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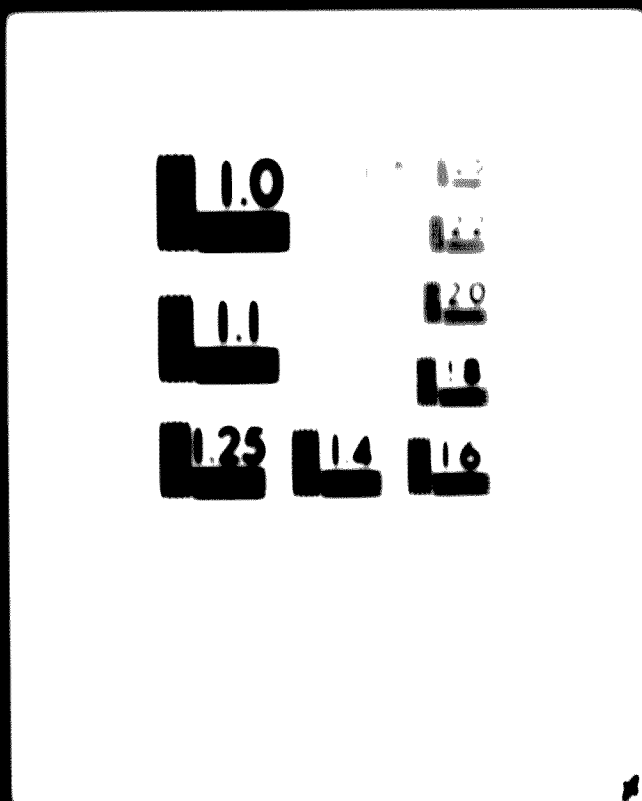
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GOPA-GESELLSCHAFT FÜR ORGANISATION, PLANUNG UND AUSBILDUNG MBH

D-638 Bad Homburg v. d. H., Hindenburgring 18 Phone/Tel.: 06172/32004 Telex 0415186

Germany Allemagne Alemania

GOPA-GESELLSCHAFT FÜR ORGANISATION, PLANUNG UND AUSBILDUNG MBH

D-638 Bad Homburg v. d. H., Hindenburgring 18 — Phone/Tel.: 06172/32004 — Telex: 0415186

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SIS 69-685

Contract No. 70/77

Assistance to the
Senegalese Furniture Industry
from
Dec. 24, 1970 to April 23, 1971

01089

FINAL REPORT

Submitted to
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Preliminary Remarks

By contract No. 70/77, project number SIS 69-685, the United Nations Industrial Development Organization (UNIDO) charged GOPA - Gesellschaft für Organisation, Planung und Ausbildung mbH, Bad Homburg, W. Germany, to delegate its woodworking expert, Mr. K. Schmidhammer, to Senegal to advise the Senegalese woodworking industry for a period of four months in the manufacture of furniture and other wooden products, as requested by the SONEPI, Société Nationale d'Etudes et de Promotion Industrielle.

Following the preparatory work in the headoffice of GOPA the expert left Germany on 23 December, 1970 and started work in Senegal on 24 December. On 21 April, 1971 Mr. Schmidhammer returned to Germany and was debriefed by the UNIDO on 23 April, 1971.

The mid-term report on the activity of the expert was submitted to the UNIDO in the month of March 1971 and was commented by letters of 25 April and 7 May, 1971.

Introduction

The SONEPI assists Senegalese enterprises in

- the introduction of rational working methods
- the financing of investment projects
- the planning of new enterprises and
- market research.

As a contribution to the development of the Senegalese woodworking industry, the UNIDO, at the request of the SONEPI, delegated an expert to render advisory services to some selected enterprises. The assistance was concentrated on

- Société Sénégalaise d'Artisans Associés, S.S.A.A., Dakar
- Menuiserie Moderne Lamine Siby, M.L.S., Dakar
- Compagnie Thiésoise de Scièrie et Ebénisterie, Thiès

and comprised upon request also advisory services to other entrepreneurs.

If a continuous advisory assistance is extended to suitable enterprises, that is to enterprises that meet certain basic pre-requisites, it will be possible to improve the working techniques in a way that the serial production of high-quality furniture on a profitable basis can be introduced, that new work places will be created and the furniture imports will be replaced by local production.

1. SONEPI's Cooperation with Woodworking Enterprises Located in Dakar

1.1 Technical and Commercial Assistance

For many woodworking enterprises residing in Dakar it is difficult to discern production bottlenecks and to introduce by their own means rationalization measures.

The "Fonds de Participation et de Garantie" represents a financial aid system reserved to small and medium enterprises which after having their financial and productive situation closely examined by the SONEPI are granted short- and medium-term credits for an adaptation of their plants and equipment to the requirements.

In the technical advisory service of the SONEPI, Senegalese specialists and experts of international organizations are charged with determining the optimum employment of machinery and production methods and to apply them, together with open-minded entrepreneurs, also in practice. Thus there is virtually no risk even as regards future-oriented investments, and a practice-near overall conception of the structure of small and medium industrial woodworking enterprises is rendered possible.

One of the main tasks consists in the development of artisan workshops into enterprises of industrial production capacity with an acceptable quality and price level which are in a position to supply the Senegalese market with furniture and arrive at a more rational manufacture.

1.2 Tasks of the Adviser

The modernization of the equipment (machinery) and the rationalization of production techniques are of special importance for the Senegalese woodworking industry.

The statistics indicate a 1969 import of finished wooden products, mainly furniture, to a value of approx. F CFA 150 million (US\$ 550,000). It is doubtless possible to diminish this import volume and to supply in some years the Senegalese market with local products.

In order to reach this target, some suitable enterprises will have to be selected and supported by a continuous advisory service. Of decisive importance are:

- purchase of missing machinery in order to arrive at a cost-favourable and high-quality production
- introduction of new production techniques such as the use of dowel joints especially for drawer furniture, the use of gauges and devices for serial production of furniture to arrive at a maximum accuracy to gauge, and the use of high-speed routers for the machining of plastic materials
- systematic practical and theoretical training of executive staff and skilled labour
- improvement of models by testing designs made by the enterprises themselves
- comparison with high-quality products manufactured by competitors
- establishment of sales organizations
- close collaboration of all furniture producers, if possible.

It was the task of the adviser to utilize all possibilities for fulfilling the above-mentioned conditions, to encourage the good will of the entrepreneurs and to set priorities.

1.5 Results of the Advisory Activity

Two woodworking enterprises to be located in Inker were planned. These units will be in a position to take up the industrial production of furniture and building carpentry. Thereby a basis was created for increasing the quality or quantity of the products, for diversifying the products and creating additional work places.

The extension to a workshop in Thil was suggested and conceived. The extended workshop will be in a position to manufacture furniture and to rationalize the workshop for building carpentry.

Entrepreneurs who cooperate with the GONEPF were consulted regularly on all technical problems involved in the management of the workshops. Doubtless, this contact will have a positive effect in practice.

Shortcomings in design and production were discussed and the entrepreneurs were convinced of the profitability of improving both (see the recommendations).

In order to get informed on the type, quality, and origin of the imported furniture, the expert visited the furniture shops and evaluated the information thus gained for the local producers. Thereby a better knowledge of the products offered and of the market requirements was gained.

In order to arrive at a correct pricing method, calculation forms were developed for all products to guarantee through a proper cost calculation a profitable or at least cost covering sale.

The significance of more intensive cooperation was explained to the entrepreneurs. In some cases it was already succeeded in establishing contacts for cooperation.

2. Supply of Raw Material and Supplies

2.1 Situation of Supply

Almost all raw materials and supplies required for the manufacture of furniture and other wooden products have to be imported (solid wood from the Ivory Coast). Hence there is a certain dependence on the suppliers as regards the quality and quantity of the material. With only a few exceptions the timber for building carpentry can be obtained without difficulty from timber merchants and saw mills. Dry timber that can be processed immediately is not available in sufficient quantities. Long periods of storage are required for air-drying which are, however, kept only in isolated cases.

Particle board and plywood panels are available in standard sizes. It is, however, very difficult to buy special panel sizes and panels with an especially high-grade veneer.

For furniture carpentry in general three or four types of veneer are used. The problem of moisture can be solved easier in the case of veneers than of solid wood, since the air temperature allows for short drying periods.

Formica plates are available only in some few designs; special wishes can be fulfilled only to a limited extent.

Lacquers, glues, stains, sanding material etc. are available; there is, however, only little choice. Fabrics for upholstered furniture can be procured from the local textile industry. They are of good quality. Plastic covering materials have to the major part to be imported. They are workmanlike and subject to normal wear and tear.

Quite problematic is the procurement of suitable fittings for furniture carpentry. There are only simple fittings available which can in most cases not be used for the serial production of both optically and functionally attractive furniture. On the presentation of models it is possible to have almost all types of fittings manufactured. The stability does, however, meet only very modest requirements as compared with similar imported articles.

2.2 Quality of Raw Materials and Supplies

The moisture content of imported round wood is very high. By storing the timber too long a period under heavy exposure to sunlight the logs easily form cracks and the output of blemish-free planks is reduced considerably. Often there is no suitable storing place and the necessary drying period is not kept. As a result the moisture content of the timber to be machined is much too high. In spite of the application of excellent glues (polyvinyl acetate resin, formaldehyde resin, urea resin glues, phenolic glues) there appear gluing defects; warping of the wood exceeds by far the permissible extent. Especially in furniture building these blemishes cannot be equalized. In the case of edge gluing with subsequent veneering, shrinkage is discernible on the surface of the piece of furniture and considerably affects the quality of the product.

Plywood and particle boards are imported in most cases in air-tight packing and would present no difficulty if processed at once. When storing the boards, the timber merchants remove the plastic packing and, as a result, the boards adapt themselves to the humidity of the air. If the boards are repeatedly exposed to different climatic conditions they easily warp and can no longer be used for the manufacture of high-quality products.

Lacquers and stains react very sensitively to high storage temperatures and too long storing periods. The result is a deterioration of the quality of the surfaces treated with these lacquers and stains although the materials used are of excellent quality.

If sealed well the glues used can be stored for a long time. Most of them have been tested already for some years in Europe. The sanding material corresponds in granulation and size to the European standard. There are no differences in the quality.

For individual production the quality of the imported fittings meets the requirements; the possibility of variation to meet the individual wishes of the customers is given only to a limited extent.

Regarding serial production, it is indispensable to have available fittings which can be mounted in a quick, clean and durable way.

2.3 Prices of Raw Material and Supplies

The price of cut timber is between F CFA 21,000 and F CFA 27,000 per cu. m. (US\$ 77 to US\$ 100) depending on the quality. Special cuts for special purposes (edge gluing, chair building, panelling) cost about 30 to 50 per cent more. These prices are not higher than those to be paid for comparable timber in European countries.

Plywood and particle board plates of standard size on an average cost about 20 to 30 per cent more than in the European producer countries. Veneer sheets of 4 to 6 mm thickness are about of the same price as in Europe; for the serial production of high-quality furniture they can, however, often not be used except for backs, fillings and bottoms reinforced with frames.

Veneers are about 10 per cent more expensive than in the furniture exporting countries. The types of veneer that are used only seldom are too expensive for application in serial or mass production. Most frequently used are teak veneers, oak veneers, walnut veneers and veneers of "bois rouge".

All fittings offered on the market are about 50 to 70 per cent more expensive than fittings of the same type and quality in furniture exporting countries. In order to remain competitive, the entrepreneur is often forced to use cheap fittings of an inferior quality.

Glues and sanding material, especially for machine sanding, are on an average about 50 to 100 per cent more expensive than comparable articles in Europe.

If larger quantities were taken, all products mentioned above could be purchased at a more favourable price. This is, however, as yet not possible since the furniture is not manufactured in large series and group buying could to date not be introduced.

3. Sales Market

3.1 Order Volume

All enterprises which cooperate with the SONEPI are employed to capacity the year over; in many cases additional production capacities would be of advantage to execute all orders in due time. The bottlenecks are always to be found in the obsolete technical equipment and the deficient organization of the flow of production.

The small workshops are mainly engaged in the manufacture of simple types of furniture and repair work. A continuous employment to capacity is not secured since there is no standing clientele, on the one hand, and large-volume orders, on the other, cannot be executed for lack of sophisticated technical equipment and suitable accommodations.

The orders of the Government are awarded among the most efficient enterprises by way of tenders. Private customers from all sections of the population place their order with workshops of any size, the personal relations between customer and entrepreneur being often of more importance than the quality and the price of the article concerned.

European-owned enterprises which for Senegalese conditions are very well equipped and promote high quality standards in part deliver their products to regular customers or dispose of their own sales centres. The furniture production has thus become more independent of short-term orders and there is a basis for serial production of all kinds of furniture.

3.2 Selection of Products and Design

So long as the Senegalese woodworking industry can manufacture furniture only on order since there is lack of regular customers for certain types of furniture, it is neither possible nor necessary to select the products for an exactly planned manufacturing programme. In the case of individual orders the ideas of the customer - mostly based on catalogues, photos or other models - are always taken into account.

Some workshops have specialized in the manufacture of chairs and tables of a most simple design. Wooden seats, in part upholstered, are mounted on metal frames. These uncomplicated chairs can be manufactured without a natured working technique. The proportions of the chairs would, however, have to be altered considerably in order to give them a more attractive appearance.

Since the furniture offered so far can be made cheaply and finds its customers, only a few craftsmen have so far made an effort to improve the proportions of the chairs by experimenting on models. By a functional design, more attractive proportioning and the use of new timber and coloured textiles the chair models can be improved without major expenditure. It is, however, by far more difficult to find regular customers for these articles since the simple models meet the requirements of the traditional customers and are much more favourable in price.

3.3 Consumer Advertising and Sales Opportunities

For a systematic expansion of the production volume it should be tried through an "aided" advertising campaign to find new customers for the local production. At present, only the stores, with a broad scale of supply advertise also the sale of furniture.

The Senegalese workshops cannot afford to spend the necessary minimum on advertising. Within the framework of rationalization advertising will, however, become an indispensable tool for fully employing the production capacities set up additionally. By an advertising activity organized in common a maximum efficiency could be reached and market shares held by imported furniture could be gained for Senegalese products.

4. Advisory Assistance to the Société Sénégalaise d'Artisans Associés, S.S.A.A.

4.1 Development and Present Situation of the S.S.A.A.

Since its foundation in 1962 the S.S.A.A. has experienced a steady development. In 1969, on the instigation of the SONEPI the "Fonds de Participation et de Garantie" was founded by the aid of which artisan workshops can realize their investment projects.

With the financial assistance of the "Fonds de Participation" the S.S.A.A. completed its machinery and on account of the favourable development of the workshop it could envisage further technical improvements (for instance, additional tools for existing machinery, installation of a wood seasoning chamber). All machines are of standard make as regards weight, rpm and HP.

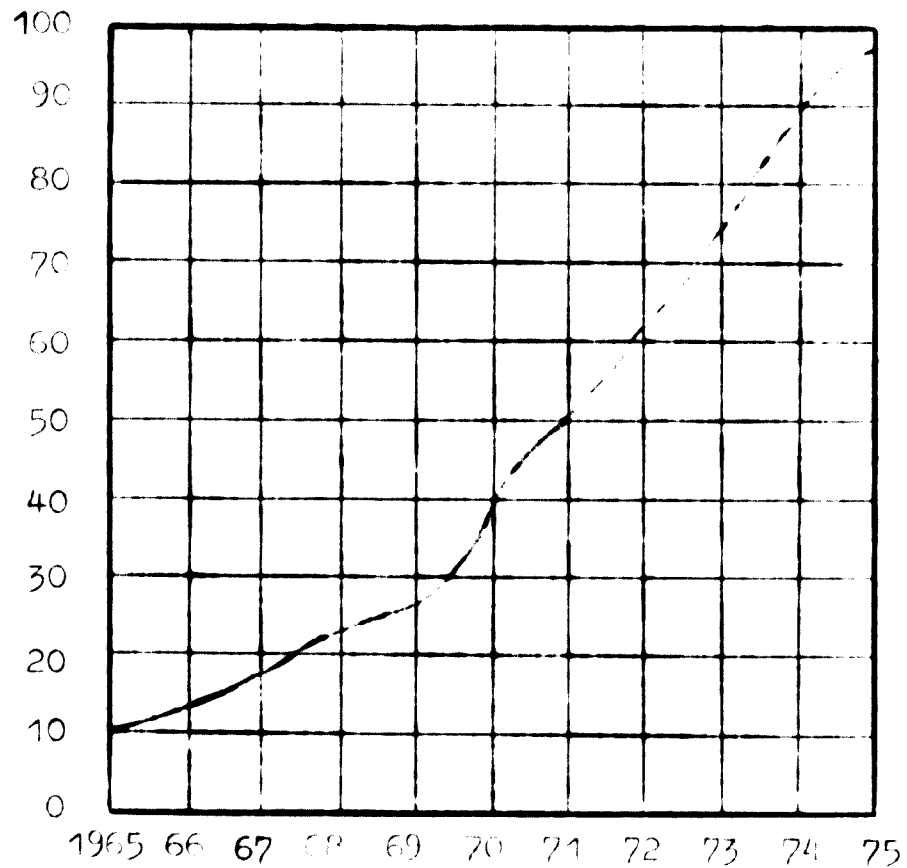
The present machinery consists of

- 1 jointing machine, new 530 mm
- 1 planing machine with surfacing equipment, combined, 430 mm
- 1 planing machine, single, 600 mm, new
- 1 band saw
- 2 circular saws
- 1 belt sander, new
- 1 shaper with tenoning device, new
- 1 shaper, heavy type
- 1 mortising drill
- 3 boring machines, portable
- 1 air compressor with accessories for paint-spraying
- 1 veneer press, hand-operated

The growth of the enterprise and its anticipated development can be seen in the following graph.

Development of the S.S.A.A.

Number of Employees



Remarks: In 1969, the "Fonds de Participation et de Garantie" was established

All statements of the entrepreneurs regarding the turnover and the invested capital are very unreliable. It is in fact assumed that there are no such exact data available since the accounting system has to date been heavily neglected. The SONEPI is, however, intensively engaged in taking remedial measures.

The growth of the S.S.A.A. was extrapolated on the basis of the population growth rate of Dakar, a more rational production in the new enterprises to be set up and the expansion of the clientele owing to a more intensive consumer advertising. The market development was assumed not to exceed the normal scope.

4.2 Establishment of a New S.S.A.A. Workshop

As soon as it is complied with the necessary formalities the establishment of the new workshop in the "Domaine industriel" of Dakar can be started. In order to exactly determine the investment to be placed in the new workshop the calculation was rechecked. The S.S.A.A. itself will contribute a sufficient share. There is no risk that the means available will be too short.

The new workshop is to start production at the latest in August/September 1971. The SONEPI together with the owners of the enterprise will take over the supervision of the construction work. The technical drawings were prepared in cooperation with SONEPI experts.

Special emphasis was laid on a clear flow of material. One line of production is envisaged for the manufacture of furniture, the other for the other products. The internal transport is handled on manoeuvrable rolling trucks.

The machine work, assembly of the furniture etc. and veneer cutting will take place in separate departments. A sanding cell is incorporated in the machine hall. The varnishing department is completely separated from the production process so that one of the major problems of surface treatment is taken into account adequately. For the upholstery a separate room is likewise provided although the present volume could be handled also under less favourable conditions.

In order to have enough space for manufacturing, the rooms for the office personnel and the management will be accommodated in the upper storey, a solution which is very suitable since the total operations can thus be surveyed by the management.

4.3 Manufacturing Programme and Possibilities of Extension

4.3.1 Building Carpentry

The building carpentry work of the S.S.A.A. is of excellent quality. More recently the share of building carpentry in the overall turnover of the enterprise has decreased while that of the furniture production has increased.

The most commonly produced articles are doors of all sizes, garage doors, different types of windows (also combined with aluminium parts), Venetian blinds and stairs of simple construction. If the workshop has a good earning base the manufacturing programme could be expanded by roll shutters. The envisaged workshop of the S.S.A.A. provides for sufficient space to install, if need be, additional special machines of simple design.

The manufacture of parquet floors, especially mosaic parquet, could represent a further profit-producing branch. A separate workshop would however have to be set up in this instance.

The potential clients are among the private and public builders. There is a very active building business going on, and how many parquet floors can be bedded is only a question of how they are introduced on the market (possible export). As raw material the hard timber imported from the Ivory Coast would be suitable. This timber is used for parquetry also in Europe. The Rennier-palm which is abundant in the Casamance could as well be used if it proves to have the respective technological properties.

This timber has a very decorative structure and is of extreme hardness. By testing the wood of the Rennier-palm on the spot there would be a reliable answer to the question of its suitability for the production of parquet.

For the daily production of 500 sq.m. of mosaic parquet the following machines would have to be purchased:

- 1 two-side crosscut saw with accessories	US\$ 7,000
- 1 two-side planing machine with accessories	US\$ 6,800
- 1 finger sorting machine	US\$ 7,700
- 2 conveyer belts à US\$ 1,000	US\$ 2,000
- 5 hand assembly frames à US\$ 250	<u>US\$ 1,250</u>
	US\$ 24,750

The production of mosaic parquet is to be preferred to strip parquet. Small-size timber waste can be used. The thickness of the fingers is between 8 and 12 mm while in the case of strip parquet the thickness is between 18 and 23 mm. The investment cost of the machines for strip parquet production is about 20 to 30 per cent higher.

The purchase of a wood seasoning chamber is envisaged but not yet realized. It would, however, be more advantageous if some entrepreneurs would club together for this investment.

4.3.2 Furniture Carpentry

The S.S.A.A. offers a broad furniture manufacturing programme. As regards the production of seating furniture the programme extends from simple chairs to ostentatious armchairs. In the mass production of seating furniture devices have to be used in order to shorten the production time, to guarantee the quality of mass-produced seating furniture and to be in a position to offer it at a favourable price. As yet there is, however, no possibility of mass production since a continuous

sale is not secured and the storage of goods over a long period of time is uneconomical. If a simple wooden frame seth was purchased, the production of seating furniture with turn parts could be started and the manufacturing program could be expanded by some interesting types of furniture.

On order the S.S.A.M. produces any type of furniture. The production comprises office furniture, sitting furniture, bedroom furniture, interior office furnishings, and office furnishings. The quality of these products is very good and the prices are realistic. The furniture building program could be expanded by taking up the mass production of chairs and extensior elements. There is a great market for this furniture covered with fabrics. The program should also include the production of refrigerating cabinets which should be taken into consideration.

4.4 Completion of the Machine Park

4.4.1 Furniture Production

The serial production of high-quality furniture requires an adequate organization of the flow of operations. In this context the machinery is of utmost importance. Machines and tools which in individual production are employed to a great degree cannot be utilized in mass production due to their small an output.

The employment of additional machines is the precondition for any expansion of the manufacturing program and ensures the proper execution of each working operation in mass production.

It will be indispensable for the S.S.A.M. to buy a veneer press with at least 2 floors and a glue spreading machine. For the turning of furniture legs, wooden handles etc. a lathe should

be purchased in order to have a sufficient amount of furniture out
this machine work on an hourly basis. European countries have
been quick and well equipped in a rich production of wood
working machine tools. For plastic cover, rollers and
rollers of suitable quality of the machinery for the
production of furniture and the following machine tools are
not very suitable for plastic. The machine tools for the
production of plastic furniture are: 1. Machine tools for
buying suitable materials and machinery for the production
of plastic materials and the furniture fittings.

The following was information about the technical conditions
of the machine tools. "Service Incentive" of the ICOMI
was given technical literature to facilitate further study
resistance in question of machine tools and furniture.

As regards the technical conditions of the machine tools, the
following requirements should be observed: 1. The machine tools
the two German machine tools are: 1. The machine tools of the
They supervise the machine tools of the machine tools and
the machine tools of the machine tools of the machine tools
the control of the quality of the machine tools of the machine tools.
The necessity of the machine tools of the machine tools
throughout the entire production process. However, the machine tools
of the machine tools of the machine tools of the machine tools.

4.4.2 Machine Capacity

Since the building industry is not relatively small, it
it is not urgently required to buy special machinery.

For the manufacture of Venetian blinds and window
with Venetian blind rollers. Venetian blind grooving machine
should be purchased. The most efficient type is offered by
Messrs. Fiat which have an efficient plant in Dekan. One machine
was reported to be in operation and to perform very

satisfactorily. This machine is considered as the most suitable one also by the S.S.A.A.

On the international tool market excellent articles are to be had with a high cutting capacity and many operational possibilities. All machine tools are subject to a constant development; the offer extends from circular saw blades to complicated tool sets for shaping operations. Often the precondition for taking rationalization measures is the current information about new developments in tool making.

More detailed information on the tools to be purchased is of little expedience since there is only a small tool offer on the Dakar market and the financial possibilities of the entrepreneurs allow only for isolated tool purchases. The SONEPI disposes, however, of respective catalogues so that the entrepreneurs can get informed, if need be.

4.5 Recommendations on the Further Extension to the Enterprises

4.5.1 Mass Production of Furniture

Work preparation plays a relatively inferior role in the case of individual production. This is different in the case of mass production. When buying the raw materials the preparation of mass production is started. Work preparation is most suitably subdivided into the groups

- design and calculation
- procurement of material
- technological preparation
- operation planning (flow of material, operational phases)
- supervision of production and
- quality control

The skilled labour must first be made familiar with the new type of production in order to avoid stoppage of work; since small troubles on individual work places affect the whole production programme. It is an essential to have a clear survey of the individual operational phases.

For the proper seasoning of the timber to be processed in mass production the installation of a seasoning chamber is of great importance (it is already envisaged to purchase the seasoning chamber).

Various possibilities of construction with combination and extension elements were investigated, though it was not yet decided on the final choice.

4.5.2 Foundation of a Sales House in Dakar

For any furniture producer a sales house is of utmost importance. In March 1971 the S.S.A.A. has taken advantage of the possibility of renting suitable sales rooms in Dakar. Thus there is a direct contact to all spending groups, a showroom is available and effective advertising is possible. Furniture models that are well accepted by the market can be taken up for mass production; the sales risk is thus diminished and the production capacity can be employed in a more balanced manner.

The fact that business premises are rented very high in Dakar may perhaps prevent at the present moment an extension to the sales house; in the long run, however, an extension will certainly be possible. The profit gained from the direct sales of the production of the S.S.A.A. may render possible investments in the technical equipment of the S.S.A.A. whereby a continuous modernization of the workshop would be secured.

This in return would create more favourable conditions for a continuous improvement of the production techniques, and one of the major problems involved in the industrial production of furniture would thus be solved.

4.5.3 Cooperation with Other Workshops in Dakar

The cooperation of Senegalese woodworking enterprises in commercial and technical matters is still only little developed. The SONEFI has dedicated itself with much patience and understanding to the encouragement and promotion of cooperation among the entrepreneurs. It is, however, a wearisome task and it will depend on the personal contact and the persuasive power of the experts whether the confidence of the entrepreneurs can be gained. The entrepreneurs do not yet recognize the economic advantages a cooperation would offer. Mention may be made of the following positive aspects:

- coordination of apprentice training in all enterprises
- lower price of raw materials by the purchase of larger quantities
- specialization of able enterprises in certain types of furniture, for instance office furniture, kitchen furniture, seating furniture etc.
- subcontracting with workshops that do not dispose of sophisticated machinery and equipment
- common purchase and utilization of machines for special purposes (veneer presses, seasoning chambers etc.)
- common sales organization and advertising.

The S.A.A.A. as the most advanced enterprise would be in a position to take the leading part in this common effort and to convince with the support of the SONEPI also other enterprises of the suitability of a common action. The S.S.A.A. is willing to do so and it appears that it can count on official support.

5. Advisory Assistance to the Menuiserie Moderne Legine Siby, Dakar.

5.1 Development and Present Situation of the M.L.S.

The workshop of the M.L.S. covers an area of 10 m x 25 m. Separation walls are made out of boards and metal sheet parts. The roofing is simply a protection, if any, against the sun. The workshop floor consists of sand mixed with cement.

The machines and the work benches are not separated from each other so that the working conditions, in particular, for the labour at the work benches are unfavourable due to noise and dust development.

The machine park consists of

- 2 planer jointing machines
- 1 planing machine
- 1 circular saw, heavy construction
- 1 circular saw, light construction
- 1 Venetian blind grooving machine with hand-operated feeding device
- 2 table shapers
- 1 tenoning machine
- 1 chain mortiser (very obsolete)
- 2 grinding machines for planer knives and shaping tools

and one pressing device for the gluing of doors without fillings, made in the workshop.

As suggested by the expert the tools were renewed and the cutting angle of the shaping heads was altered.

In order to reduce the speed of one of the planer jointing machines, a more suitable drive pulley will soon be mounted for obtaining a better cutting speed. By adjusting rubber pads the vibration of the planing machine could be eliminated.

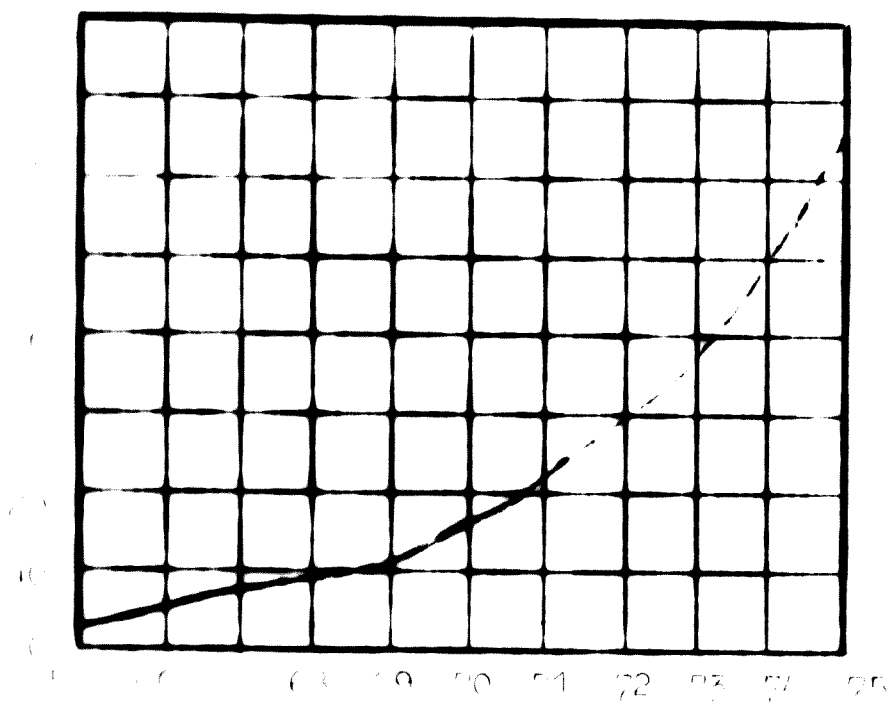
One obsolete planer jointing machine was dismantled since the shaft, the adjustment and the driving motor could no longer be used and due to the phenomena of wear no proper machining was possible. Since the M.L.S. was to move soon into the new workshop it was not proceeded to a re-arrangement of the machinery.

For a routing machine a wooden device was designed and built to facilitate the quick and proper mounting of fittings on doors and windows.

The "Fonds de Participation et de Garantie" grants loans to the M.L.S. for the purchase of the indispensable machinery. The technical specifications of these machines were laid down together with the entrepreneur and offers of various firms were called in to compare the prices, quality and functioning of the different machines.

The growth of the enterprise and its anticipated development can be seen in the following graph.

Development of the M.L.S. - Number of Employees



Remarks: In 1969, the "Fonds de Participation et de Garantie" was established.

5.2 Establishment of a New Workshop for the M.L.S.

5.2.1 Planning Work

The planning work for the new workshop of the M.L.S. in the "Zone Industrielle" is completed. The drawings will still have to be transmitted to the local authorities for approval. The total area of the new workshop will cover 860 sq.m.

The future manufacturing programme was roughly outlined and the work flow was fixed correspondingly. The most favourable position was determined for the existing machinery by leaving scope for the installation of additional machines. As regards the work on the machines, the furniture production is separated from the building carpentry. For the internal transport flat trucks are envisaged in order to reduce the time wasted so far on transportation.

The assembly takes place in a separate room; the planing machines are arranged in a way that conveyer-line assembly of the furniture is rendered possible. The paint-spraying room is not very large, but it can be extended without difficulty if need be. For exhibiting and storing of the furniture sufficient space is provided for. There is also scope for extension. The building comprises, moreover, one room each for the storage of small machines and auxiliary material as well as office rooms for the administrative and managerial staff.

5.2.2. Commencement of Building and Starting up of Production

Immediately after the approval is given by the local building authority it will be commenced with the building work. In August 71, a large-scale order of the Administration should be ready for assembly. This time can be kept only if the production is soon started.

5.3 Manufacturing Programme and Expansion Possibilities

5.3.1 Building Carpentry

The building carpentry work is produced in small and medium series. The programme comprises in the main doors with fillings, Venetian blinds, windows, wainscoting of walls and ceilings. In order to arrive at a more rational production, devices were designed out of wood which are employed mainly for shaping operations.

The manufacturing programme of the M.L.S. can be extended only by special constructions since all saleable products are being manufactured.

5.3.2 Furniture Carpentry

The M.L.S. has only little experience in furniture carpentry since it has concentrated to date on building carpentry. More recently the M.L.S. has made some furniture ordered by the Administration as well as wardrobes covered with formica and cupboards. These pieces of furniture are not very attractive but their price is so low that high demands cannot be made on them.

To demonstrate the different possibilities of varying the proportions of a piece of furniture the disposition of the elements of identical furniture was altered. The introduction of wood and material lists will facilitate the switch from individual to mass production of furniture.

The technical pre-conditions for a further extension of the programme of mass-produced furniture are available in the new enterprise. Without the advice of specialists it will, however, hardly be possible to arrive at a smooth organization of the total production process (for instance, employment of rational joining techniques, a more exact work preparation and production control).

5.4 Additional Machinery Required

5.4.1 Furniture Carpentry

Simple furniture can be made on the existing machines. The extension of the production programme will depend largely on the technical equipment of the enterprise.

For the mass production of high-quality furniture a veneer press with two floors (2540 mm x 1320 mm), not necessarily heatable, a universal belt sanding machine and a gluespreading machine will be required. For proper surface treatment a compressor with spraying equipment will have to be purchased. The careful execution of all individual operations necessitates the acquisition of shaping tools with carbide-tipped cutters as well as formed cutters for security cutter heads, circular saw blades for cross-cutting and for the working of particle board and plywood. The tools can be ground on a normal tool grinding machine equipped with special grinding wheels that are available on the market.

Together with the entrepreneur, M. Lamine Siby, tools were selected from catalogues that suit the special requirements of the enterprise; different firms in France, Belgium, Sweden, Italy and Germany were inquired about the prices and technical details of their products. The final decision on which tools will be purchased for the furniture production will be given by the entrepreneur and the experts of the "Service Productivité" of the SONEPI.

5.4.2 Building Carpentry

The demands on the technical equipment for the production of windows, doors etc. being not very high, standard machinery can be employed.

For the manufacture of Venetian blinds a more efficient machine should be bought (for instance, the Venetian blind grooving machine manufactured by Messrs. Festo which makes 48 to 55 grooves per minute), since often up to 8,000 shaping operations are necessary; the machine would be amortized within a short period of time and could be operated also by unskilled labour and apprentices.

By the purchase of jointer attachments which can be combined with the jointing machine a 100 per cent increase in the efficiency can be obtained.

A feeding device for all shaping operations would provide for a 100 to 200 per cent increase in the performance and the accident proneness would be reduced to a minimum. These investments would involve no risk; the profitability is obvious by a higher performance and an improvement in the quality.

If the financial situation of the enterprise allows the purchase of further machines, it is urgently recommended to buy a portable disc sander, a chain shaper and a belt sander. At the moment these machines can, however, not be purchased from the own resources of the M.L.S.

5.5 Recommendations on the Further Development

5.5.1 Mass Production of Furniture

If the enterprise is to mass-produce furniture considerable alterations have to be effected. The basic pre-condition is given with the new workshop. Now the organization of the production process has to follow. The advantages of mass production are, among other things:

- The expenditure on the construction and the organizational and technological preparation is distributed over large piece numbers. The share of the expenses in the enterprise cost is diminishing with each product.
- The workers can be better employed according to their ability and qualification. They will specialize in certain operations and thus the productivity of labour will be increased. Unskilled labour can carry out simple work.
- Devices and machines can be fully utilized; this is of special importance in the case of special machines and special tools.
- The material can be better utilized due to the larger quantities of identical parts.

The smooth handling of the internal transport can be brought about by various means. The transport of the workpiece against the flow of material heavily impedes the production, the material accumulates, additional storage place becomes necessary and unproductive labour has to be engaged.

5.5.2 Foundation of a Sales House in Dakar

The workshop in the "Domaine industriel" provides for a showroom which is to be used also as salesroom.

The location of the enterprise is, however, so unfavourable in terms of sales prospects that it will be necessary to rent a more centrally located room in Dakar. Since at present all financial means available are utilized for the new workshop and its technical equipment it will scarcely be possible in the near future to build a sales house in Dakar.

5.5.3 Cooperation with Other Workshops in Dakar

It would be a great advantage if enterprises with experience in furniture production would disseminate their knowledge to interested entrepreneurs. The entrepreneur, M. Lamine Siby, is prepared to enter into contact with all progressive entrepreneurs, to pass on his own experience in building carpentry and to organize, if need be, the purchase of machinery and their utilization together with other entrepreneurs.

At the present moment there exist only very few contacts with other woodworking enterprises in Dakar, the professional jealousy playing a certain and also justified role.

6. Advisory Assistance to the Compagnie Thiésoise de Scierie et Ebénisterie (C.T.S.E.)

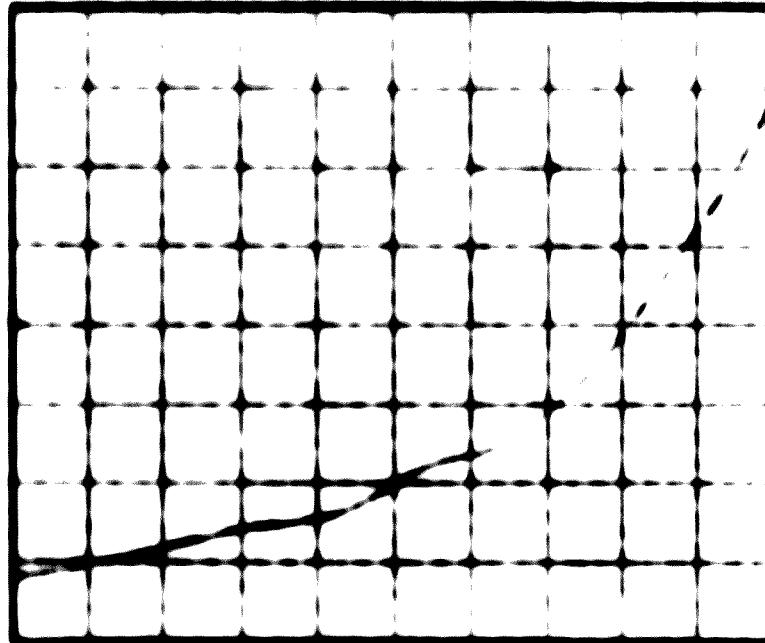
6.1 Development and Present Situation of the C.T.S.E.

The C.T.S.E. operates two workshops. One is located in the "Domaine industriel" of Thiès and is engaged in furniture carpentry; the other is in the city region of Thiès and carries out building carpentry work. Since March/April 1961 the furniture-making shop operates with newly installed machinery. A planing machine and a shaping machine were purchased from a Belgian firm. The standard model is sufficient for the production in small series. Major changes are not to be expected in the foreseeable future.

The re-arrangement of the machines in the building carpentry workshop has proved to be of advantage, since now the workpieces are no longer transported against the flow of material, the space required for the storage of the material has become smaller and the individual operational phases can be completed without interruption.

The growth of the enterprise and its anticipated development can be seen in the following graph.

Development of the C.T.S.L.
Number of Employees



Remarks: In 1969, the "Fondo de Participación de los Gerentes" was established.

6.2 The Workshop Outside of the "Deposito Industrial" of Tijuana

6.2.1 Machinery and Equipment

The building carpentry machine park was completed by a disc grinding machine which can be used also for the mounting of fittings. A planing machine (working width 510 mm, 5 HP, 4-cutter spindle) was installed in addition to the existing planing machine which has only a small capacity.

All existing tools were overhauled. Favourable cutting angles guaranteed a long life of the shaping and slotting tools. The cutting angle of circular saw blades for long wood cutting was corrected and the teeth were set anew.

For an easier and exacter filing of the band saw blades a file guide was mounted on a grinding device whereby the sharpening time can be reduced by 50 per cent.

6.2.2 Production Method

The production capacity is fully employed by orders of the Administration. By the re-arrangement of the machines it was possible to accelerate the flow of operation.

Orders consisting of 400 to 600 units render possible assembly-line production. A clear organization of the individual operational phases and the employment of simple wooden devices facilitate the work. In the internal transport unnecessary labour is still engaged. An improvement of this situation is, however, envisaged by the employment of small trucks.

6.2.3 Preparation and Supervision of Work

The master carpenter responsible for the organization of the work is an excellent improvisator who is, moreover, able to make the plans and, what is more important still, to make the work conform with them.

In order that each worker knows the stage of execution of the orders, a large board showing the respective data was placed on a spot where it can be seen from everywhere. By the introduction of work sheets the supervision of production is facilitated and the work actually performed can be compared to the target performance.

6.2.4 Manufacturing Programme

The execution of all work in connection with building carpentry is workmanlike. The orders which employ the workshop to capacity consist mainly in all types of windows, doors of different design, wainscoting of walls and ceilings.

6.3 The Workshop in the "Domaine Industriel" of Thiès

6.3.1 Machinery and Equipment

The machines and equipment of the workshop located in the "Domaine industriel" will have to be considerably completed. The existing machines answer only very low requirements.

As recommended by the adviser a new shaper was installed so that the frequent profiling operations can be made quick and properly. Other machine work is effected in the workshop outside the "Domaine industriel" and the products are later transported for assembly and final treatment to the furniture carpentry shop.

6.3.2 Production Methods

The technical means for the production of furniture are very limited. This is the reason why it is not possible to make high-quality furniture in mass production.

It is not necessary to take any special organizational measures for the production of furniture since the orders are not very comprehensive and can easily be controlled. Nevertheless, material lists were introduced for mechanical production; devices for the construction of drawer furniture were constructed and mounted and size tolerances were introduced for controlling the quality. These recommendations served a demonstrative and instructive purpose rather than an increase in the production.

6.3.3 Preparation and Supervision of Work

The master carpenter of the building carpentry shop is responsible also for the preparation and supervision of work in the workshop located in the "Domaine industriel". The detailed planning of work in the case of mass production was elaborated theoretically with the assistance of the adviser. The lack of practical experience in the mass production of furniture should be compensated by a continuation of technical assistance.

6.4 Possibilities of Expanding the Manufacturing Programme

6.4.1 Building Carpentry

In the building carpentry sector the possibilities of expanding the programme are very limited unless the purchase of additional machines opens up new market sectors.

The market conditions are favourable for inlaid floors, roll shutters, windows and doors out of wood combined with plastic or metal profiles. After knowledge of the production plans the required investment could be estimated.

6.4.2 Furniture Carpentry

For the further expansion of the manufacturing programme it is envisaged

- to start the mass production of all kinds of furniture
- to set up a sales house
- to increase the sales by advertising.

The mass production of furniture depends to a large extent on the technical possibilities of modernization. A continuation of the technical advisory services to the enterprise should be secured. This advice should be rendered in work preparation so that the maximum employment of the machines is possible, in a profitable calculation, in the regulation of a smooth internal transport, in the suitable selection and employment of devices and fittings and in the cooperation with the management of the enterprise in the case of technical problems (employment of tools, joints, application of glues, surface treatment etc.).

6.5 Additional Machinery Required

6.5.1 Building Carpentry

There is a large flow of incoming orders and it will be necessary to take rationalization measures. Much labour can be saved by the purchase of a feeding device for the shaping operations. A joining attachment which can be mounted on the jointing machine reduces the labour requirements by 50 per cent.

6.5.2 Furniture Carpentry

It is not possible to produce at reasonable cost high-quality furniture on the machines presently available.

The following machines will have to be purchased:

- 1 circular saw, 3-4 HP (with different blades)
- 1 band saw, dia 800 mm, 3 HP
- 1 planing machine, 410 mm, 5 HP
- 1 jointing machine, 4 HP

- 1 belt sander, 6-8 HP
- 1 veneer press with two floors, about 150 x 150 cm
- 1 glue spreading machine
- 1 compressor with spraying equipment
- 1 portable machine for moulding and cutting plastic laminates

With this machinery furniture can be produced in small quantities. The investment is estimated at about F.Cha 3 million (US\$ 14,000). For the purchase of tools about F.Cha 1 million (US\$ 3,660) should be available.

6.6 Recommendations on the Further Level plant

6.6.1 Mass Production of Furniture

The workshop is offered a large market for the sale of mass-produced furniture in Thib's. Simple home furniture with a wide appearance can be altered by exchangeable elements for the best sales prospects. Office furniture covered with leather might have a good market and is susceptible to substitution completely for the import of metal office furniture. It is certainly possible to find a keen consumer interest in all kinds of kitchen furniture covered with formica. The mass production could be organized relatively easily; it could be done without special machines. If the combination and extension system is used, the possibilities of variation would make the offer more attractive for the buyers.

It is recommended that the C.T.S.E. concentrates on a few types of furniture only. It could otherwise run the risk of frittering away owing to too many models whereby the profitability would be gravely affected.

6.6.2 Foundation of a Sales House in Thiès or Dakar

In order to guarantee the continuous sale of a certain quantity of furniture it is necessary to sell to bulk buyers or better still to establish a sales house. The most suitable places for a C.T.S.E. sales house would be Thiès or Dakar. By exactly knowing the wishes of the customers it would be possible to manufacture readily saleable types of furniture in large quantities thereby establishing the basis for the mass production of furniture.

6.6.3 Cooperation with Other Entrepreneurs

The Compagnie Thiésoise is in principle prepared to cooperate on a meaningful basis with interested and capable entrepreneurs. As regards the mass production of furniture it is possible and expeditious to have certain individual parts such as drawers, furniture supports, doors etc. manufactured by sub-contractors and assembled in the workshop within the "Domaine industriel". The quality of the products manufactured by sub-contractors would have to be controlled by means of templates and gauges. The manufacture of simple pieces of furniture which belong to a suite could possibly also be made by sub-contractors; there is however a certain risk that there is an obvious difference in the quality of the individual pieces since a continuous supervision is neither possible nor economical. If the small workshops are left to their own resources there will be no change for the better and they will continue to produce in a happy-go-lucky manner.

6.7 Saw Mill Project in the "Domaine Industriel" of Thiès

6.7.1 Sales Possibilities

The cut timber requirements of Thiès are covered from Dakar. Much time and high cost are, however, involved in the procurement of cut timber from Dakar saw mills. A planned purchase of timber is generally effected only by enterprises with a very good organization; the majority of the other enterprises only buys timber if there is the opportunity of a good bargain. The storage of certain timber species that are more frequently processed is too expensive for many an entrepreneur. For lack of suitable timber, short-term orders can often not be executed while at the same time the production capacities cannot be employed.

By the establishment of a saw mill in Thiès these difficulties could be overcome. The daily cut timber requirements in Thiès are estimated at 10 to 15 cu.m.; this quantity is likely to increase with the installation of a saw mill.

6.7.2 Supply of Raw Material

Senegal is short of wood; the round wood to be processed into cut timber has to be imported to the major part.

In Dakar operate several large saw mills which are supplied with round wood from other African countries. Since all saw mills are located relatively favourably to the harbour the transport cost is not very elevated. Timber from the southern well-wooded regions of Senegal are likewise being processed, the wood resources are, however, too small to be exploited profitably.

The transport of round wood from the harbour in Dakar to the saw mill in Thiès costs somewhat more than in the case of cut timber since the cut timber weighs less about 40 to 60 per cent (depending on the moisture content).

The transport of locally grown round wood is less expensive to Thiès than to Dakar (land transport). Therefore this raw material should preferably be processed in Thiès.

6.7.3 Selection of Location

For some years now the carpenter's shop of the "Direction des Chemins de Fer" has discontinued the cutting of timber for its own purposes.

It is more reasonable for the workshops of the "Direction des Chemins de Fer" and a number of independent entrepreneurs to buy their timber in Thiès. For this reason a certain quantity of cut timber can regularly be sold on the market. The sales quantity is estimated at about 4 cu.m. daily to begin with.

In the "Domaine industriel" some suitable halls are available in which the saw mill could be installed. The extension to the halls will not require any considerable investment. As soon as the necessary foundations are mounted the saw could be installed and the production of cut timber could be started. Doubtless, the "Domaine industriel" is to be preferred to other places since with a relatively small expenditure a maximum effect can be obtained.

6.7.4 Machinery and Equipment

The most important machine for the saw mill can be purchased from the "Direction des Chemins de Fer". This log band saw with slide, rails, 20 saw blades and a sharpening device costs only a fraction of the purchase price. It is of excellent quality, the possible cutting capacity is 10 to 15 cu.m. per 8-hour day. The machinery additionally required can be bought in Belgium and financed by Belgian credits. It is intended to order the following machines incl. normal accessories:

- 1 edging circular saw
- 1 chain saw
- 1 pendulum saw
- 1 high-capacity circular saw
- 1 solder for saw blades

The date of delivery of the machines depends mainly on the progress of the negotiations on the question of who will assume the responsibility for the saw mill.

6.7.5 Cooperation

It is envisaged to organize the saw mill under the direction of the C.T.S.E. If also other entrepreneurs participated in the investment a larger production capacity could be reached. It has, however, to be borne in mind that each entrepreneur will possibly fight for his own interest and that there is a certain risk of disagreement in questions of competence. The main difficulty might be the question of whether Thiès should be preferred to Dakar as location for the saw mill. Within the framework of the policy of decentralization of the small industries in the long run Dakar would be the less favourable location although some other factors speak clearly in favour of Dakar (large sales market, direct connection to

the harbour).

If the C.T.S.E. is assisted by the SONEPI by the allocation of funds for the establishment of the saw mill in the "Domaine industriel" of Thiès and can, furthermore, count on a regular technical advisory assistance in the operation of the saw mill, this solution should be the most efficient one for both the entrepreneur and the consumer.

7. Planning Work for the Possible Export of Desks with Senegalese Carvings (Entrepreneur M. Moctar Diaw)

The SONEPI was inquired by a European furniture sales organization about the possibility of producing and exporting representative writing desks with typically Senegalese carvings.

The adviser designed four models (front view and technical details) and discussed the possibilities of realization with the wood-carver M. Moctar Diaw (pricing). The manufacture of such products is rendered difficult by following facts:

- the workshop of the entrepreneur is too small to guarantee a proper execution of large orders (keeping of the time of delivery; machines and equipment)
- even for one order only it is difficult or even impossible to get the required quantities of irreproachable massive timber (about 15 cu.m.). The available timber is too wet and springs easily when air-dried. With the installation of a seasoning chamber this problem could be eliminated.

The ability and experience of the entrepreneur would, however, secure a perfect execution of such orders. It could be aimed at carrying out such projects in cooperation with other entrepreneurs.

8. Sales of Furniture

8.1 Furniture Imports

The leading furniture houses of Dakar¹⁾ were visited to inquire about

- the quantity
- the type
- the design
- the quality and
- the prices

of imported furniture. The results of this investigation were compiled in lists which are to be evaluated for the establishment of the manufacturing programmes of Senegalese entrepreneurs.

Certain types of furniture can be made only by means of special techniques and will have to be imported so long as no furniture of equal quality can be made with the technical means available (foil coating, bending technique etc.). These models answer in most cases only very exceptional wishes and owing to the small clientele they are not interesting for mass production. The prices of the imported furniture being very high they could without difficulty be undercut in most cases. The only exception is seating furniture of simple design which without an automatic machinery could not be offered at a lower cost than imported furniture.

The imported furniture is of good quality and there is a broad offer which, however, is often not up to European taste since the models are in part for quite some time in store and are no longer "modern".

1) Dakar Ameublement - Dakar Occasions - Equip - La Maison du Meubl
Paris Meuble - S.A.I.B. - Société Dakaroise d'Equipement

8.2 Local Production

In some furniture houses Senegalese furniture is offered for sale. Its share in the total offer is, however, small (about 10 to 20 per cent).

The S.A.I.B. (Société Africaine des Industries de Bois) in Dakar is the most important producer of high-quality furniture. This enterprise is European-owned and is technically well equipped; it is independent in terms of its productive equipment and produces furniture in series.

The S.S.A.A. intends to organize its production and sales in the same manner.

Most workshops have no contact with the furniture houses since they offer their products in the street and their quality does not meet the requirements of the furniture house clientele.

9. Recommendations on the Further Development of the Wood-working Industry and the Establishment of Sales Houses

The demands of the customer on the appearance and quality of high-grade furniture and other wood n articles are steadily increasing. In order to cope with these requirements, it is necessary to set up efficient enterprises which combine commercial thinking with technical skills.

At present the apprentices are trained only in practical fields, the extent to which a skill is gained depending on the frequency of certain operations, or the interest of the apprentices in the trade and also simply on mere chance. Theoretical training is in most cases completely missing.

By laying down a performance level which once attained should be confirmed by a certificate to be conferred by a competent authority there could be an incentive to keep a fixed training system.

The young people must be trained systematically. Both practical and theoretical training will be necessary, the theoretical training being of utmost importance since the technical development demands a quick adaptability, flexibility and an organizational sense on the part of the skilled labour. Trade proficiency of the traditional kind becomes less relevant although the practical workmanship of the skilled labour must nevertheless be paid attention to.

Regular training of the managerial staff should be continued since one easily lags behind modern methods of organization and production. To this end short-term intensive training courses could be held which leave enough scope for the execution of the managerial tasks. These courses could be organized by the SONEPI in cooperation with an artisan school.

The productive equipment should be modernized continuously. Seen the situation prevailing in Senegal (creation and maintenance of jobs) it is advised against an excessive automation. On the international market hardly used machines are offered at favourable cost. They are in good condition and disposed of only for reasons of a full automation of machine chains. If credits that are not earmarked exclusively for the purchase of new machines were granted, there would be the possibility of buying a major number of efficient machines. In this case special attention will have to be given to the condition of the shaft and spindle bearings. If possible, a period of guarantee should be demanded of the suppliers (this might, however, be possible only on the basis of special regulations).

Of special importance is the selection of suitable tools. A valuable contribution to the improvement of the production capacity would be the current information of the entrepreneurs about new developments in the machine and tool sector to be given by the "Service Productivité" of the SONEPI. For this purpose a Technical Information Service could be attached to the Documentation of the SONEPI whose task would consist of demonstrating by means of concrete examples more efficient means and methods of production and fixing production targets.

The furniture production programme must be aligned to the wishes of the customers thereby taking into account the technical possibilities of the workshops. The workshops selected by the SONEPI are in a position to build any type of furniture (kitchen, bed-room, sitting-room, children's room furniture, built-in furniture etc.). The mass production of furniture must, however, be based on an approved programme so that the production and sales risk is reduced to a minimum. The style of the furniture to be produced will thus have to be tailored to the taste of the consumers which in return depends upon the fashion.

On the initiative of the SONEPI a furniture design group should be called into being to unite the most important entrepreneurs. This is not to say that all models must necessarily be their own designs. This working group could represent the basis for a cooperative effort also in other fields. For instance, a specialization on certain types of furniture could be organized which would lead to a much better employment of the production capacities.

The organization of work in the enterprises must be planned in more detail if mass production of furniture is to be rendered possible (preparation and supervision of production, quality control). The workshops with a clear artisan structure could then concentrate on the manufacture of simple furniture and effect repair work, an activity that would be in line with the means and skills available with them.

The semi-automatic production of tool handles, brushes, toys (chess sets, board games, building sets etc.) could substitute for the imports of these articles; it is even possible that they could be sold abroad as typically Senegalese articles.

The joint financing and utilization of a seasoning chamber and a veneer press would be of great advantage to all wood-working enterprises. These facilities could be rented to interested parties for a certain period of time and could also constitute a basis for a more intensive technical cooperation.

The foundation of a "Senegalese Furniture Selling Society" to be linked if possible to the Chamber of Commerce and Industry with all qualified entrepreneurs as partners would be the ideal solution to the problems involved in the marketing of furniture. A constant contact among the entre-

preneurs would thus be secured, the quality level of the furniture would be high and balanced, and the profit margin would not be cut unduly by rich dealer's profits. The investment in a sales house could be distributed among a certain number of entrepreneurs and their share in the investment would not be an extreme burden to any of them.

By regularly advertising their products among the traditional buyers of imported furniture (foreign experts, embassy officials etc.) the Senegalese furniture producers would certainly gain a new customer group with a large purchasing power. If the advertising effort is conceived and financed in common, it would be avoided that individual entrepreneurs are financially overcharged and the chances for a success would be increased.

Having a thorough knowledge of the production and marketing conditions prevailing in Senegal the SONEPI could assume a very important function as initiator and coordinator in the successful realization of these recommendations.

It is hoped that the outline on the working conditions in the Senegalese woodworking industry gives an overall picture of the prevailing situation.

Shortcomings which are due to a lack of experience and the insufficient possibilities of information and occur in the training of the young and the production and distribution of the building and furniture carpenter's shops cannot be eliminated in a few months by expert advisory services extended to the entrepreneurs in cooperation with the SONEPI. It is recommended to have the advisory assistance continued by the UNIDO. The multitude of the tasks to be carried out seems to require a long-term advisory activity in order to arrive at a thorough improvement of the production conditions in the woodworking industry.

Conclusions

By the establishment of new and the extension to existing enterprises the basic prerequisites for the modernization of the Senegalese furniture industry are given.

The techno-economic assistance rendered by the SONEPI as well as the skill of the selected entrepreneurs will render possible a steady improvement of the level of production.

The measures already taken and envisaged for the modernization of the machine park in the selected enterprises will constitute the basis for a balanced and mechanized flow of the production process. Practical abilities and the experience of skilled labour are no longer the sole decisive factors determining the quality of an article. Unexperienced and unskilled labour can be incorporated in the production process for the feeding of the machines.

Pretentious designs can now go into the production without demanding too much on the enterprises and thereby causing idle capacities.

There are possibilities of cooperation which should be taken advantage of for the benefit of a general production improvement and the sales of furniture.

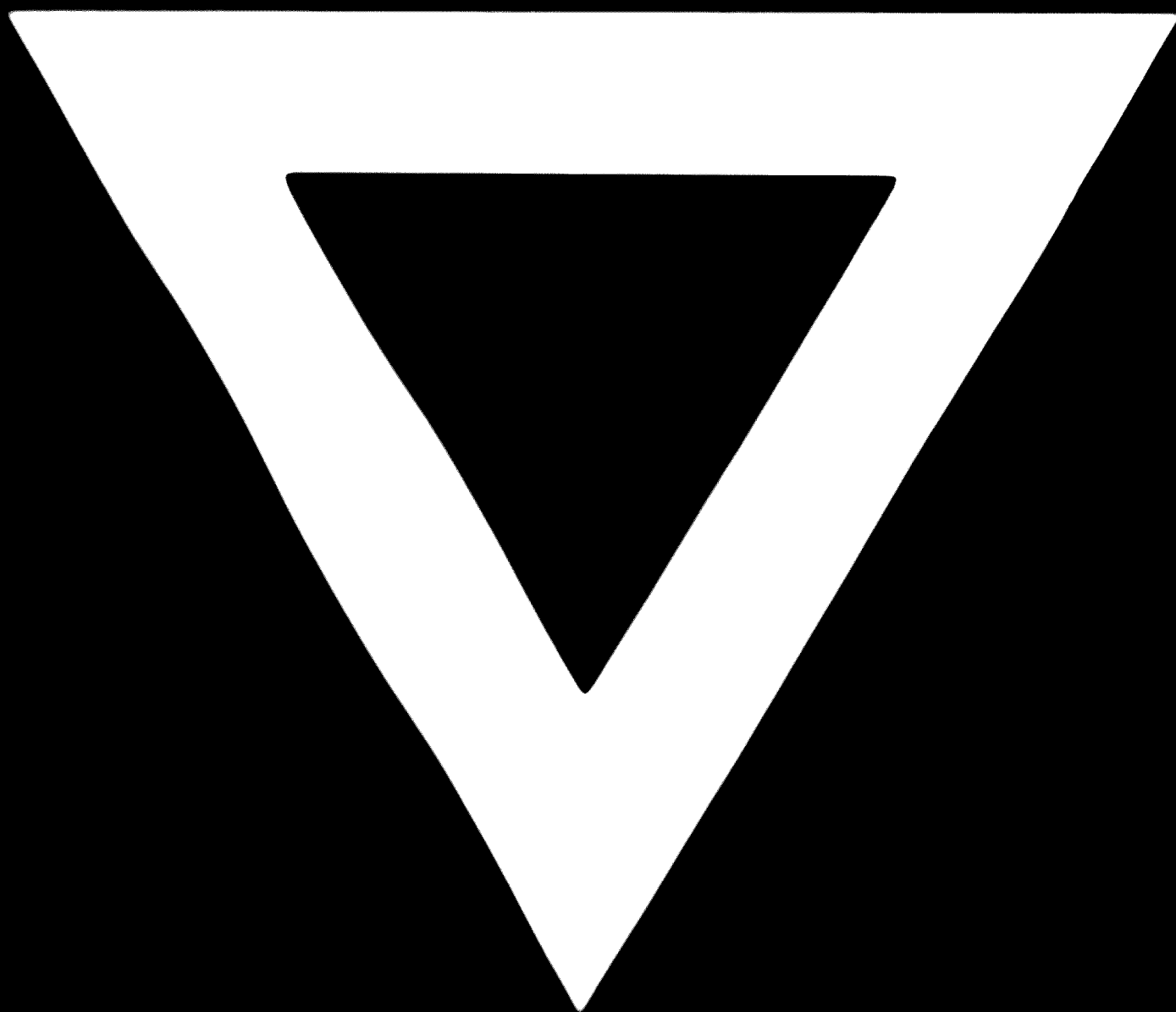
It will be possible in the years to come to steadily diminish the imports of furniture and other kinds of wooden products. Thus the main objective aimed at with the promotion of the wood-working industry would be obtained and it would be succeeded in approaching the level of international furniture production.

By a further intensification of the effort, the export of wooden articles could be envisaged for the future; this will, however, take at least another 5 to 10 years.

Summing up, it can be stated that the overall situation of the Senegalese woodworking industry is considerably improved and it is doubtless worthwhile to support it also in the future.



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