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ASSISTANCE IN FURNITURE PRODUCTION TECHNOLOGY FOR EXPORT

UC/BOL/89/266

BOLIVIA

Technical report: Status of Bolivia's furniture and joinery industries*

Prepared for the Government of Bolivia

by the United Nations Industrial Development Organization

Based on the work of a UNIDO staff member

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Vienna

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* This document has not been edited.

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TABLE OF CONTENTS

1.	Introduction	3
2.	Present Situation of the Furniture and Joinery Industries	3
3.	Proposed implementation programme for the subsequent phases of the project	7

ANNEXES

I	List of institutions, associations and firms visited	10
II	Proposed programmes for the technical and management workshops	14

1. INTRODUCTION

As a result of a request for technical assistance made by the Bolivian Ministry of Planning in October 1988 and endorsed by UNDP in La Paz in March 1989, UNIDO approved a project to assist Bolivia's furniture producers to improve technology to enable them to enter export markets. This project (UC/BOL/89/266), valued at US$ 48,000, was finally approved on 15 December 1989.

Since the background information on Bolivia's furniture and joinery industry was not detailed enough to identify problems in priority areas and thus permit immediate implementation, UNIDO sent the technical officer, responsible for the project, Antoine V. Bassili, to Bolivia on a fact-finding mission and to provide ad hoc technical advice from 20 to 31 March 1990. The cost of this mission was borne by the ongoing Investment Promotion Project DP/BOL/86/018.

During his 12 day stay in Bolivia, he visited 15 furniture, 6 joinery plants and 6 showrooms in La Paz, Cochabamba and Santa Cruz. He also visited two plywood mills (in Santa Cruz) and two particle board mills (in Cochabamba and Santa Cruz). He also met with officials of the National and Departmental Chambers of Industry, Exporters and Manufacturers' Associations and visited two Vocational schools and the Wood Technology Laboratory. Curtesy calls were also made on officials in the Ministries of Industry and Planning and on CORDECRUZ. A detailed list of institutions and firms visited and persons met is given in Annex I.

Throughout these visits ad hoc advice was given on technical and other aspects. Additional information was provided in some cases upon his return to Vienna.

A lecture on problems to surmount to enter export markets and use a wider range of species was given at the request of the National Forestry Chamber.

2. PRESENT SITUATION OF THE FURNITURE AND JOINERY INDUSTRIES

Stage of development of the secror

Of all the plants visited, only a few plants in La Paz and Cochabamba and some four in Santa Cruz were producing - or had the possibility of producing - at an industrial level (i.e. in series). In spite of the fact that many of the firms visited had the basic woodworking machines, they were producing at the craft (or "mechanized craft") level, i.e. components were not standardized, machines served man and not vice versa, plant layout was haphazard and followed no logic, there was no dust extraction and internal transport, series were extremely small, jigs were used sparingly and there was no use of low cost automation or mechanization (except for rare cases in the more modern plants).

This does not mean that the quality and designs of some of the products made were not high. Two artisanal plants produced really high class furniture, and others had attained a quality that could enter export markets.

Productivity however was low and preparation of production was very primitive resulting in unnecessarily high production costs.

Raw material availability

Bolivia is blessed with excellent quality hardwoods (Mahogany, Oak and Cedar). Veneer, plywood and particle boards are also produced locally, and are of acceptable quality. The range of species used is extremely limited, and high valued species are often used in applications where less desirable species could also be used. (Their use in such applications by the local furniture and joinery industry would help their acceptance as sawnwood - on the export markets).

Adhesives, surface finishing materials, foils, hardware and auxiliary products such as abrasives are imported, often from Argentina and Brazil.

Foams used in upholstery are produced locally, but although textiles are also produced locally, those used in higher class upholstered furniture are imported. Leather used for upholstery is usually tanned locally.

Markets

By and large, the quasi totality of the production is for the local market. Overseas markets are still an unknown Eldorado and attempts to enter them have been made, without much perseverance, at the individual firm level. No concentrated sector-wide export promotion programme has been initiated yet. Market intelligence is also totally lacking. The differentiation between marketing and selling is not clearly understood by many of the firms that are interested in exporting.

The local market is small - Bolivia's total population is 6.9 million and the GNP per capita is US$ 570. Hence production in large series for the local market will never be achievable if one bears in mind the distances between the major population centers.

There is not yet any standardization in joinery, and furniture producers all try to produce as wide a range of products as possible. Since production is on a craft (or "mechanized craft") level there are no benefits from larger series, there is thus a very wide range of products made in all factories.

Marketing channels for the bigger plants are through a captive - fully owned - retail outlet. In all cases but one, this is situated in the same city as the plant. (The exception had retail outlets in both Santa Cruz and Cochabamba, with the plant in the latter town.) This further reduces the possibility of specializing and increasing the size of series.

Product development

Furniture is usually produced based on photos or items of furniture (some imported from Brazil) that are copied. Firms have designers on their regular payroll, and except for one plant, free-lance designers are not used (and do not yet exist in Bolivia).

Joinery is usually designed by the architect of the project. None of the joinery plants visited had any standard products.

All furniture products seen were designed for craft (and not serial) production, i.e. there is no attempt at limiting tooling requirements by standardizing sizes of standard joints - dowels, tenons, etc. - nor of standardizing components (such as drawer sides, rails etc.) and using them in more than one product.

Production Technology Used

Many of the firms visited did not understand the importance of using wood dried to the equilibrium moisture content of the place of ultimate utilization, nor the mechanisms of wood drying - be it natural or in a kiln.

Similarly, correct tooling was often not used, and its importance not recognized.

Tool maintenance was adequate.

Plant housekeeping was poor - mainly because of non-availability of dust extraction installations, and fire fighting equipment was lacking in practically all the plants visited.

Jigs were used sparingly, and their construction, when used, was rudimentary.

Full use of pneumatics was also not made, neither for power tools (such as stapling or sanding) nor in assembly clamps.

The range of hardware fittings used was very limited, and practically no furniture was being produced in knock-down form for shipping. (This will have to happen since the resulting savings in freight when shipping knock-down furniture for export, make it far more popular from the buyer's point of view.)

A limited range of surface finishing material was being used, but quality of products was satisfactory.

Plant managers still did not seem to realize that no value is added in moving components from the floor near one machine to the floor near another, and internal transport systems (pallets, bins or trolleys) were non-existent in most plants, and, in the rare cases where it existed, they were used sporadically.

Because by and large production was still at the craft (or "mechanical craft") level, very few plants had a logical plant layout.

Documentation for production control was non-existant in most of the plants visited.

Quality control was normally undertaken at the final assembly, resulting in unnecessary value being added to components which will be rejected in the end. No gauges or special tools were being used.

The importance of some aspects - such as the need to have serrated, tight fitting dowels, made from a hard wood (harder and dryer than the one in which the dowel is inserted) was not recognized at the shop floor level.

Similarly, the correct stacking of wood for air and kiln drying, the need for stabilizing the timber after drying etc. was also often not recognized.

Equipment Installed

Equipment consisted of standard woodworking machines, produced in Brazil, Italy, the Federal Republic of Germany and Argentina.

Tooling was adequate, but productivity and quality could be improved by using more sophisticated tools. TCT tools were also not as commonly used as warranted. This was due to the difficulty in maintaining them.

Machines often lacked the safety devices that are mandatory in developed countries.

Low cost automation could, in many cases, have greatly increased productivity and reduced rejects had it been incorporated in the existing machines. Similarly, increased use of well designed and precise jigs can greatly increase the precision and productivity of the basic machines used.

Surface finishing equipment - be it spray guns or spraying booths were often of the most rudimentary type. Only one curtain coating machine was seen, and it was not being used.

Machine precision and precision of machine setting seemed to be adequate, but none of the technicians seemed to have knowledge of how to test it. This applies also to the kilns.

Due to the very wide range of products made by each factory, investments in a very wide range of machines were made resulting in an extremely low utilization of some machines such as, for example copying lathes.

Manpower

Like in most developing countries, the industry's manpower is trained traditionally on the job through ad hoc apprenticeships. Joiners and cabinet makers are given access to machines without any real training in their use, limitations, safety considerations and correct operation. This contributes to (a) a low productivity, and (b) a shorter machine life.

Middle management and technical personnel do not have the skills for industrial production in the wood sector, and no possibility seems to exist to give them the necessary training. (Bolivian universities train industrial engineers, but they have no knowledge of wood technology when they graduate; and people who have acquired experience in wood processing lack even the basics of industrial engineering.)

Similarly draughtsmen lack the basics of ergonomics and designers with creative talent lack the knowledge of furniture construction and woodworking machine operations to enable them to design for industrial production.

Institutional and Industrial Infrastructure

Manpower development exists only in so far as school leavers are taught carpentry, joinery and cabinet making (as well as the basics of machine woodworking) in INFOCAL Vocational Schools.

There are no courses for operators from industry to acquire additional skills in such fields as surface finishing, tool and machine maintenance, jig design and construction, etc.

Aspects of estimating, production planning, etc. are also not taught.

Industrial information is not available for the furniture and joinery industries, in so far as there is no central specialized library that can offer also answers to technical questions; nor is a data base being compiled to provide industry with statistics, names and addresses of manufacturers of equipment and auxiliary products, etc.

Testing facilities for testing inputs (paints, adhesives, etc.) and finished products do not exist. Such facilities exist in all the major furniture producing countries of Europe, and are being created also in the developing countries (Singapore, Hong Kong, Philippines, Malaysia, etc.).

Common service facilities often accelerate the development of the sector because they provide equipment and know-how which individual firms cannot afford to have because of the high cost of this equipment and the relatively low utilization possibilities. Examples of such common service facilities are tool maintenance centers, common wood drying facilities, and specialized firms that undertake specialized operations (eg. turning, laminating and edge banding, surface finishing with sophisticated products that need UV or infra-red drying tunnels, etc.). Such firms do not yet exist in Bolivia, and it seems that the average entrepreneur is unwilling to subcontract operations to such specialized firms.

Specialized consulting engineering firms. There do not seem to exist consultants or consulting engineering firms that have specialized in the requirements of the furniture and joinery industry (eg. selection of machine, plant layout, design and calculation of dust extraction systems, calibration of kilns, etc.). The provision of such services locally would greatly accelerate the development of this sector.

Manufacturers' associations are at the point of being created to cater specifically for the need of the furniture industry. They should be strengthened to play an increasing role, not only in representing their members in meetings with government officials, but also for organizing activities such as training courses, study tours, market surveys etc. which cannot be carried out by the individual firms, and which the Government is reluctant to undertake.

3. PROPOSED IMPLEMENTATION PROGRAMME FOR THE SUBSEQUENT PHASES OF THE PROJECT

In view of the fact that most of the problems identified are common to a large number of firms, and in order to make as full a use as possible of the 4.5 man/months of expert services foreseen in project UC/BOL/89/266, it is recommended to conduct, within the above project, two one-week seminars. The first, covering aspects of management, should be held in Cochabamba, and the second, covering technical aspects, should be held in Santa Cruz. Their proposed programme is given in Annex II. It must be realized that holding a two week seminar for chiefs of enterprises would make it impossible for those coming from other towns to attend. Hence, the merit of implementing the assistance programme in two phases - i.e. two one-week seminars, the first

covering management and the second covering technology aspects. The manpower inputs of 4.5 m/m will be allocated accordingly. Each seminar will be complemented by 2 m/w of assistance to be provided on an ad hoc basis, at least one week of which will be prior to the seminar. Thus, the programme of the experts should be as follows:

	Phase I: Management (or v/v)	Phase II: Technology (or v/v)
Week I	Ad hoc visits to Santa Cruz	Ad hoc visits to Cochabamba
Week II	Ad hoc visits to La Paz	Ad hoc visits to La Faz
Week III	Seminar in Cochabamba	Seminar in Santa Cruz

Ideally, a one month break between the two phases would be best. Santa Cruz was preferred over Cochabamba or La Paz due to the better possibilities of factory visits - even though the INFOCAL school in Cochabamba has a better and wider range of equipment, a better layout and a dust extraction system.

A feature of both seminars will be the half day round table discussions when, after a summing up, discussions could be held and a plan of action for the development of the sector can be elaborated and adopted.

A well established, respected and efficient national counterpart is needed to assume the responsibility of all the local arrangements.

Because of the fact that the National Chamber of Furniture Industries has not yet been fully created - its board was to be elected on 4 April 1990 - it can not yet be considered. Export bodies are not directly involved in the technological processes and management of furniture factories. The remaining bodies are the National Chambers of Forestry and of Industry. The National Chamber of Industry is preferred to the National Chamber of Forestry since its Headquarters are in La Paz and since it has offices in all departments. All other Chambers are of course welcome to participate in the seminar.

The project, as approved, only covers international inputs, and the local counterpart body - or the government - will have to assume the following duties:

(a) Organize the schedule of factory visits for the experts, and, if the factories do not provide it, assure transportation.

(b) Provide, upon arrival of the team, background information on the firms to be visited and their main problems as well as a schedule of visits, enabling the experts to select the factories to be visited by each of them according to their fields of specialization. (UNIDO will provide the Bolivian counterparts with a set of relevant questions that the factories can answer.) In cases where an expert does not speak Spanish, interpretation will have to be provided. Logistic and secretarial support will be needed to coordinate the visits, follow-up, etc.

(c) Provide the venue for the seminar, i.e. a room for up to 50 persons, audio-visual aids (overhead and slide projectors, screen, and

possibly a video player and TV monitor). Interpretation will have to be provided if an expert does not speak Spanish.

(d) Provide ad hoc secretarial and photocopying services.

(e) Assume the responsibility of reproducing the UNIDO publications in sufficient quantity, after UNIDO has selected them and after UNIDO has authorized the Bolivian authorities to reproduce them.

(f) Assume responsibility of issuing the invitations, and of receiving background information on the candidates and the firms. They will also assume responsibility for selecting the participants to the seminar (in case too many candidates are interested). The ideal number of participants is between 25 and 30. **In no case should the number of participants to the seminar exceed 50.**

(g) Provide the UNIDO team with a set of curricula vitae of the persons attending the seminar.

(h) Assume the responsibility to invite additional personalities to the round tables during the last half day of the seminar.

(i) Take notes and publish and diffuse the conclusions of the round tables.

(j) Bear the costs (honoraria, travel and per diem) of Bolivian lecturers.

UNIDO will only be able to start implementing this project after the Bolivian authorities have communicated to it, through UNDP, their agreement to this proposal (or suggested modifications) and the National Chamber of Industries has accepted, formally, to be the counterpart, provide the services enumerated above and bear their cost. They should also nominate the counterpart who will be in regular contact with UNIDO Headquarters and the UNIDO Country Director in the office of the United Nations Development Programme in La Paz.

It should be estimated, that, in order to recruit the team(s) of experts, three to four months are needed from the date of approval of the proposed programme and nomination of the counterpart.

Job descriptions will have to be finalized once the persons have been identified, since they will have to cover more than one topic and the job descriptions will have to reflect each individual's specializations.

Acknowledgements

The author of this report wishes to thank hereby the staff of the Investment Promotion Project for the efficient programming and assistance given.

ANNEX I

LIST OF INSTITUTIONS, ASSOCIATIONS AND FIRMS VISITED AND PERSONS MET

A. La Paz

1. **Institutions**

Ministry of Industry, Commerce and Tourism
- Mr. Victor Hugo Pérez Delgadillo, Subsecretary of Industry and Tourism
- Mr. Sergio Sanchez, Advisor to the Minister for Industry

Ministry of Planning and Coordination
- Mr. Fernando Torres Saravia, Director, DIFAD

Asociación de Pequeñas Industriales de La Paz (ADEPI-LA PAZ)
- Mr. Wilden Ovando Miranda, General Manager
- Ing. Marcelo Guttiérrez, President

National Institute for Promotion of Exports (INPEX)
- Ing. Oscar Farfan Mealla, Executive Director
- Mr. Jorge Iturri Muñoz, General Advisor
- Dr. Franklin Bustillas Galvez, Sub-Director, Planning and Markets

National Association of Furniture Manufacturers
- Ms. Lydia M. de Calderon
- Mr. Jorge Dias
- Ing. Victor G. Cabrera L.

National Chamber of Industries (CNI)
- Dr. Alfredo Arana Rück, General Manager
- Dr. Alfonso Rojas Veja, Deputy Manager and Legal Counsellor

National Chamber of Exporters
- Lic. Jorge Adriazola, General Manager
- Ing. Helga Herrera Krebber, Chief, Technical Department

2. **Furniture manufacturers**

Equus
- Mr. Percy Luza Avila, General Manager

Mobilia
- Ing. Javier Inchanste, General Manager

Casa y Járdin
- Mrs. Carola Martinez, Administrative Manager

Manufactura Madera
- Mr. Luis A. Moura, Owner-Manager

Casa Bella
- Mrs. Carola H. de Mac Lean, Owner and Interior Decorator

3. **Joinery Manufacturers**

Ambiente S.r.l.
- Ing. Ricardo Maldonado, General Manager
- Arch. German Velasco, Production Manager
- Lic. Jaime Trigo, Administrative and Financial Manager

Carpinteria Gutierrez
- Ing. Marcelo Gutierrez, Owner

4. **Furniture showrooms**

Occidental Bolivia S.r.l.
- Mr. Percy Louza Avila, General Manager

Mobilia
- Ing. Javier Inchanste, General Manager

Casa y Jardin
- Mrs. Carola Martinez, Administrative Manager

Mobiart
- Mr. Javier Martin Dockweiler C., General Manager

Casa Bella, Arte y decoración
- Mrs. Carola H. de Mac Lean, Interior Decorator and owner

5. **United Nations Development Programme**

- Mr. Mario Salzman, Deputy Resident Representative
- Mr. Gregorio Pruzan, UNIDO Country Director
- Mr. Erik K. Eriksen, UNIDO Junior Professional Officer
- Mr. Raul Garron, Investment Promotion Adviser, Investment Promotion Project
- Ing. Jorge Barron, National Consultant, Investment Promotion Project

B. Cochabamba

1. **Institutions**

Departmental Chamber of Industries
- Mr. Juan José Caballero, Manager
- Ms. Rose Mary de Olguin, (Carpinteria Olmas)

Investment Promotion Programme
- Ing. Gonzalo Grossberger Z., Delegate, Investment Promoter

INFOCAL, Vocational School
- Mr. Jorge Castellon, Principal

2. **Furniture Manufacturers**

Planta Secadora de Madera (PLASEMA)
- Mr. Ramiro Peña Prada, Owner Manager

Carpinteria Jacaranda
- Ms. Julia Mendez de Rios, Administrative Manager

Carpinteria Modular
- Mr. Manuel Fernandez, Owner

Carpinteria
- Dr. Carlos A. Olguin, Owner

IBEMA EXIMPORT S.r.l.
- Mr. Alberto Muriel, Owner

3. Joinery Manufacturers

Industrial Maderera SALI Ltda.
- Mr. Luka Vranicic Franulic, General Manager
- Mr. Mario Raljevic F., Technical Manager

Empresa Maderera Industrial "Vila Tunari"
- Mr. Ivo Dobronic E., Owner

4. Furniture showrooms

IBEMA S.r.l.
- Mr. Alberto Muriel, Owner

5. Particle Board Manufacturers

Industria Maderera de Prensaje y Afines S.r.l. (IMPA)
- Ricardo Burgos M., Chief of Production
- Mr. Burgos, Owner

C. Santa Cruz de la Sierra

1. Institutions

Departmental Chamber of Industry and Commerce
- Ing. Goran Matkovic Vranjican, Director of Industry
- Lic. José Luis Velez Ocampo C., General Manager
- Lic. Carlos Roca Leigue, General Manager, Instituto Boliviano de Comercio Exterior (IBCE)
- Lic. Juan Carlos Lijeron Rojas, Promotion Department IBCE
- Lic. Francisco Javier Terceros Suarez, General Manager, Chamber of Exporters of Santa Cruz (CADEX)
- Lic. Benjamin Saucedo, International Department (CADEX)
- Ing. Damir Matkovic V., Manager Madetrop.

INFOCAL Vocational School
- Mr. Jorge Marcos Salvador, President, Departmental Board
- Ing. Raúl Cors Navarro, Departmental Executive Director

National Chamber of Forestry
- Ing. Edgar Landivar Landivar, President

CORDECRUZ
- Lic. Alfonso Saavedra, Administrative Manager

Investment Promotion Project
- Mr. Carlos Carrasco, Promotion Advisor

LABONAC Forest Products Laboratory
- Ing. Mansilla, Director
- Ing. Vascope
- Arch. Parrada

2. Furniture Manufacturers

Muebles Fatima
- Mr. Jaime Pommier G., General Manager

Industria del Mueble Roda (IMR)
- Ing. Cristobal Roda Vaca, General Manager

Industria de Muebles Kory Punku S.r.l.
- Mr. Juan Carlos Urzagaste U., Manager

Industria de Muebles Hurtado Ltda.
- Mr. Enrique Hurtado, General Manager

Design (Fabrica de Muebles)
- Mr. Giorgio Valli, Manager

3. Joinery Manufacturers

Asseradero San Martin S.r.l.
- Mr. Juan Abuawad, President

Techno Carpinteria San Pedro S.r.l.
- Lic. Roberto Vila de Prado, Controller

4. Plywood Manufacturers

CIMAL
- Lic. Aldo Sacre España, General Manager
- Ing. Cristobal Roda Vaca, General Manager

SOBOLMA Ltda.
- Ing. Wilfredo Jurado Mattos, General Manager

N.B. SOBOLMA also produces particle board.

ANNEX II

WORKSHOP ON FURNIUTRE PRODUCTION FOR EXPORT

Module I: Management aspects (in Cochabamba)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Opening	Equipment Selection and Methodology for purchase of woodworking machines	Plant layout	Production planning and control	Low cost automation (examples)
Requirements of production for export				
Characteristics of export markets				
Design and production development for industrial poduction	Quality control	Tool maintenance	Production planning and control	Round table discussion and adoption of a plan of action
	Packaging of furniture			

WORKSHOP ON FURNITURE PRODUCTION FOR EXPORT

Module II: Technical Ascpects (in Santa Cruz)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Opening	Wood drying	Production technology	Design and use of jigs	Surface finishing (lecture)	Surface finishing (demonstration)
Solid wood as a raw material					
Properties of lesser known species (Damir Matkovic V.)	Wood based panels used in furniture production	Visit to Hurtado Furniture Plant and San Pedro Joinery plant	Group work on jig design (At Hurtado)	Round table discussion and adoption of a plan of action	
	Hardware for KD panel furniture				