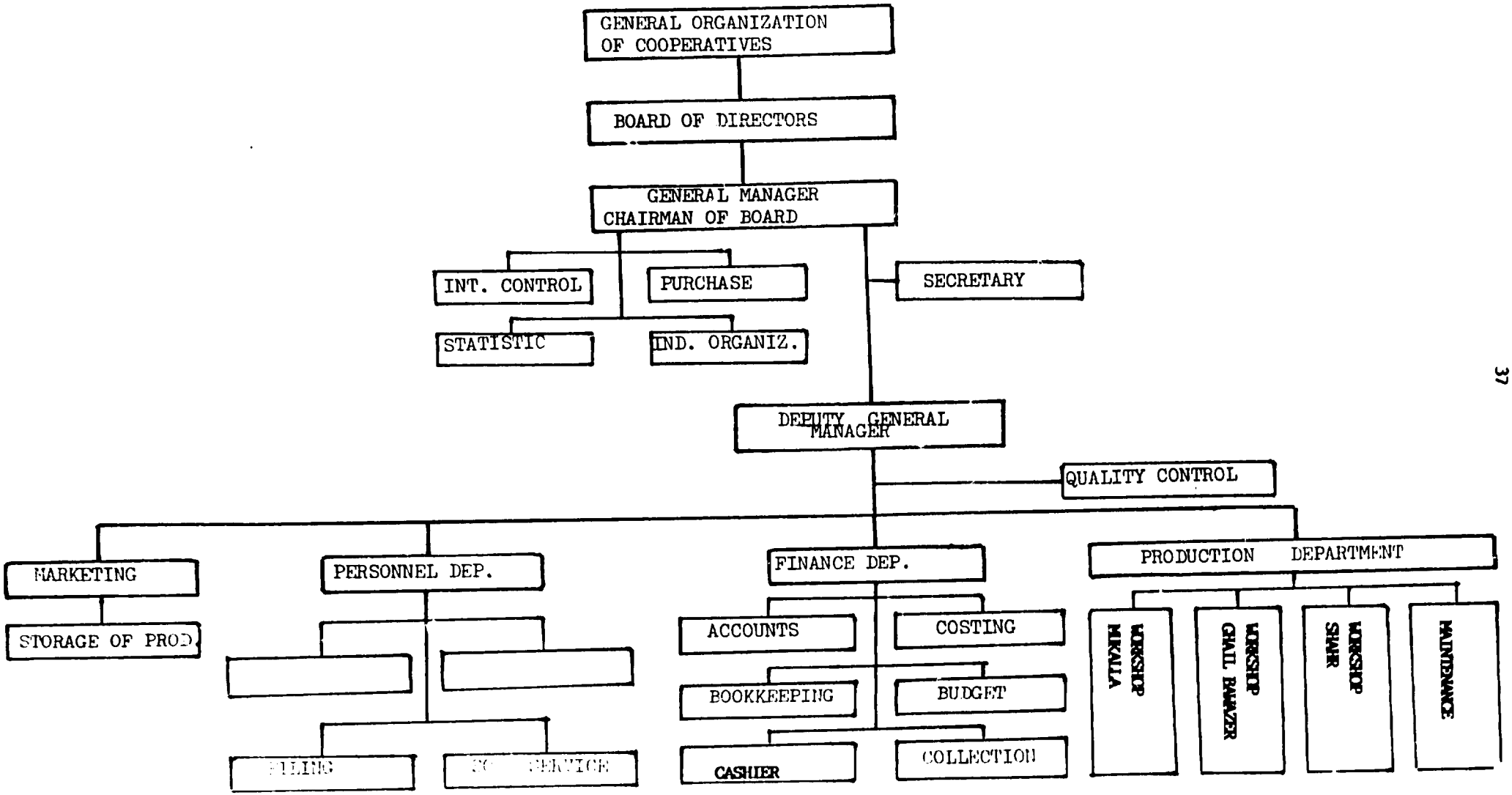
3. Plant Layout **Mukalla**

Ahmed Salim Al-Dagail	Production Manager
Joman Ahmed Al-Hemd	Proudctior Department Manager
Mohammed Awadh Bin Wabar	Sales Department Deputy Manager
Saeed Mubarak Magtoof	Furniture Assembly Supervisor
Saleh Karama Bayashoot	Production Supervisor
Nasser Bin Silman	Joinery Assembly Supervisor
Salim Obeid Bin Al-Hemd	Joinery Machining Supervisor
Abdulla Awadh Badhreis	Ghail Bawazer, Workshop Production Manager
Mohammed Ahmed Bashear	Furniture Assembler
Mahfood Salim Melag	Furniture Assembler
Mubark Abdulla Basba	Operator
Saeed Nasser Saad	Operator

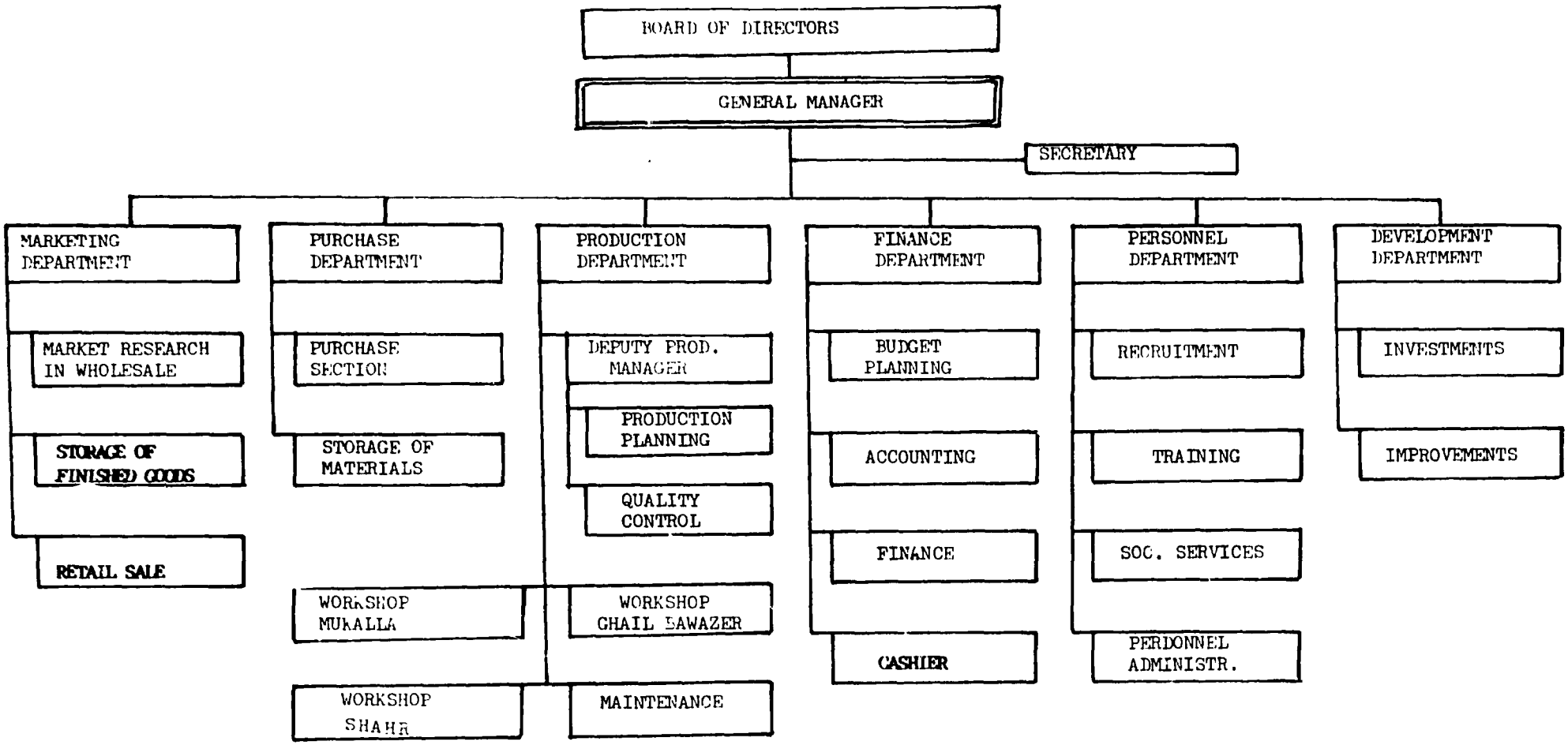
4. Panel Sizing **Mukalla**

Omer Abdulla Al-Hadad	Operator
Saeed Ahmed Thoban	Operator
Joman Mohammed Baghozeih	Operator
Omer Mohammed Sheikhan	Operator
Hussein Mohammed Al-Shahaby	Operator
Khames Saad Mubaral	Operator
Abdulla Saeed Al-Hadramy	Furniture Assembler

EXISTING ORGANIZATIONAL CHART OF CSCC MUKALLA



MACRO ORGANIZATIONAL CHART FOR CSCC MUKALLA
(proposed by the expert)



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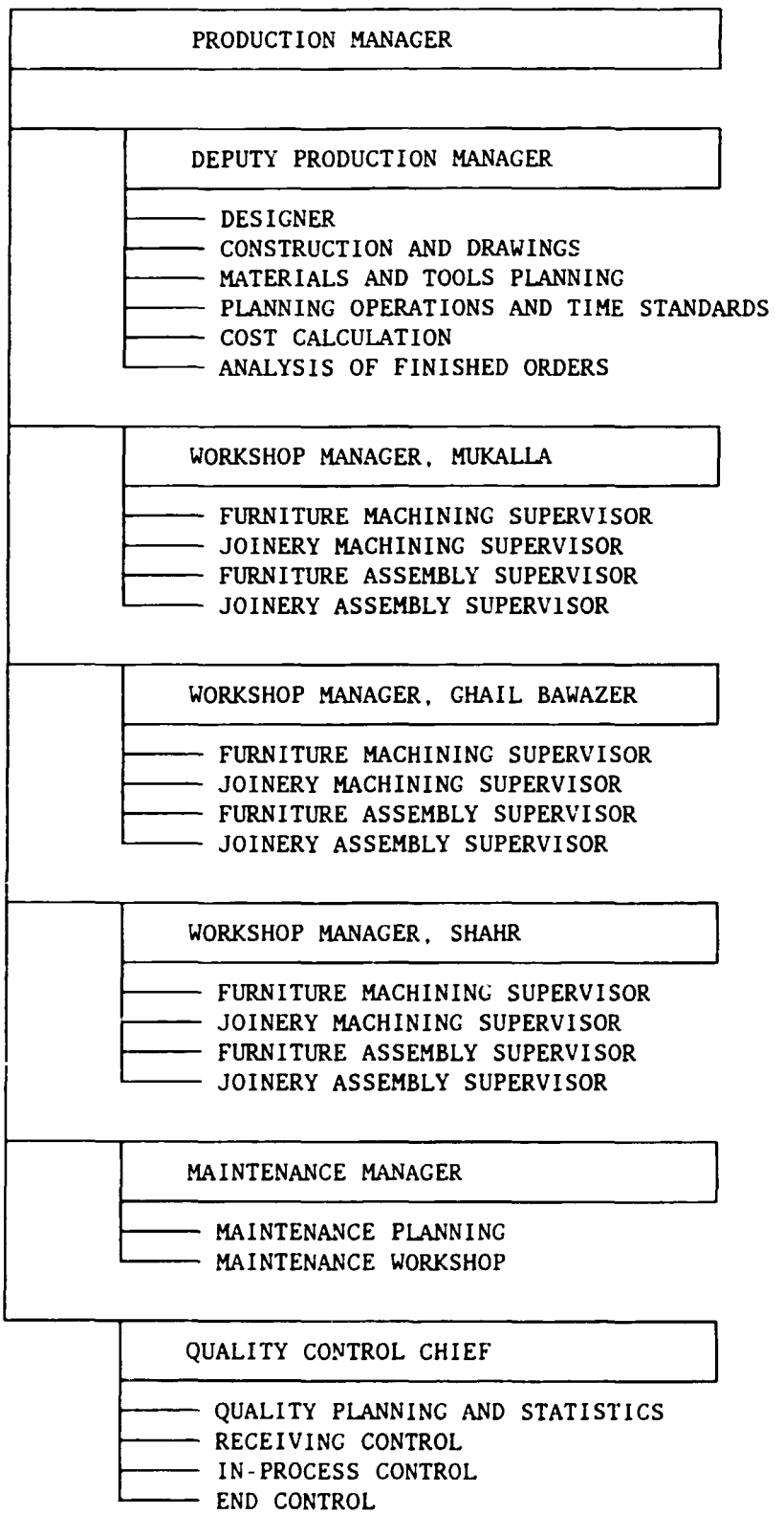
ORGANIZATIONAL CHART FOR THE PRODUCTION DEPARTMENT



ANNEX III

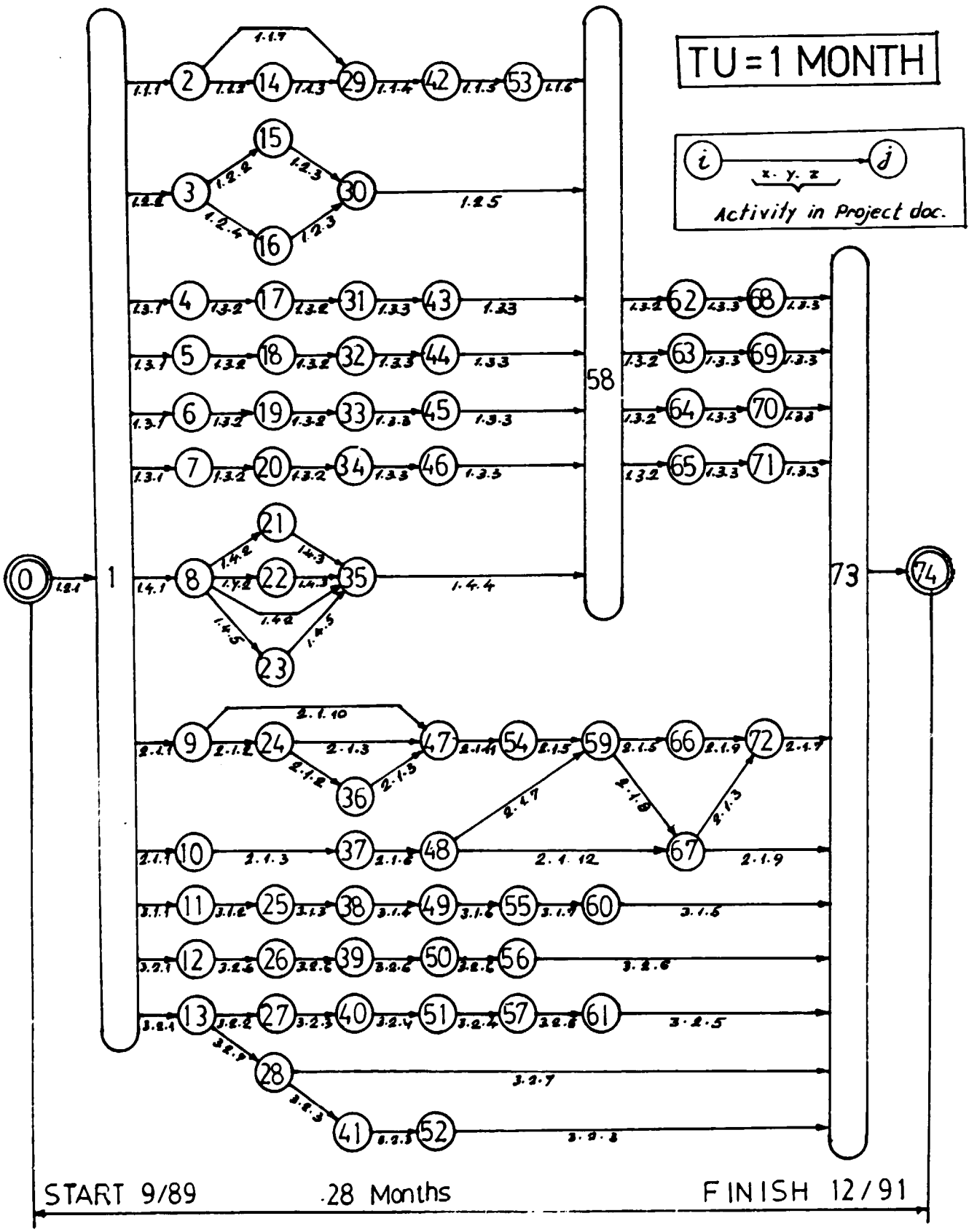
EXPERTS'S MISSION ITINERARY

	ARRIVAL DATE (1990)	DEPARTURE DATE (1990)
Sarajevo		13 March
Zagreb	13 March	13 March
Vienna	13 March	16 March
Frankfurt	16 March	16 March
Kuwait	16 March	16 March
Aden	17 March	21 March
Mukalla*	21 March	27 March
Seiyun	27 March	31 March
Mukalla	31 March	21 April
Aden	21 April	24 April
Mukalla*	24 April	11 May
Seiyun	11 May	15 May
Mukalla	15 May	2 June
Aden	2 June	9 June
Kuwait	9 June	10 June
Frankfurt	10 June	10 June
Vienna	10 June	13 June
Zagreb	13 June	13 June
Sarajevo	13 June	

* The project's car was used for both return trips from Mukalla and Seiyun.

ANNEX IV

SIMPLIFIED CPM WORK PLAN



CPM WORK PLAN

ACTIVITIES		Duration	Start	Finish	Carried out by
Number	Description				
0-1	Selection and training of four accountants at Dar Saad Institute	6	9/89	2/90	Govt.
1-2	Review of the present marketing system	0.5	4/90	4/90	11-05
1-3	Review of the present cost accounting situation	0.5	3/90	4/90	11-05
1-4	Review the different systems of production planning	0.5	4/90	5/90	11-01
1-5	Review of different systems of organization	0.5	4/90	5/90	11-01
1-6	Review of different systems of quality control	0.5	4/90	4/90	11-01
1-7	Review of different systems of stock control	0.5	4/90	4/90	11-05
1-8	Review the present procedures, criteria, prices, sources and quality of raw materials	0.5	4/90	5/90	11-01
1-9	Review of the present design capacities of both Cooperatives	0.5	4/90	4/90	11-01
1-10	Review present designs from the optimal use of materials and introduction of serial production points of view	0.5	4/90	5/90	11-01
1-11	Review and assess the production techniques presently being used in the Cooperatives	1	3/90	4/90	11-01
1-12	Review the maintenance system of all workshops of the cooperatives and the available maintenance capacities	0.5	4/90	5/90	UNV COOP
1-13	Review the condition of the machinery	0.5	4/90	5/90	11-01 UNV
2-14	Analyze the market for woodworking items	0.5	5/90	5/90	11-05
3-15	Cost analysis of products	0.5	3/90	4/90	11-05
3-16	Preparation of training manual for cost accounting	1	4/90	4/90	11-05
4-17	Advise on improvements in production planning	0.5	10/90	11/90	11-01
5-18	Advise on improvements in organization	0.5	5/90	5/90	11-01
6-19	Advise on improvements in quality control	0.5	10/90	11/90	11-01
7-20	Advise on improvements in stock control	0.5	5/90	5/90	11-05
8-21	Review the present use of raw materials	0.5	3/90	4/90	11-01

ACTIVITIES		Duration	Start	Finish	Carried out by
Number	Description				
8-22	Review the future needs of raw materials	1	11/90	11/90	11-01
8-23	Draft training manual on wood and affiliated products	0.5	4/90	4/90	11-01
8-35	Advise on new cheaper raw materials and more appropriate sources of supply	1	10/90	11/90	11-01
9-24	Prepare an organizational chart and draft terms of reference for the production department	0.5	5/90	12/90	11-01
9-47	Draft a manual on product development	1	4/90	5/90	11-01
10-37	Prepare a specific technical criteria for design	0.5	10/90	11/90	11-01
11-25	Review and assess ways to improve production techniques, quality and optimal utilization of materials	1	4/90	12/90	11-01
12-26	Review the sharpening and maintenance of tools	0.5	10/90	10/90	11-04
13-28	Design a dust exhaust system which concurs with the new layout of the workshop	2	10/90	12/90	11-01
14-29	Advise on a suitable product range	0.5	10/90	11/90	11-01
14-42	Prepare a training manual on marketing	0.5	4/90	5/90	11-05
15-30	Prepare models on the cost analysis system	1	4/90	5/90	11-05
16-30	Train four accountants	0.5	5/90	5/90	11-05
17-31	Draft a manual on production planning	1	10/90	11/90	11-01
18-32	Draft a manual on organization	1	2/91	3/91	11-01
19-33	Draft a manual on quality control	1	10/90	11/90	11-01
20-34	Draft a manual on stock control	1	3/91	4/91	11-01
21-35	Prepare technical specifications for the purchase of raw materials	0.5	11/90	12/90	11-01
22-35	Establish channels for contacting suppliers	0.5	12/90	3/91	11-01
23-35	Train counterpart staff on wood and affiliated products	0.5	5/90	5/90	11-01
24-36	Prepare a job description for the design and production department	1	10/90	12/90	11-01
24-47	Draw up a programme for new designs	0.5	10/90	11/90	11-01
25-38	Review and assess new production techniques according to new designs	0.5	11/90	12/90	11-01
26-39	Develop an appropriate system for tool maintenance	0.5	4/91	4/91	11-04

ACTIVITIES		Duration	Start	Finish	Carried out by
Number	Description				
27-40	Develop an appropriate machine maintenance system	0.5	4/90	11/90	UNV COOP 11-01
28-41	Draft a manual for occupational safety and health improvement measures	1	3/91	4/91	11-01
29-53	Supervise installations of the dust exhaust systems	2	10/91	12/91	11-01
29-42	Formulate a system for market analysis	0.5	5/90	5/90	11-05
30-58	Write a technical report on cost accounting	0.5	4/90	4/90	11-05
31-43	Train the counterpart staff in production planning	0.5	11/90	11/90	11-01
32-44	Train the counterpart staff in organization	0.5	3/91	4/91	11-01
33-45	Train the counterpart staff in quality control	0.5	11/90	12/90	11-01
34-46	train the counterpart staff in stock control	0.5	4/91	4/91	11-01
35-59	Prepare a technical report	0.5	End of each expert's mission		
36-47	Allocate design work to specific counterpart staff and supervise their work	1	11/90	4/91	11-01
37-48	Review the present production capacities with a view of introducing new designs and further rationalization	0.5	3/90	5/90	11-01
38-49	Establish training needs for labourers, middle levels and management staff	0.5	4/90	4/90	11-01
39-50	Draft a training manual on tool sharpening and maintenance	1	3/90	4/90	11-04
40-51	Draft a training manual on maintenance techniques	1	5/90	6/90	UNV
41-52	Conduct a course on occupational safety and health improvement measures	0.5	4/91	4/91	11-01
42-53	Train in marketing concept, strategies and plans	0.5	5/90	5/90	11-05
43-58	Implement improved production planning	2	2/91	4/91	11-01 COOP
44-58	Implement improved production planning	2	4/91	12/91	11-01 COOP
45-58	Implement improved quality control	2	11/90	4/91	11-01 COOP
46-58	Implement improved stock control	2	4/91	11/91	11-01 COOP
47-54	Train the Cooperative's members in design and product development	0.5	5/90	12/90	11-01

ACTIVITIES		Duration	Start	Finish	Carried out by
Number	Description				
48-59	Prepare a new layout in order to achieve flexibility and permit the introduction of new designs.	1	4/90	11/90	11-01
48-67	Select equipment to be purchased with UNDP funds.	0.5	4/90	11/90	11-01 COOP
49-55	Develop an overall training programme covering all training needs.	1	4/90	4/90	11-01
50-56	Train tool sharpeners in proper sharpening and maintenance of tools	1	4/91	4/91	11-04
51-57	Instruct maintenance technicians in proper maintenance procedures	0.5	6/90	12/90	UNV COOP
52-73	Improve occupational safety and health conditions in the workshops	4	2/91	11/91	11-01 COOP
53-58	Formulate marketing plans for 1991.	0.5	11/90	12/90	11-01 COOP
54-59	Review the designs prepared and advise on their suitability	0.5	3/91	3/91	11-01
55-60	Prepare other training manuals in accordance with the training programme	8	6/90	10/91	11-01 UNV
56-73	Supervise the implementation of the tool maintenance system.	1	4/91	4/91	11-04
57-61	Implement the plan for reconditioning of machinery	8	11/90	4/91	COOP UNV
58-62	Advise on improvements in production planning (Seiyun)	0.5	10/91	10/91	11-01
58-63	Advise on improvements in organization (Seiyun)	0.5	11/91	11/91	11-01
58-64	Advise on improvements in quality control (Seiyun)	0.5	10/91	11/91	11-01
58-65	Advise on improvements in stock control (Seiyun)	0.5	10/91	10/91	11-01
59-66	Establish a system of prototypes and rudimentary testing of products	2			
59-67	Plan the implementation of the improvements in working conditions	0.5	3/91	10/91	11-01 UNV
60-70	Conduct other training courses and provide on-the-job training in accordance with the training programme (Seiyun)	8	11/90	11/91	11-01 UNV
61-73	Supervise the implementation of the machine maintenance system (Seiyun)	6	11/90	2/91	UNV
62-68	Train the counterpart staff in production planning (Seiyun)	0.5	10/91	11/91	11-01
63-69	Train the counterpart staff in organization (Seiyun)	0.5	10/91	11/91	11-01
64-70	Train the counterpart staff in quality control	0.5	10/91	11/91	11-01

ACTIVITIES		Duration	Start	Finish	Carried out by
Number	Description				
65-71	Train the counterpart staff in stock control (Seiyun)		10/91	11/91	11-01
66-72	Introduce new designs and production techniques to production	3	3/91	12/91	11-01 UNV
67-72	Introduce various jigs in the production	4	3/91	11/91	UNV 11-01
67-73	Implement the new layout.	10	10/91	12/91	11-01 UNV
68-73	Implement improved production planning (Seiyun)	2	10/91	12/91	11-01
69-73	Implement improved organization (Seiyun)	2	10/91	12/91	11-01
70-73	Implement improved quality control (Seiyun)	2	10/91	11/91	11-01 UNV
71-73	Implement improved stock control (Seiyun)	2	10/91	11/91	11-01
72-73	Introduce techniques of rationalization of production	2	3/91	11/91	11-01
73-74	Write the terminal report and the final evaluation of the project	2	11/91	12/91	11-01

ANNEX V

TRAINING PROGRAMME FOR FURNITURE AND JOINERY PRODUCTION

This training programme is designed to achieve the objectives and outputs of the project entitled "Strengthening the Technical and Managerial Capacities of the Carpentry Cooperatives in Mukalla and Seiyun" (project No. SM/PDY/87/005).

After visiting all the production units of these Cooperatives, (the three units of the Coastal Strip Carpentry Cooperative and the four units of the Carpentry Cooperative, Seiyun), and after studying the present state of their production, it has been concluded that a thorough training of operators and managerial staff is a prerequisite for all improvement. Due to this conclusion, the training programme prepared and proposed hereunder is more comprehensive, and the training activities are more numerous than originally planned in the project document. It has been designed to meet the specific requirements of the cooperatives which are on the point of transiting from handicraft to industrial production. The topics for the training courses selected are:

COURSE NUMBER	TITLE OF COURSE	DESIGNED FOR:
1.	Production systems and types of production in the wood processing industry.	Management staff of the Cooperatives and their production units.
2.	Furniture products, classification, standards, design and construction	Production Department staff
3.	Joinery products, classification, standards, design and construction	Production Department staff
4.	Product development in the secondary wood processing industry	Staff of the production and sales departments.
5.	Organization and planning of production.	Production planning staff.
6.	Work allocation and control of production	Production planning staff, supervisors and foremen.
7.	Planning, cost accounting, pricing, cost control and optimization of a product line.	Accountants, salesmen and staff of the production department.
8.	Inventory control and purchasing techniques.	Purchasing unit's staff and staff of the production department concerned with material planning.
9.	Basic elements of marketing	Management, sales and production department staff.
10.	Modern industrial production management	Managerial staff.
11.	Information and documentation systems in the secondary wood processing industry.	Managerial staff, top and middle management of the cooperatives.
12.	Plant layout	Staff of the production department and production supervisors.

COURSE NUMBER	TITLE OF COURSE	DESIGNED FOR:
13.	Wood, affiliated products and other materials used in the production of furniture and joinery	The technical department's staff, supervisors, foremen and operators.
14.	Wood seasoning and preparation	The technical department's staff and people working in the timber yard.
15.	Crosscutting and trimming of sawnwood	Operators of crosscutting and ripping machines, and foremen in the wood cutting area.
16.	Panel sizing.	Operators of panel sizing machines and their foremen.
17.	Veneering and laminating surfaces and edges of wood based panels.	Operators laminating surfaces and edges of panel furniture components.
18.	Surface planing and thicknessing of components	Operators of surface planers/jointers and thicknessers and their foremen.
19.	Tenoning, mortising and drilling	Operators of tenoning, mortising and drilling machines and their foremen.
20.	Moulding and routing	Operators of moulding and routing machines and their foremen.
21.	Sanding and surface finishing.	Operators of sanding and surface finishing machines and their foremen.
22.	Preassembling, assembling and packaging.	Assemblers, packagers and their foremen.
23.	Managing of quality and quality control	Managerial staff at all levels, foremen and quality controllers.
24.	Jigs, templates and fixtures in the secondary wood processing industry.	Production department's staff.
25.	Tool sharpening, maintenance and managing.	Tool sharpeners and persons in charge of ordering tools.
26.	Internal transport, receiving and storage of materials and shipping of products.	Persons working in storage and internal transport services.
27.	Maintenance of equipment	Maintenance personnel.
28.	Safety measures in the secondary wood processing industries.	Foremen and supervisors in workshops.
29.	Motivation of employees	Managerial staff at all levels.
30.	Innovation and development techniques and methods.	Managerial and production department staff.

PURPOSE AND METHOD OF TRAINING

Training of employees is an integral part of production in modern industrial enterprises. Technical and technological developments offer new technical means and new production methods which make human work easier, safer and more productive. To be able to utilize such advancement, people working in industry have to learn and to train in order to achieve new knowledge and skills necessary for handling modern equipment and processes.

In developing countries, such training has decisive importance for the better utilization of new production techniques and for mastering new technological processes. To avoid unnecessary mistakes and gain indispensable skills, training courses are the most suitable way, because, in a short time, people can learn the best way of performing their duties in production.

The output of these training courses should be knowledge acquired by workers who will increase their abilities for effective production. To achieve this, the training method will rest on three stops as follows:

1. The lecturer will explain a new method.
2. The lecturer will demonstrate the new method.
3. The trainee will perform the new method under the lecturer's supervision.

Short manuals written in a simple language, understandable to the workers, will be prepared by lecturers for each course, translated into Arabic and distributed to the trainees. All graphs, tables and formulas will be adjusted to the level understandable to the people to be trained.

Theoretical teaching will be conducted in a classroom and its duration will be adapted to the minimum of theory which has to be known for a certain job. This part of the training will be performed by the CTA, other experts in the project and by United Nations Volunteers assigned to the project.

The practical part of the training will be organized at the work areas of the respective production operations. This part of the training will be carried out jointly by the experts and the UN Volunteers. The working area must be organized in a proper way, including the prepared production documents, tools, jigs, gauges, protective devices, pallets, materials and everything that is necessary for safe, productive and good quality work. The lectures should explain and show how to check a machine, tools, jigs, and in the case of wrong adjustment, how to correct them and how to prepare correctly all that is needed for the production operation.

The lecturer will show the correct way of performing the operation and supervise the performance of the trainees until he concludes that their work is fully acceptable and that the quality of the products is satisfactory. The counterparts with higher skills and experience will also be engaged to train less qualified labourers and to supervise their practical work.

Most of the training courses conducted for the Coastal Strip Carpentry Cooperative will be repeated for the Carpentry Cooperative in Seiyun, while in some cases the trainees from Seiyun will be invited to come to Mukalla. Persons from the production units outside of Mukalla and Seiyun will be travelling to these two places. Some of the practical training could and should be carried out in the satellite units by he UN volunteers.

SELECTION OF TRAINEES

Trainees will be selected by the counterpart, according to their jobs and to the topics of the training programme. Besides workers who will directly perform particular production operations, all other people concerned with certain aspects of the production, such as: foremen, supervisors, management staff, maintenance personnel, etc. can be included in the training. The list of trainees is an integral part of the training programme and it determines the number of copies of the training manuals to be prepared and distributed for each course.

TIMING OF TRAINING COURSES

The training courses will be prepared and conducted mostly during the experts' missions, and those to be conducted by the volunteers will be scheduled in between those missions. The priority should be given to the courses which are a prerequisite for the better understanding of other topics.

The timetable of all courses is a part of this programme, though the exact schedule can be changed depending on the timing of the future missions by the experts.

Some of the courses are intentionally foreseen for the last mission, hoping that by that time the workshops will be the missing equipment, which is indispensable for a proper training of the operators.

SYLLABI OF COURSES

This programme contains syllabi of all courses planned to be conducted during the project execution. The courses are broken down into topics, and, for each topic, the training duration, both theoretical and practical, and the level of competence to be reached are given.

The selection of topics and the required level of competence is aimed to reach a minimum knowledge needed for successful manufacturing of furniture and joinery products in a medium-scale factory.

Each course has its number and topics are subdivided into a decimal classification following the numbers of the courses.

Once all the training courses are completed the training material can be compiled into a printed handbook to be used throughout the country.

I. Production systems and types of production in the wood processing industry.

This course is foreseen for the management staff of the cooperatives and their production units.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
I-1	Introduction	0.25	--	Understanding the purpose of the course.
I-2	Definition of a system	0.25	--	Understanding the concept and components of a system
I-3	Kinds of systems	0.25	--	Basic knowledge about open and feed-back systems in production.
I-4	Feedback control systems	0.25	--	Understanding feedback in a management system.
I-5	The operations' function as part of the enterprise system	0.25	--	Understanding materials and information flow within the operations function.
I-6	Specific management models in secondary wood processing	0.5	--	Knowing about basic management models in the secondary wood processing.
I-7	Types of production in secondary wood processing.	0.5	--	Understanding characteristics of simple serial and mass production in the manufacture of furniture and joinery.
I-8	Optimization of a production system	0.5	-	Understanding inputs and outputs of a system and the possibility of its optimization.
1-9	Limiting factors for optimization of joinery and furniture production	0.5	--	Knowing about the main limitations that the furniture and joinery production is faced with.
	TOTAL	3.25	--	

2. Furniture products, classification, standards, design and construction.

This course is foreseen for the production department staff:

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
2-1	Introduction	0.25	--	Understanding the purpose of the course.
2-2	General knowledge about furniture products	0.25	--	Knowledge about the main characteristics of furniture products.
2-3	Classification of furniture products	0.25	--	To understand the classification of furniture products as a base for specialization of production.
2-4	Standardization and interchangeability of parts	0.25	--	Understanding the role of standardization and interchangeability of parts as well as its application in production
2-5	Design of furniture products	0.5	--	Understanding the tasks and importance of design of furniture
2-6	Construction of furniture products	0.5	8	Being able to produce constructive drawings of simple furniture products.
2-7	Drawing in detail.	0.5	8	Being able to make detailed drawings of furniture parts.
2-8	Fixed and knock-down construction	0.25	--	Knowing about knock-down constructions and their advantages.
2-9	Quality requirements in furniture production	1	--	Knowing about basic quality requirements of furniture.
	TOTAL	3.75	16	

3. Joinery products, classification, standards, design and construction

This course is foreseen for the staff of the production department

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
3-1	Introduction	0.25	--	Understanding the purpose of the course.
3-2	General knowledge of joinery products	0.25	--	Knowing the main characteristics of joinery products.
3-3	Classification of joinery products	0.25	--	Understanding the classification of joinery products as a base for production specialization.
3-4	Standardization and interchangeability of parts	0.50	--	Understanding the role of standardization and interchangeability of parts as well as its application in production.
3-5	Design of joinery products	0.5	--	Understanding the tasks and the importance of design of joinery products and the use of modular systems.
3-6	Construction of joinery products	0.5	4	Being able to produce constructive drawings of joinery products.
3-7	Detailed drawings.	0.5	4	Being able to make detailed drawings of joinery parts.
3-8	Quality requirements and testing of furniture products.	1	1	Knowing about basic quality requirements and simple testing methods for joinery products.
	TOTAL	3.75	9	

4. Product development in the secondary wood processing industry

This course is foreseen for the staff of the production and sales departments.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
4-1	Introduction	0.25	--	Understanding the purpose of the course.
4-2	Strategic approach to product development	0.25	--	Being able to make strategic decisions concerning product development.
4-3	Life cycle of products.	0.25	--	Understanding the necessity of permanent innovation of the product line.
4-4	Steps in product development	0.50	--	Knowing about procedures of product development
4-5	Analysis of market demand and factory capabilities	0.5	--	Being able to understand the importance of some of the factors of the product line.
4-6	Analysis of existing production.	0.5	--	Being able to analyze and improve products.
4-7	Design of products	1	4	Knowing about the main design factors and rules.
4-8	Production of prototypes	0.5	8	Being able to produce prototypes of new products.
4-9	Value analysis	0.5	4	Being able to carry out a simple value analysis.
4-10	Construction, detailed drawings and technical description of a new product	0.5	2	Being able to work out the construction, detailed drawings and the technical description of a product.
4-11	Recommendations for product development adapted to the Cooperatives' situation	1	--	Understanding what changes are inevitable in order to develop a more appropriate product line for the Cooperatives.
	TOTAL	5.75	18	

5. Organization and planning of production

This course is foreseen for the production planning staff.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
5-1	Introduction	0.25	--	Understanding the purpose of the course.
5-2	Organization of production in the secondary wood processing industry	0.50	--	Understanding the organizational system and its role.
5-3	Production planning.	1	1	Knowing about production planning tasks and procedures and organization of the production planning unit.
5-4	Product line data base, its preparation and maintenance	0.50	--	Understanding elementary facts about the data base and its role.
5-5	Preparation and use of production documents and processing of information	2.5	2	Knowing about production documents, their function and the procedures they are subjected to.
5-6	Job order and other relevant documents coming to a work place.	1.5	1	Being able to understand and use all documents coming to the work place as orders or instructions.
5-7	Improvement of production methods and time standards	1	1	Being able to measure operational times to analyze existing production methods and to rationalize production.
	TOTAL	6.25	5	

6. Work allocation and control of production.

This course is foreseen for the production planning staff, supervisors and foremen.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
6-1	Introduction	0.25	--	Understanding the purpose of the course.
6-2	Main characteristics of serial production.	0.50	--	Understanding the system of serial production and its advantages.
6-3	Monthly production plan.	0.25	--	Understanding the purpose of the monthly plan and the ability to control its execution.
6-4	Operational times and control of capacity utilization.	0.5	--	Knowing about structure of operational times and their use in planning capacities.
6-5	Sequence of operations.	0.5	--	Being able to work out sequences of operations.
6-6	Timing of operations	1	1	Being able to work out a monthly schedule of production.
6-7	Quality control.	0.5	--	Being able to control quality of parts produced for each job order.
6-8	Receipt of materials.	0.50	--	Knowing about procedures for the receipt of materials for the job order.
6-9	Organization of the work area.	0.5	--	Being able to organize the work area for machining and assembly operations.
6-10	Provision of tools and jigs.	0.5	--	Knowing about procedures concerning the provision of tools and jigs.
6-11	Reporting requirements.	0.5	0.5	Being able to complete data about job orders and other required information.
	TOTAL	5.5	1.5	

7. Planning, cost accounting, pricing, cost control and optimization of a product line.

This course is foreseen for accountants, salesmen and staff of the production department.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
7-1	Introduction	2	--	General information about costing.
7-2	Costing system.	1	1	Knowing how the system is built up and documentation required. Being able to produce cost calculations.
7-3	Costing and production planning.	1	1	Understanding the role of production planning and ability to optimize production line
7-4	Practical application of the new costing system.	--	2	Being able to fill out all the costing documents and keep registers. All the documents will be filled out by the participants.
7-5	Costing and pricing.	1	1	Being able to prepare information and calculate a product price.
7-6	Cost accountant job.	1	1	Understanding the duties and responsibilities of a cost accountant and his relations with other functions.
	TOTAL	6	6	

8. Inventory control and purchasing techniques.

This course is foreseen for the staff of the purchasing unit and the production department's staff concerned with material planning.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
8-1	Introduction	0.25	--	Understanding the purpose of the course.
8-2	Inventories and their functions.	0.50	--	Understanding the functions of inventories at different stages: raw materials, work in process and finished goods.
8-3	Forecasting and planning inventories	0.5	--	Being able to predict the correct needs for various inventories.
8-4	Components of demand.	0.5	--	Understanding an average demand and random effects.
8-5	Pareto (ABC) analysis of inventory	0.5	1	Being able to select inventory items according to their total value
8-6	The classical inventory models	1	1	Being able to maintain an inventory control system.
8-7	Variability of demand.	0.5	0.5	Being able to maintain an optimal level of inventories.
8-8	Inventory system for managerial control.	0.50	--	Knowing about inventory control and purchasing techniques.
	TOTAL	4.25	2.5	

9. Basic elements of marketing.

This course is foreseen for the management, sales and production department staff.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEORY	PRACTICE	
9-1	Introduction	0.25	--	Understanding the purpose of the course.
9-2	Basic concepts and considerations in marketing.	0.50	--	Understanding the basic concepts of marketing and its role.
9-3	Tasks of marketing in furniture production.	0.5	--	Understanding the basic concepts of marketing and its role.
9-4	Marketing research, methods of market study and collection of data	0.5	--	Understanding tasks and importance of market research.
9-5	Product planning in the secondary wood processing industry.	1	2	Being able to perform product planning.
9-6	Pricing.	1	2	Knowing about pricing techniques and being able to make appropriate decisions with regard to establishing a new price.
9-7	Advertising and sales promotion.	0.5	--	Understanding the role and ways of advertising and sales promotion.
9-8	Distribution	0.50	--	Knowing of distribution channels and prosonal selling.
9-9	Planning and programming marketing efforts for cooperatives	1	2	Being able to perform marketing planning.
9-10	Organization of a marketing oriented company.	0.5	--	Better understanding of marketing concepts.vision of tools and jigs.
9-11	Management in marketing.	0.5	--	Understanding the tasks of the management in marketing.
9-12	Fundamentals of export trade.	1		Knowing about the basic approach to the foreign markets and the advantages of export trade.
	TOTAL	7.75	6	

10. Modern industrial production management.

This course is intended for managerial staff.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEORY	PRACTICE	
10-1	Introduction	0.25	--	Understanding the purpose of the course.
10-2	Basic characteristics of an industrial organization.	0.50	--	Knowing about the structure of small to medium industrial organization.
10-3	Role of management in a modern industrial enterprise.	1	--	Understanding the essential tasks of management in a modern enterprise.
10-4	Information system as a base for making a decision.	1	--	Being able to design a simple information system at the cooperative level.
10-5	Organization of decisions.	1	2	Acquiring general knowledge about the existence of some well known decision preparation methods.
10-6	Some management techniques: ABC analysis, CPM method, management by objectives etc.	2	2	Being able to understand and use these methods in a simple form.
10-7	Management in the carpentry cooperative.	1	--	Understanding some specific tasks of management of a Cooperative.
10-8	Controlling utilization of capacities, materials and other resources.	1	1	Being able to establish control systems for main resources.
10-9	Planning and controlling economic results of production.	1	1	Being able to use a direct costing system for planning and control of economic results.
10-10	Keeping up with development trends in the world.	0.5	--	Knowing how to get and use information about the global development of the sector.
10-11	Motivation as a management factor for achieving goals	0.5	0.5	Being able to understand and use the most important motivations.
	TOTAL	9.75	6	

11. Information and documentation systems in the secondary wood processing industry.

This course is foreseen for the top and middle management of the Cooperatives.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
11-1	Introduction	0.25	--	Understanding the purpose of the course.
11-2	Definition of information and its characteristics.	0.25	--	Understanding the essence of information.
11-3	Information systems oriented towards the tasks of management, functions and technological needs.	0.50	--	Being able to understand and to create simple information systems and sub-systems.
11-4	Components of an information system.	0.5	--	Understanding roles of the system's components: senders, transmitters, sensors, receivers, coders, decoders, etc.
11-5	Documentation and principles of its creation	0.5	1	Understanding and using written documents as a main transmitter of information.
11-6	Circulation of documents.	0.25		Becoming familiar with the documents circulation scheme.
11-7	Selection of information for the various levels of management.	0.25	--	Being able to select information for each management level.
11-8	Optimal level of information for an optimal decision making system.	0.50	--	Being able to decide about an appropriate number and type of information for making various decisions.
	TOTAL	3	1	

12. Plant layout.

This course is foreseen for the staff of the production department and production supervisors.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
12-1	Introduction	0.25	--	Understanding the purpose of the course.
12-2	Objective of a plant layout.	0.25	--	Understanding which factors have to be taken into consideration.
12-3	Starting points for a plant layout.	0.25	--	Knowing about necessary information for planing a layout.
12-4	Special characteristics of production in the furniture and joinery industries.	0.5	--	Knowing about special characteristics of secondary wood processing to be taken into consideration.
12-5	Arrangement for production.	0.25	--	Understanding various principles of arranging production capacities.
12-6	Production capacity.	0.50	--	Knowing about the average capacities of basic woodworking machines.
12-7	Mans and facilities for plant layout.	0.5	2	Knowing about means and facilities needed for planning the layout of a plant.
12-8	Production flow.	0.50	--	Being able to select an appropriate production flow.
12-9	Plant layout.	2	8	Ability to design a simple plant layout.
12-10	The factory building.	0.50	--	Knowing about major characteristics of a modern factory building in the furniture and joinery industries.
12-11	The factory area.	0.5	--	Knowing about requirements for the production areas.
	TOTAL	6	10	

13. Wood, affiliated products and other materials used in the production of furniture and joinery.

This course is foreseen for the staff of the technical department, supervisors, foremen and operators.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEORY	PRACTICE	
13-1	Introduction	0.25	--	Understanding the purpose of the course.
13-2	Growth process of a tree and anatomy of wood.	0.25	--	Understanding wood's structure and the properties of wood and wooden products.
13-3	Classification of wood species, hardwood, softwood and major species used for furniture and joinery products.	0.25	--	Being able to recognize major wood species and distinguish hardwoods, softwoods, sapwood and heart wood.
13-4	Physical and mechanical characteristics of wood.	0.25	--	Understanding better the relationship between the properties of wood, the construction of wooden products and the processing methods.
13-5	Moisture content and shrinkage of wood.	0.25	0.25	Understanding the changes occurring in wood during drying and deformities caused by shrinkage and swelling.
13-6	Sawnwood, its sizes, quality and use in the secondary wood processing industry.	0.25	0.25	Being able to select proper sawnwood taking into account quality, dimensions and price.
13-7	Veneers and plastic foils used in furniture production.	0.25	--	Knowing about the main characteristics of veneers and plastic foils.
13-8	Plywood and its use in furniture production.	0.25	--	Knowledge about plywood as a raw material for furniture manufacturing.
13-9	Blockboard and its use in furniture production.	0.25	--	Knowing about blockboard and its processing and use in furniture production.
13-10	Particle board, its standard properties and use in furniture production.	0.25	--	Knowing about the properties of particle board which are important for its processing and better utilization in furniture production.
13-11	Fibreboard (elementary information).	0.25	--	Acquiring general knowledge about fibreboard and its use in the manufacture of furniture.
13-12	Surface improved boards (elementary information).	0.25		Acquiring general knowledge about surface improved boards and the possibilities of their use in the production of furniture.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
13-13	Glues and glue additives used in the woodworking industries	0.50	--	Knowing about the basic properties of various kinds of glues sued in the woodworking industries.
13-14	Surface finishing materials used for finishing furniture and joinery products	0.5	--	Acquiring general knowledge about various lacquering materials as: thinners, stains, paints, and other materials used for finishing furniture and joinery products.
13-15	Metal components: hardware, fittings, jointers and their use in the production of furniture.	0.50	0.25	Acquiring general knowledge about metal components and their use in the manufacture of furniture and joinery products.
13-16	Plastic components and other materials used in the production of case furniture.	0.25	--	Acquiring general knowledge about the major plastic components and some other products which could be used for the manufacture of furniture and joinery.
	TOTAL	4.5	1	

14. Wood seasoning and preparation.

This course is foreseen for the technical department's staff and people in the timber yard.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
14-1	Introduction	0.25	--	Understanding the purpose of the course.
14-2	Purpose of seasoning wood for the secondary wood processing industry.	0.25	--	Understanding the purpose and importance of wood seasoning for better utilization and better quality of products.
14-3	Methods of wood seasoning: air seasoning and kiln seasoning.	0.5	--	Knowing about the various possibilities for wood seasoning and their respective advantages and disadvantages.
14-4	Equilibrium moisture content in wood and its level for different products.	0.5	--	Understanding the essence of the moisture equilibrium point and its practical importance.
14-5	Stacking sawnwood for seasoning and protection from direct sunlight and rain.	0.5	2	Being able to stack sawnwood correctly for air seasoning and eventually also kiln seasoning.
14-6	Measuring moisture content in wood.	0.50	0.50	Knowing about the methods for measuring moisture content in wood and being able to use simple methods.
14-7	Defects occurring during seasoning and how to prevent them.	0.50	0.50	Knowing about defects occurring because of shrinkage and swelling of wood and how to prevent them.
14-8	Costs and benefits of wood seasoning in the secondary wood processing.	0.50	--	Knowing about costs and benefits of seasoning wood and how to optimize this treatment.
	TOTAL	3.5	3	

15. Cross-cutting and trimming of sawnwood.

This course is foreseen for operators of cross-cutting and ripping machines and foremen in the wood cutting area.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
15-1	Introduction	0.25	--	Understanding the purpose of the course.
15-2	Importance of wood optimization.	0.25	--	Understanding the importance of better optimization of wood used as a raw material.
15-3	Cross-cutting on circular saws.	0.25	1	Being able to operate a circular cross-cutting saw.
15-4	Ripping on circular saws.	0.25	1	Being able to operate circular ripping saws.
15-5	Bandsaws of operations.	0.25	1	Being able to operate narrow bandsaws.
15-6	Wood cutting tools.	0.25	1	Knowing about the main characteristics of wood cutting tools and how to control them.
15-7	Jigs and gauges.	0.50	1	Being able to use jigs and gauges and understanding their advantages.
15-8	Cutting lists.	0.25	0.50	Being able to read a wood cutting list and execute the instructions contained in it.
15-9	Cross-cutting operations.	1	2	Being able to perform the operation and produce the required parts
15-10	Ripping operations.	1	2	Being able to perform the operation and produce the required parts.
15-11	Sawing on bandsaws	1	2	Being able to produce straight and curved parts as required.
15-12	Safety measures.	0.50	0.50	Knowing the proper use of safety fixtures and obeying safety measures.
15-13	Organization of the working areas.	0.25	--	Being able to organize the working area for safe and comfortable work.
	TOTAL	6	12	

16. Panel sizing.

This course is foreseen for the operators of panel sizing machines.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
16-1	Introduction	0.25	--	Understanding the purpose of the course.
16-2	Sizing lists, panel sawing schemes and optimal utilization of boards.	0.50	--	Being able to understand a cutting list and sizing scheme and to produce parts in accordance to these documents.
16-3	Panel sizing saws. plan.	0.50	1	Being able to operate panel sizing saws.
16-4	Characteristics of sawblades for panel sizing saws.	0.25	--	Knowing the appropriate sawblade parameters for sawing wood-based panels and laminated boards.
16-5	Panel sizing operations.	0.5	1	Being able to perform panel sizing operations in accordance with the production documents.
16-6	Safety measures.	0.25	0.50	Being familiar with safety measures.
16-7	Organizing the working area.	0.25	0.50	Being able to organize the working area for safe and comfortable work.
	TOTAL	2.5	3	

17. Veneering and laminating surfaces and edges of wood based panels.

This course is foreseen for foremen and operators of the laminating operations on surfaces and edges of wood based panels.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
17-1	Introduction	0.25	--	Understanding the purpose of the course.
17-2	Glues and other ingredients in glue mixtures.	1	--	Being able to select and prepare a glue in accordance with its end use.
17-3	Glue spreading equipment and methods.	0.25	--	Knowing about the working principles and the advantages of various glue spreading machines.
17-4	Mechanical and hydraulic cold and hot presses.	1	--	Knowing about various presses which could be used for laminating and/or veneering operations.
17-5	Laminating wood based panels.	1	2	Being able to laminate correctly wood based panels with various laminates.
17-6	Safety measures.	0.25	--	Being able to apply safety measures.
17-7	Organization of the working area.	0.25	--	Being able to organize the working area for safe and comfortable work.
	TOTAL	4	2	

18. Surface planing and thicknessing of components.

This course is foreseen for operators of the surface planers/jointers and thicknessers and their foremen.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
18-1	Introduction	0.25	--	Understanding the purpose of the course.
18-2	Surface planers/joiners.	0.50	1	Being able to operate surface planers/jointers.
18-3	Thicknessers.	0.50	1	Being able to operate thicknessers.
18-4	Multi-spindle planers/profilers.	0.5	--	Acquiring general knowledge about planers/profilers.
18-5	Wood planing and thicknessing.	0.5	--	Being able to select and set correctly wood planing and thicknessing equipment.
18-6	Jigs used for planing and thicknessing operations.	0.50	1	Knowing about various jigs used for planing and thicknessing.
18-7	The planing/jointing operation.	--	1	Being able to perform correctly planing/jointing operations.
18-8	The thicknessing operation	--	1	Being able to perform correctly thicknessing operations.
18-9	Safety measures.	0.25	0.25	Being able to apply safety measures in these operations.
18-10	Organization of the working area.	0.25	0.25	Being able to organize the working area for safe and comfortable work.
	TOTAL	3.25	5.50	

19. Tenoning, mortising and drilling.

This course is foreseen for operators of tenoning, mortising and drilling machines and their foremen.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
19-1	Introduction	0.25	--	Understanding the purpose of the course.
19-2	Tenoners and other woodworking machines used for making tenons in solid wood parts.	1	1	Being able to operate tenoners for open tenons and knowing about other tenon-making machines.
19-3	Mortisers and other machines used for making mortises in solid wood parts.	1	1	Being able to operate chain mortisers and general knowledge about other mortising machines.
19-4	Drilling machines.	1	1	Being able to operate simple spindle drilling machines and acquiring general knowledge about drilling machines.
19-5	Tenoning, mortising and drilling tools.	1	1	Being able to select and set up correctly tools for the required operations.
19-6	Jigs used for tenoning, mortising and drilling.	1	1	Knowing about jigs used for tenoning, mortising and drilling.
19-7	Tenoning operations.	--	1	Being able to perform correctly tenoning operations.
19-8	Mortising operations.	--	1	Being able to perform correctly mortising operations. for the job order.
19-9	Drilling operations.	--	1	Being able to perform correctly drilling operations.
19-10	Safety measures.	0.25	0.25	Being able to apply safety measures for all the above operations.
19-11	Organization of the working area.	0.50	0.50	Being able to organize the working area in a safe and comfortable way.
	TOTAL	6	8.5	

20. Moulding and routing.

This course is foreseen for operators of moulding and routing machines and their foremen.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
20-1	Introduction	0.25	--	Understanding the purpose of the course.
20-2	Single spindle moulder.	0.50	1	Being able to operate a single spindle moulder.
20-3	High speed router plan.	0.50	--	Being able to operate a high speed router.
20-4	Moulding and routing tools.	1	1	Being able to select and set appropriate moulding and routing tools.
20-5	Jigs used for moulding and routing.	1	1	Knowing about the various jigs used for moulding and routing operations.
20-6	Moulding operations	-	1	Being able to perform correctly moulding operations.
20-7	Routing operations.	0.5	--	Being able to perform correctly routing operations.
20-8	Safety measures.	0.50	0.50	Being able to apply safety measures in moulding and routing operations.
20-9	Organization of working areas.	0.25	0.25	Being able to organize the working areas for safe and comfortable work.
	TOTAL	4.5	4.75	

21. Sanding and surface finishing.

This course is foreseen for operators of sanding and surface finishing machines and their foremen.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
21-1	Introduction	0.25	--	Understanding the purpose of the course.
21-2	Sanding machines	0.50	0.50	Acquiring general knowledge about sanding machines.
21-3	Sanding papers.	0.50	--	Being able to select appropriate sanding paper.
21-4	Sanding operations.	0.5	0.50	Being able to perform sanding operations on a narrow belt sanding machine.
21-5	Surface finishing materials.	2	--	Acquiring general knowledge about surface finishing materials.
21-6	Spray guns.	0.50	1	Being able to set up spray guns for coating.
21-7	Spray booths and other surface finishing equipment.	1	--	Acquiring general knowledge about surface finishing equipment.
21-8	Undercoating and coating with a spray gun.	0.50	1	Being able to perform coating by using spray guns.
21-9	Safety measures and fire prevention.	0.5	--	Being able to apply safety and fire prevention measures and to use fire extinguishers.
	TOTAL	6.25	3	

22. Preassembling, assembling and packaging

This course is foreseen for assemblers, packagers and their foremen.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
22-1	Introduction	0.25	--	Understanding the purpose of the course.
22-2	Assembly benches.	0.25	0.50	Acquiring knowledge on how to use assembly benches equipped with pneumatic pistons.
22-3	Assembly clamps.	0.25	0.50	Being able to use assembling clamps for assembling furniture and joinery products.
22-4	Use of compressed air and pneumatic hand tools (drills, screw drivers, staplers, nail guns etc.)	0.50	1	Knowing the proper use of compressed air and being able to work with pneumatic hand tools.
22-5	Glues used for assembling wooden products.	0.50	--	Acquiring basic knowledge on glues used for assembling wooden products.
22-6	Hardware and joining components used for assembly.	0.50	0.50	Acquiring knowledge on various hardware and joining products used for assembling furniture and joinery.
22-7	Control of parts and performing assembly operations.	0.5	2	Acquiring knowledge on how to check the quality of parts and the ability to perform assembling operations.
22-8	Control of assembled units.	0.50	2	Being able to check the quality of the product in accordance with standards.
22-9	Packaging materials, cleaning and packaging	0.25	0.50	Acquiring the knowledge of cleaning and correct packing of furniture products.
22-10	Organization of working area and safety measures.	--	0.50	Being able to organize the working area for a safe and comfortable work.
	TOTAL	3.5	7.5	

23. Managing of quality and quality control.

This course is foreseen for managerial staff at all levels, foremen and quality controllers.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEC-RY	PRAC-TICE	
23-1	Introduction	0.25	--	Understanding the purpose of the course.
23-2	Importance of quality in secondary wood processing.	0.50	--	Understanding the importance of quality for a successful business.
23-3	Quality standards for furniture and joinery products.	1	1	Being able to apply quality standards for materials and accuracy of machining.
23-4	Production factors affecting quality.	0.5	--	Understanding the influence of various production factors on the quality of the furniture.
23-5	Measuring instruments and gauges for quality control	0.50	0.50	Being able to use various measuring instruments and gauges in order to control the quality of parts and products.
23-6	Quality control by operators.	0.50	1	Being able to perform simple quality control before and after operations.
23-7	Quality control procedures in the secondary wood processing industry.	0.50	0.50	Understanding a quality control information system and a system of prevention and correction of production mistakes.
23-8	How to improve quality	0.50	--	Acquiring the knowledge on how to achieve an improvement of quality.
23-9	How to avoid defective work.	0.5	1	Acquiring knowledge on the methods for reducing defects.
23-10	quality and productivity.	0.50	--	Understanding relations between quality and productivity.
	TOTAL	5.25	4	

24. Jigs, templates and fixtures in the secondary wood processing industry.

This course is foreseen for the production department's staff.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
24-1	Introduction	0.25	--	Understanding the purpose of the course.
24-2	Economic aspects of making and using jigs.	0.50	--	Understanding the importance of jigs on the economic results of production.
24-3	Technical aspects in the design of jigs	1	1	Acquiring knowledge on the construction of jigs, stoppers and fixing elements; materials for jigs, accuracy and quality of jigs.
24-4	Storage and identification of jigs.	0.50	--	Understanding the necessity of storage and identification of jigs.
24-5	Templates and various fixtures used in the secondary wood processing industry.	0.50	--	Acquiring general knowledge on various templates and fixtures regularly used for the manufacture of wooden products.
24-6	Examples of jigs for use in machining of furniture and joinery parts.	2	1	Being able to construct and use simple jigs for the most common machining operations.
24-7	Examples of jigs for use in assembly of furniture and joinery products.	1	1	Being able to construct and use simple jigs for the most common assembly operations.
24-8	Impact of jigs on productivity, quality and safety.	0.50	--	Understanding the influence of the use of jigs on productivity, quality and safety.
	TOTAL	6.25	3	

25. Tool sharpening, maintenance and management.

This course is foreseen for tool sharpeners and people in charge of ordering tools.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
25-1	Introduction	0.25	--	Understanding the purpose of the course.
25-2	Types of woodworking machines.	0.50	--	Acquiring knowledge on woodworking machines and their elements.
25-3	Circular sawblades plan.	0.50	0.50	Acknowledging knowledge of circular saw blades and the ability to select their proper parameters.
25-4	Bandsaw blades.	0.50	0.50	Acquiring the knowledge on bandsaw blades and their characteristics.
25-5	Planing knives.rations.	0.50	--	Acquiring basic knowledge on wood planing knives.
25-6	Mortising chains.	0.25	1	Acquiring basic knowledge of mortising chains.
25-7	Moulding cutters and profilers.	1	1	Acquiring knowledge on various solid and inserted tooth tools, moulder cutters and profilers.
25-8	Routing bits.	0.50	0.50	Acquiring knowledge on various routing bits and their use.
25-9	Borers.	0.25	0.50	Acquiring knowledge on various drilling tools and the ability to select the appropriate ones.
29-10	Setting and tensioning saw[illegible]les.	0.50	0.50	Understanding the importance of proper setting and tensioning of saw blades.
29-11	Sharpening and maintenance of tools	1	1	Acquiring knowledge on the basic requirements of tool sharpening and maintenance.
29-12	Balancing and control of tools.	0.50	--	Understanding the importance and method of tool balancing and tool control.
29-13	Managing stocks and ordering tools	1	1	Acquiring knowledge about planning, ordering, storing and issuing of tools.
	TOTAL	7.25	5.50	

26. Internal transport, receiving, storage of materials and shipping of products.

This course is foreseen for persons working in storage and internal transport services.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
26-1	Introduction	0.25	--	Understanding the purpose of the course.
26-2	Internal transport in the secondary wood processing industry.	0.50	--	Knowing the pallet systems, manually operated hydraulic trucks, fork-lifts, conveyors and containers. Elementary information about dust extraction systems.
26-3	Cost of internal transport	0.50	--	Understanding costs of internal transport and how to minimize it.control its execution.
26-4	Organization of internal transport.	0.50	--	Understanding the organization of internal transport in order to ensure continuous production.
26-5	Receiving of materials.	0.50	0.50	Being able to receive materials and to perform adequate control.
26-6	Storage and stock keeping of materials.	0.50	0.50	Being able to ensure a proper storage and to carry out the necessary stock keeping of materials.
26-7	Issuing of materials to the production.	0.50	0.50	Being able to issue materials in accordance with specifications.
26-8	Receiving, storage and shipping of finished products.	0.50	0.50	Being able to carry out handling of finished products and to protect them.
26-9	Life-time and protection of perishable materials.	0.25	--	Acquiring knowledge about perishable materials and procedures for their correct storage.
26-10	First in/first out method of storage of materials.	0.25		Acquiring the ability to carry out storage employing the first in/first out method.
	TOTAL	4.25	2	

27. Equipment maintenance.

This course is foreseen for the maintenance personnel.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
27-1	Introduction	0.25	--	Understanding the purpose of the course.
27-2	Duties of maintenance of machinery and equipment.	0.25	--	Understanding tasks and duties of the maintenance staff and their responsibility for the proper functioning of equipment.
27-3	Organization of maintenance.	0.50	--	Understanding the organizational structure of the maintenance unit.
27-4	Maintenance card files.	0.50	1	Being able to establish and maintain a maintenance documentation and information system.
27-5	Preventive maintenance.	0.50	--	Understanding the essence of a preventive maintenance system.
27-6	Preventive engineering.	0.50	2	Acquiring the ability to perform checking of machines and to plan maintenance activities.
27-7	Lubrication maintenance.	0.50	1	Acquiring the knowledge about greasing and oiling and the ability to lubricate machines.
27-8	Spare parts for maintenance.	0.50	0.50	Acquiring the knowledge of ordering spare parts and the maintenance of their inventory.
27-9	Mounting the machines.	0.50	2	Being able to mount machines and to check if they are adjusted properly.
27-10	Maintenance of electric parts.	0.50	0.50	Learning basic elements about maintenance of electric parts.
27-11	Maintenance of pneumatic and hydraulic parts.	0.50	0.50	Being able to maintain hydraulic and pneumatic systems used in the production processes.
27-12	Inspection, maintenance and change of bearings.	0.50	2	Being able to control and exchange all types of bearings.
	TOTAL	5.5	9.5	

28. Safety measure in the secondary wood processing industries.

This course is foreseen for the foremen and supervisors in workshops.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
28-1	Introduction	0.25	--	Understanding the purpose of the course.
28-2	Occupational injuries in the secondary wood processing industry.	0.50	--	Acquiring the knowledge of the most common injuries which occur in the secondary wood processing industries.
28-3	Occupational diseases in the secondary woodworking industries.	0.50	--	Knowing about the most common occupational diseases in the woodworking industries.
28-4	Occupational health problems.	0.50	--	Knowing about some hazards causing health problems in the woodworking industry.
28-5	Ergonomics.	0.50	--	Knowing of the adaptation of the working environment to the work.
28-6	Woodworking machines and tools, safety problems and solutions.	2	4	Knowing of specific dangers of woodworking machines and tools and the acquiring the ability to prevent injuries.
28-7	Other safety problems.	1	1	Knowing of prevention of fires, electrical shock and preventing injuries during repair and maintenance work.
28-8	Safety regulations at the national and factory levels.	0.50		Informing on the existence of safety rules and the obligation to respect them.
	TOTAL	5.25	5	

29. Motivation of employees.

This course is foreseen for the managerial staff at all levels.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
29-1	Introduction	0.25	--	Understanding the purpose of the course.
29-2	The role of motivation and motivational factors.	0.25	--	Understanding the role and ways of motivation. Ability to apply a motivation system in the Cooperatives.
29-3	Incentives for the quality of production.	0.50	--	Acquiring the ability to develop their own incentive system for stimulating the quantity of productions.
29-4	Incentives for the quality of production.	0.50	--	Acquiring the ability to develop their own system for the quality of products.
29-5	Incentives for lowering the cost of production.	0.50	--	Acquiring the ability to use a simple motivation system in order to minimize production costs.
29-6	Incentives for outstanding performance.	0.25	--	Understanding why and how to award the best performers in the Cooperatives.
29-7	Incentives of innovations and rationalizations in the production.	0.25	--	Being able to cause efforts for innovations and all kind of improvements in the production.
29-8	Incentive rules and criteria.	0.50	--	Understanding how and why some incentive rules ought to be established.
	TOTAL	3	--	

30. Innovations and development techniques and methods.

This course is intended for the managerial and production department staff.

STAGE	TOPICS	TRAINING TIME (hours)		LEVEL OF COMPETENCE TO BE REACHED
		THEO-RY	PRAC-TICE	
30-1	Introduction	0.25	--	Understanding the purpose of the course.
30-2	Innovations and innovative companies.	0.50	--	Understanding the essence of innovation.
30-3	Innovations of the product line.	0.25	--	Understanding the importance of continuous innovation of products.
30-4	Innovations in technological processes.	0.50	--	Basic knowledge about technological innovations.
30-5	Development as against stagnation and decline.	0.25	--	Understanding the necessity of development as the only alternative of stagnation and decline.
30-6	Development by means of investments.	0.25	--	Understanding when and how to invest.
30-7	Development by means of improvements of methods and quality of work.	0.50	--	Knowing about some improvement of methods and techniques applicable to the secondary wood processing industry.
30-8	Development and transfer of technology.	0.25	--	Understanding ways of transfer of technology and how to make a successful transfer.
	TOTAL	2.75	--	

ANNEX VI

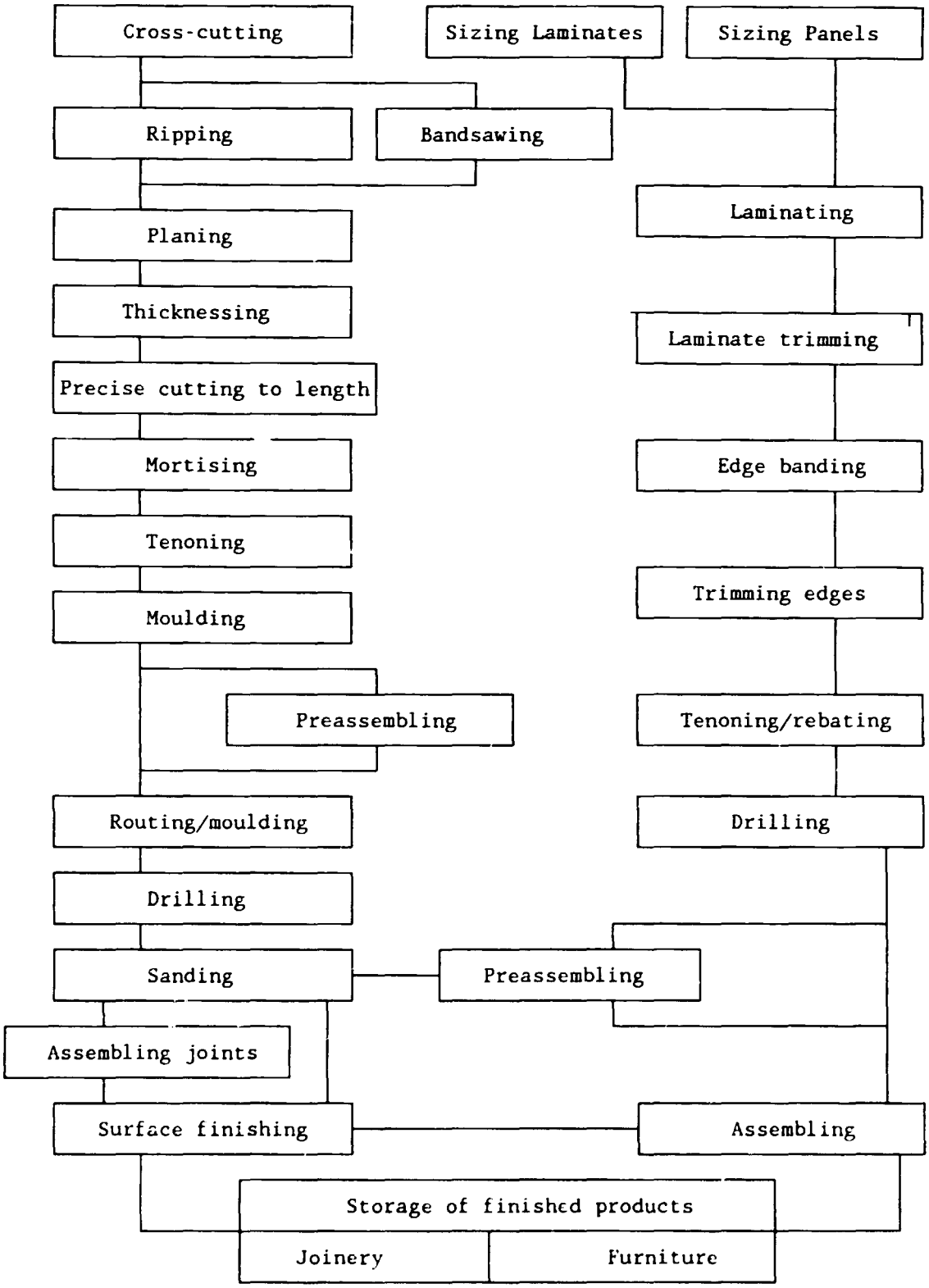
PLANT LAYOUTS

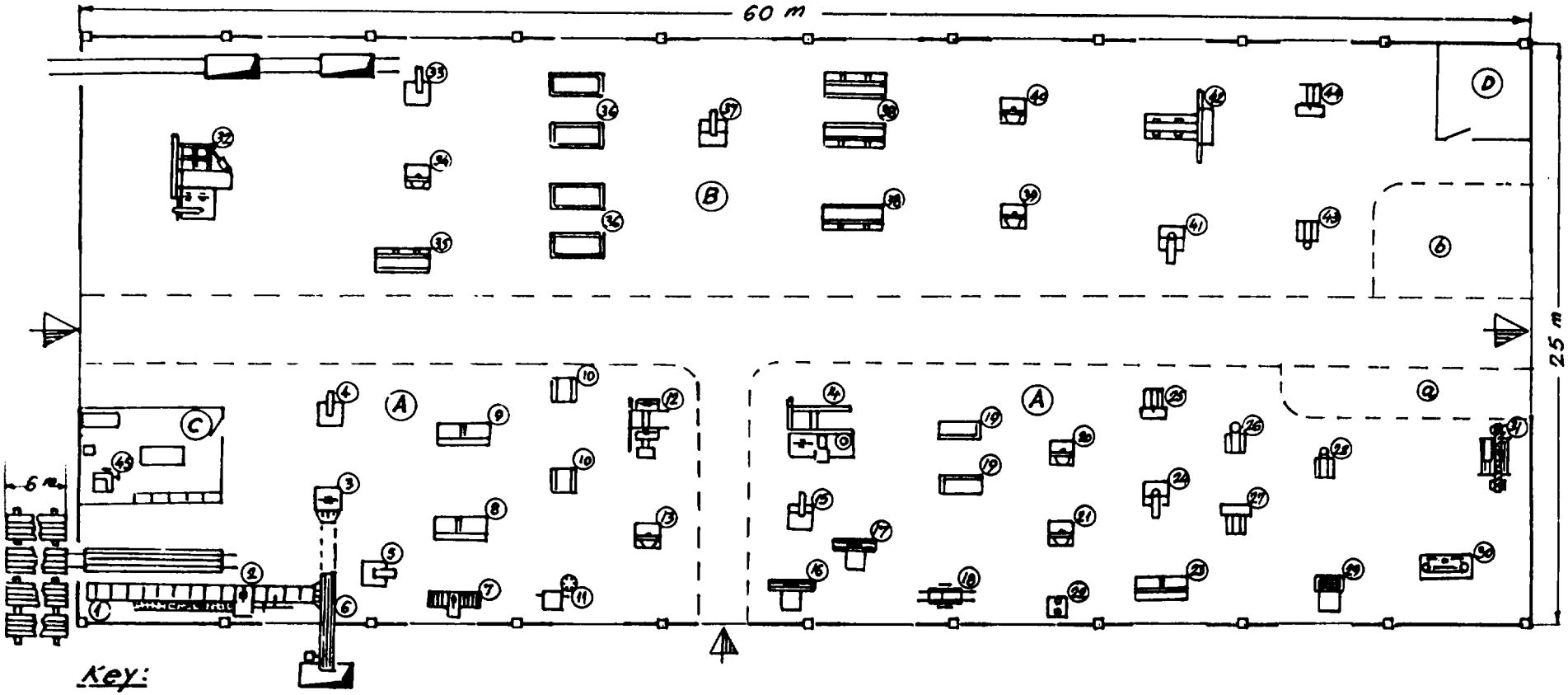
Chart showing sequential operations in the processing of solid wood (joinery) and panel (furniture) components

1.	Mukalla workshop	Machining Department Assembling Department
2.	Seiyun Workshop	General Layout Workshop Layout

Lists of equipment in Mukalla and Seiyun.

CHART SHOWING SEQUENTIAL OPERATIONS IN THE PROCESSING OF SOLID WOOD (JOINERY) AND PANEL (FURNITURE) COMPONENTS





Key:

1. Dead rollers
2. Cross cut saw
3. Ripping circular saw
4. Narrow band saw
5. Narrow band saw
6. Belt conveyor
7. Auxiliary cross cut saw
8. Surface planer
9. Surface planer
10. Thicknesser
11. Dowel making mach.
12. Double end circ. saw
13. Spindle moulder
14. Single end tenoner
15. Narrow band saw
16. Chain mortiser
17. Chain mortiser
18. Slotting machine
19. Preassembling bench
20. Spindle moulder
21. Spindle moulder
22. Lathe profiler
23. Surface planer
24. High speed router
25. Horiz. spindle drill
26. Vertical drill
27. Horizontal drill
28. Vertical drill
29. Brush sander
30. Univ. belt sander
31. Horiz. belt sander
32. Panel sizing saw
33. Narrow band saw
34. Spindle moulder
35. Bench for edging
36. Bench for laminating
37. Narrow band saw
38. Bench for edge bandin.
39. Spindle moulder
40. Spindle moulder
41. High speed router
42. Multi spindle drill
43. Vertical drill
44. Horizontal drill
45. Univ. tool sharpener

a. Quality control area
b. Quality control area

A. Machining solid wood parts
B. Machining panel parts
C. Sharpening wood work tools
D. Foremens office

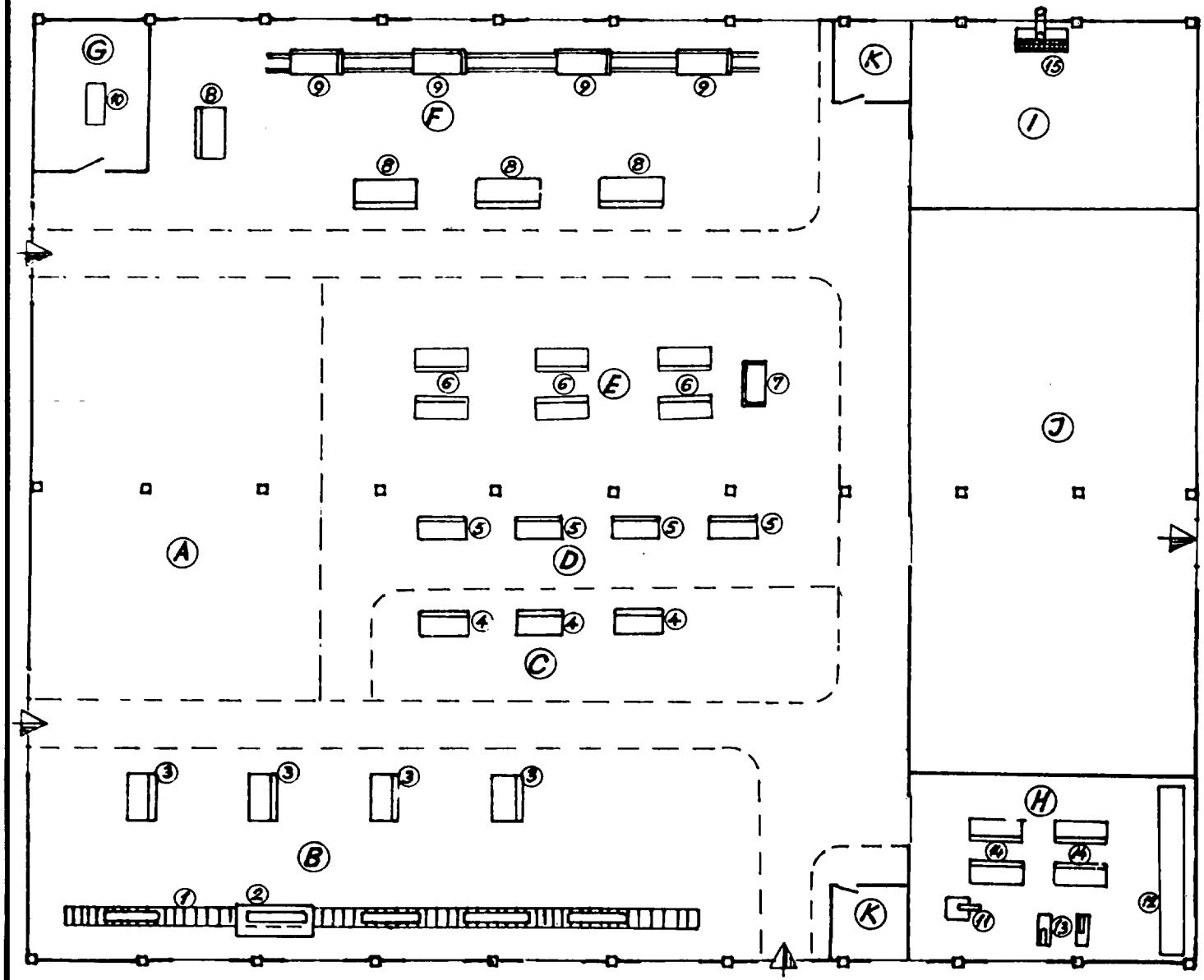
	Name	Date
Design	R. Malis	5/90
Drawing	R. Malis	6/90
Approv.		

CSCC MUKALLA

WORKSHOP LAYOUT

UNIDO PROJECT SM/PDY/87/005

SCALE 1:200



Key:

A. STORAGE OF MACHINED PARTS
B. CARCASS FURN. ASSEMBLY
C. SPEC. PRODUCTS ASSEMBLY
D. CHAIRS AND TABLES ASSEMBLY
E. WINDOWS ASSEMBLY
F. DOORS ASSEMBLY
G. GLASS CUTTING
H. UPHOLSTERI SHOP
I. SURFACE FINISHING
J. FINISHED GOODS STORAGE
K. OFFICES FOR FOREMEN

1. Dead roller way
2. Carcass clamp
3. preassembling benches
4. Assembly benches
5. Chair assembly benches
6. Winuows assembly benches
7. Quality control table
8. Benches for door preassembly
9. Movable assembly stands
10. Glass cutting table
11. Foam cutting machine
12. Fabrics cutting table
13. Sewing machines
14. Upholstering benches
15. Spray booth.

	Name	Date	CSCC MUKALLA
Design	R. Halis	5/90	
Drawing		6/90	
Approv.			

ASSEMBLY SHOP LAYOUT

UNIDO PROJECT SM/PDY/87/005 | SCALE 1:250

CSCC MUKALLA, LAYOUT OF THE MACHINE DEPARTMENT

Review of equipment

No.	Equipment	To be reconditioned	To be made locally	To be imported
1	Dead roller way	-	1	-
2	Cross-cut saw	-	-	1
3	Ripping circular saw	1	-	-
4	Narrow bandsaw	1	-	-
5	Narrow bandsaw	1	-	-
6	Belt conveyor	-	-	1
7	Auxiliary crosscut saw	-	-	1
8	Surface planer	1	-	-
9	Surface planer	1	-	-
10	Thicknesser	2	-	-
11	Dowel making machine	-	-	1
12	Precise double-end circular saw	-	-	1
13	Spindle moulder	1	-	-
14	Single side tenoner for open joinery tenons	-	-	1
15	Narrow bandsaw	1	-	-
16	Chain mortiser	1	-	-
17	Chain mortiser	1	-	-
18	Slotting machine	-	-	-
19	Preassembly benches	-	2	-
20	Spindle moulder	1	-	-
21	Spindle moulder	1	-	-
22	Lathe profiler	1	-	-
23	Surface planer	1	-	-
24	High speed router	-	-	1
25	Horizontal single spindle drill	1	-	-
26	Vertical single spindle drill	-	-	1

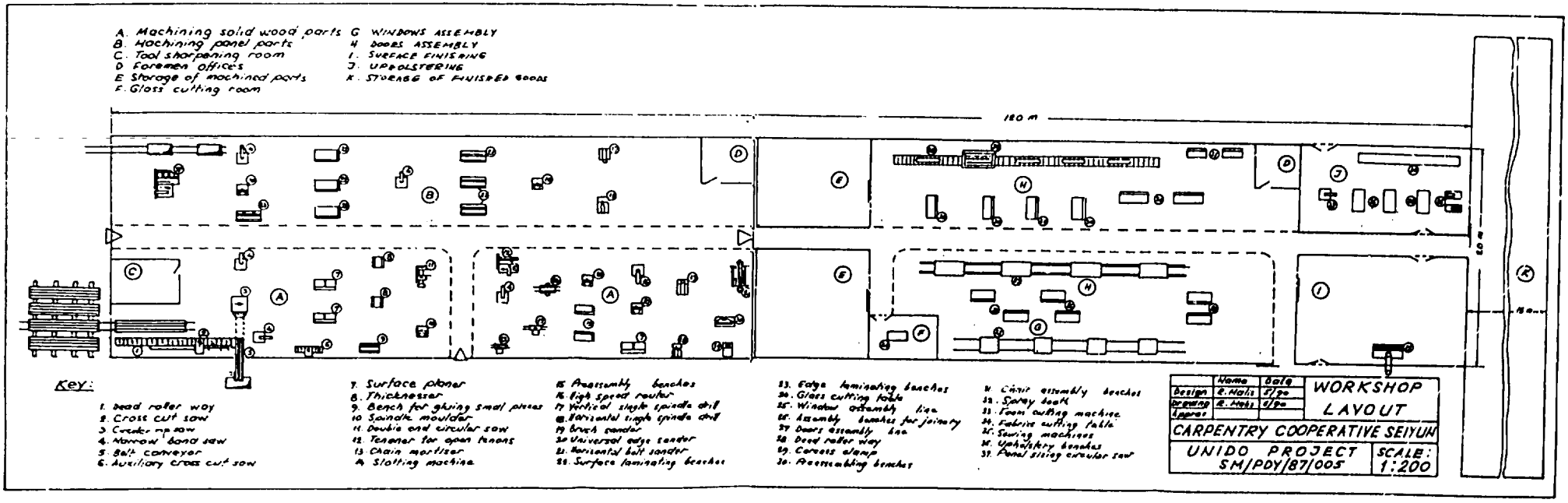
No.	Equipment	To be reconditioned	To be made locally	To be imported
27	Horizontal single spindle drill	1	-	-
28	Vertical single spindle drill	-	-	1
29	Brush sander	-	-	1
30	Universal narrow belt edge sander	-	-	1
31	Horizontal belt sander	1	-	-
32	Panel sizing machine with sliding table and scoring and sawing saw	1	-	-
33	Narrow bandsaw	-	-	1
34	Spindle moulder	1	-	-
35	Bench for edging with solid wood lippings	-	1	-
36	Benches for laminating panel surfaces	-	4	-
37	Narrow bandsaw	-	-	1
38	Benches for laminating edges	-	3	-
39	Spindle moulder	1	-	-
40	Spindle moulder	-	-	1
41	High speed router	-	-	1
42	Single-side horizontal and vertical multi-spindle drill	-	-	1
43	Vertical single spindle drill	-	-	1
44	Horizontal single spindle drill	-	-	1
45	Universal woodworking tool sharpener	-	-	1
	TOTAL	22	9	19

Note: Dust extraction and internal transport equipment are not included in this list.

CSCC MUKALLA: LAYOUT OF ASSEMBLY WORKSHOP

Review of Equipment

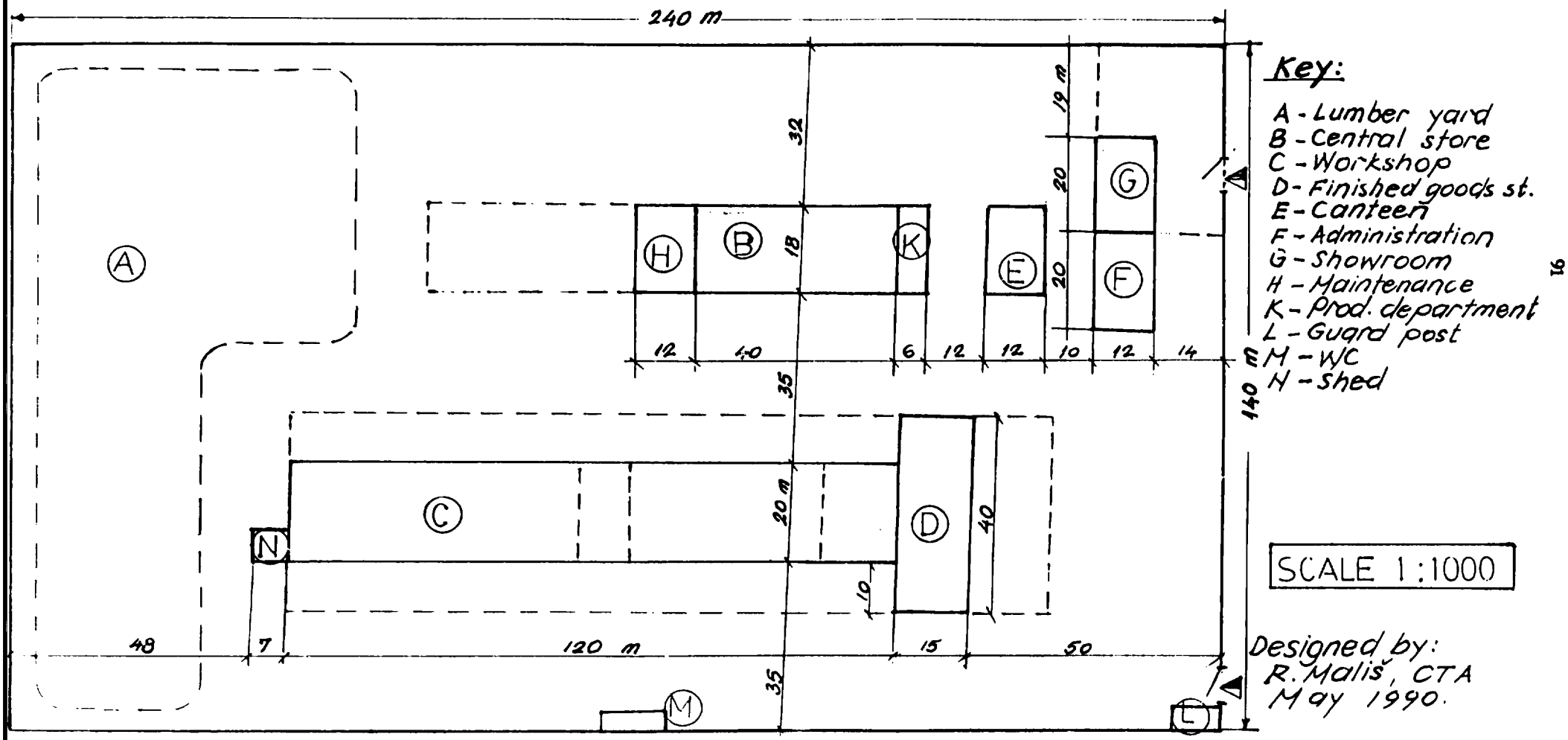
No.	Equipment	To be recondi-tioned	To be made locally	To be imported
1	Dead roller conveyor	-	1	-
2	Carcass clamp	-	-	1
3	Furniture assembly benches	-	4	-
4	Special products assembly benches	-	3	-
5	Assembly benches for chairs and tables	-	4	-
6	Benches for assembling windows	-	6	-
7	Quality control table	-	1	-
8	Assembly benches for doors	-	4	-
9	Assembly line for doors	-	1	-
10	Glass cutting table	-	1	-
11	Foam cutting machine	1	-	-
12	Fabrics cutting table	-	1	-
13	Upholstery sewing machine	1	-	1
14	Upholstery benches	-	4	-
15	Spraying booth	-	-	1
	TOTAL	2	30	3


A. Machining solid wood parts
B. Machining panel parts
C. Tool sharpening room
D Foremen offices
E Storage of machined parts
F. Gloss cutting room
G WINDOWS ASSEMBLY
H DOORS ASSEMBLY
I. SURFACE FINISHING
J. UPHOLSTERING
K. STORAGE OF FINISHED GOODS
180 m
Key:
1. Infeed roller way
2. Cross cut saw
3. Creaker rip saw
4. Narrow band saw
5. Belt conveyor
6. Auxiliary cross cut saw
7. Surface planer
8. Thicknesser
9. Bench for gluing small pieces
10 Spindle moulder
11. Double end circular saw
12. Tenoner for open tenons
13. Chain mortiser
A Slotting machine
15. Preassembly benches
16. High speed router
17 Vertical single spindle drill
18. Horizontal single spindle drill
19 Brush sander
20 Universal edge sander
21. Horizontal belt sander
22. Surface laminating benches
23. Edge laminating benches
24. Glass cutting table
25. Window assembly line
26. Assembly benches for joinery
27 Doors assembly line
28 Infeed roller way
29. Carcass clamp
30. Preassembling benches
31. Chair assembly benches
32. Safety booth
33. Foam cutting machine
34. Fabric cutting table
35. Sewing machines
36. Upholstery benches
37. Panel sizing circular saw
Design E. Matis 7/90
Drawing E. Matis 8/90
Approved
WORKSHOP LAYOUT
CARPENTRY COOPERATIVE SEIYUN
UNIDO PROJECT SM/PDY/87/005
SCALE: 1:200

REPUBLIC OF YEMEN
CC SEIYUN

GENERAL LAYOUT

UNIDO PROJECT SM/PDY/87/005



Key:

A - Lumber yard
B - Central store
C - Workshop
D - Finished goods st.
E - Canteen
F - Administration
G - Showroom
H - Maintenance
K - Prod. department
L - Guard post
M - WC
N - Shed

SCALE 1:1000

Designed by:
R. Mališ, CTA
May 1990.

CARPENTRY COOPERATIVE SEIYUN. WORKSHOP LAYOUT

Review of equipment

No.	Equipment	To be recondi-tioned	To be made locally	To be Imported
1	Dead roller way	-	1	-
2	Cross-cut saw	-	-	1
3	Ripping circular saw	1	-	-
4	Narrow band saw	3	-	2
5	Belt conveyor	-	-	1
6	Auxiliary cross-cut saw	1	-	-
7	Surface planer	3	-	-
8	Thicknesser	2	-	-
9	Bench for gluing and joining	-	1	-
10	Spindle moulder	5	-	-
11	Double end circular saw	-	-	1
12	Tenoner for open tenons	-	-	1
13	Chain mortiser	2	-	-
14	Slotting machine	2	-	-
15	Preassembly benches	-	2	-
16	High speed router	-	-	1
17	Vertical single spindle drill	-	-	2
18	Horizontal single spindle drill	2	-	-
19	Brush sander	-	-	1
20	Universal edge sander	-	-	1
21	Horizontal belt sander	-	-	1
22	Surface laminating benches	-	3	-
23	Edge banding benches	-	4	-
24	Glass cutting table	-	1	-
25	Window assembly line	-	1	-
26	Joinery assembly benches	-	6	-
27	Door assembly line	-	1	-
28	Dead roller conveyor	-	1	-

No.	Equipment	To be reconditioned	To be made locally	To be Imported
29	Carcass clamps	-	-	1
30	Furniture assembly benches	-	6	-
31	Chair assembly benches	-	2	-
32	Sprav booth	-	-	1
33	Foam cutting machine	1	-	-
34	Fabrics cutting table	-	1	-
35	Upholstery sewing machines	-	-	2
36	Upholstering benches	-	3	-
37	Panel sizing machine	1	-	-
	TOTAL	23	33	16

Note: Dust extraction and internal transport equipment are not included in this list.

ANNEX VII

JOB DESCRIPTION FOR AN EXPERT IN TOOL MAINTENANCE

SM/PDY/87/005/11-04 (J-12209)

Post title: Expert in tool maintenance

Duration: 3 months

Date required: Early 1991

Duty station: Mukalla with travel to Seiyun and Aden

Purpose of project: To strengthen the technical and managerial capabilities of the carpentry cooperatives in Mukalla and Seiyun.

Duties: Under the guidance of the furniture and joinery production expert (CTA), the expert in tool maintenance will be expected to:

1. Review and analyze the present tool maintenance systems used by the cooperatives.

2. Assess the state of the equipment installed.

3. Assess the skills of the saw doctors and other tool and machine maintenance technicians.

4. Recommend a training programme for them, to be implemented by the project's two UN Volunteers.

5. Draw up a list of equipment, tools and auxiliary materials, in order of priority, for each cooperative, giving detailed technical specifications, estimated costs and names and addresses of potential suppliers.

6. To the extent possible, train counterparts in the above fields.

7. Prepare a technical report outlining his findings and recommendations addressed to the management of the cooperatives, government and international organizations.

Qualifications: Saw doctor, wood technician or engineer with long experience in tool and machine maintenance. Experience in maintaining a wide range of tools used by the furniture industry essential. Experience in developing countries desirable.

Language requirements: Arabic preferred, English acceptable.

Background information: The woodworking sector in the People's Democratic Republic of Yemen consists of the Public Corporation for Carpentry in the Aden Governorate and two carpentry cooperatives in the Hadramawt Governorate. It employs approximately 1000 people and its sales volume reached nearly YD 2.5 million in 1985. In general the woodworking sector produces low quality products at high costs. This can be attributed mainly to low utilization of equipment, poor maintenance of production facilities, low labour productivity and extensive use of expensive raw materials. Factories are often run without a sound orientation on the market requirements and subsequent production planning and organization lack long term perspective.

The present strategy of the People's Democratic Republic of Yemen towards industrial development, as reflected in the Third Five Year Plan, focuses on strengthening the industrial infrastructure. It concentrates on three types of measures: (a) increase the utilization of existing productive capacities, through the rehabilitation of selected factories; (b) the establishment of a limited number of new factories to cater for the growing needs for indigenously produced goods, with a view to saving hard currency through import substitution; and (c) improving the production and managerial capacities in industrial enterprises. This project in the woodworking sector falls under the first and the last categories.

The first technical assistance to the woodworking sector in the People's Democratic Republic of Yemen was provided in 1978 through a review of the Aden Public Corporation for Carpentry. The review indicated various areas for improvement of production and management. In 1981, project PDY/81/006 "Training in Management and Efficiency Improvement in Industries" provided a consultancy mission to conduct a survey of the manufacturing facilities of the Coastal Carpentry Cooperative. The survey team's findings indicated the urgent need for technical assistance in relation to the cooperative's plan to consolidate the operations of three of its member units. Thus, in 1983, a three month mission was fielded to review this issue. This mission drew up the blueprint for a central workshop in Mukalla and advised on the necessary technical assistance to implement the plan. As no funds could be secured for this purpose, no follow-up was given by UNDP.

Two cooperatives are active in the Hadramawt Governorate: one in the area around Seiyun and one in the area around

Mukalla. Each cooperative consists of a number of small scale production units, which supply their immediate environment with construction woodworking items (doors, windows) and selected furniture (beds, tables, chairs, sofas).

The cooperative of Seiyun has workshops in Tarim, Al-Hauta, Shibam and Seiyun itself. It employs 173 persons in various capacities, compared to 166 in 1977. The volume of sales of this cooperative was YD 644,348 in 1987 compared to YD 455,007 in 1982. Production is at an artisanal level, relying mainly on the individual skills of the carpenters.

The Coastal Carpentry Cooperative has workshops in Ghail, Mukalla and Shahr. The total number of employees was 366 in 1977 and 376 in 1987. Most of the people are employed by the central workshop in Mukalla. The sales volume of this cooperative in 1987 was YD 1.245.842. Production in the central workshop in Mukalla has industrial characteristics, particularly in the furniture production, but the other workshops are of the same level as those in Seiyun.

All items are produced on demand and according to the specifications of the customer. Most workshops have waiting lists for certain items which are much in demand. In Seiyun the construction woodworking items form about 72 per cent of the sales volume, whereas this figure is 46 per cent in Mukalla. As both cooperatives have hardly any capacity for cost accounting, unit is impossible to assess which category of products has the highest added value of what the highest cost factor in production is. Prices are fixed based on global production costs and a traditional feeling of "what the market will allow".

Both cooperatives are weak in terms of human and physical resources and need strengthening in all aspects of their operations. With the exception of the workshops in Mukalla and Tarim, the production facilities of the workshops are cramped and poorly maintained. The machinery has reached the end of its technical life and breaks down frequently.

As most items are produced on demand, and according to customer specifications, production planning is totally dependent on the intake of orders. The cooperatives are not producing any items for stock and so there is hardly any serial production. Therefore, production organization is geared towards meeting the consumer preferences, and relies heavily on the skills of the individual carpenters to produce the items required. Consequently, most production techniques used in the cooperatives are still at the artisanal level.

Given the lack of managerial capacities and technical knowhow, the cooperatives have only been able to achieve

limited product and production innovation. thus retaining low levels of labour productivity. As the wage rates in both cooperatives are directly linked to the productivity of the individual workers, wages have hardly gone up in real terms over the last five years, and in Seiyun they have actually decreased considerably (21 per cent).

Most of the cooperative members are illiterate skilled labourers, who have either had small workshops of their own before the cooperative was established or they have been trained by their colleagues in the workshop. As both cooperatives are situated in rural areas, job opportunities are few and the well-being of cooperative members is dependent on the economic and financial position of the cooperative. The cooperative does not only provide jobs and wages, but it also provides pensions and guarantees bank loans. In this context, both cooperatives have started self-help housing schemes for their members.

ANNEX VIII

COMMENTS BY THE SUBSTANTIVE OFFICER

The report is well presented. It gives a succinct account of the current situation in the workshops. The project's work plan is detailed, but might prove to be overambitious, in so far that slippages have occurred in: (a) the obtention of funds from the counterpart to purchase the equipment, (b) the approval of fielding of the consultant in tool maintenance instead of the one in marketing originally foreseen, (c) the return mission of the CTA - delayed to ensure that the equipment had arrived, thus permitting training on it. This has resulted in the assignment of the two UN Volunteers ending before the completion of the CTA's missions and his having to work with no support.

The training programme proposed is well conceived and realistic. (It may be overambitious, in so far that not all the topics will be covered during the project's lifetime.) The training manuals - which will be issued as separate technical reports - are well written, in the sense that they provide basic information to people who do not have an education in wood technology or an engineering subject. They will be useful not only for the two cooperatives receiving assistance under the project, but also for others (eg. the one in Aden).

The plant layout, lists of equipment to be provided etc. are well done.

We concur with the CTA's recommendations.