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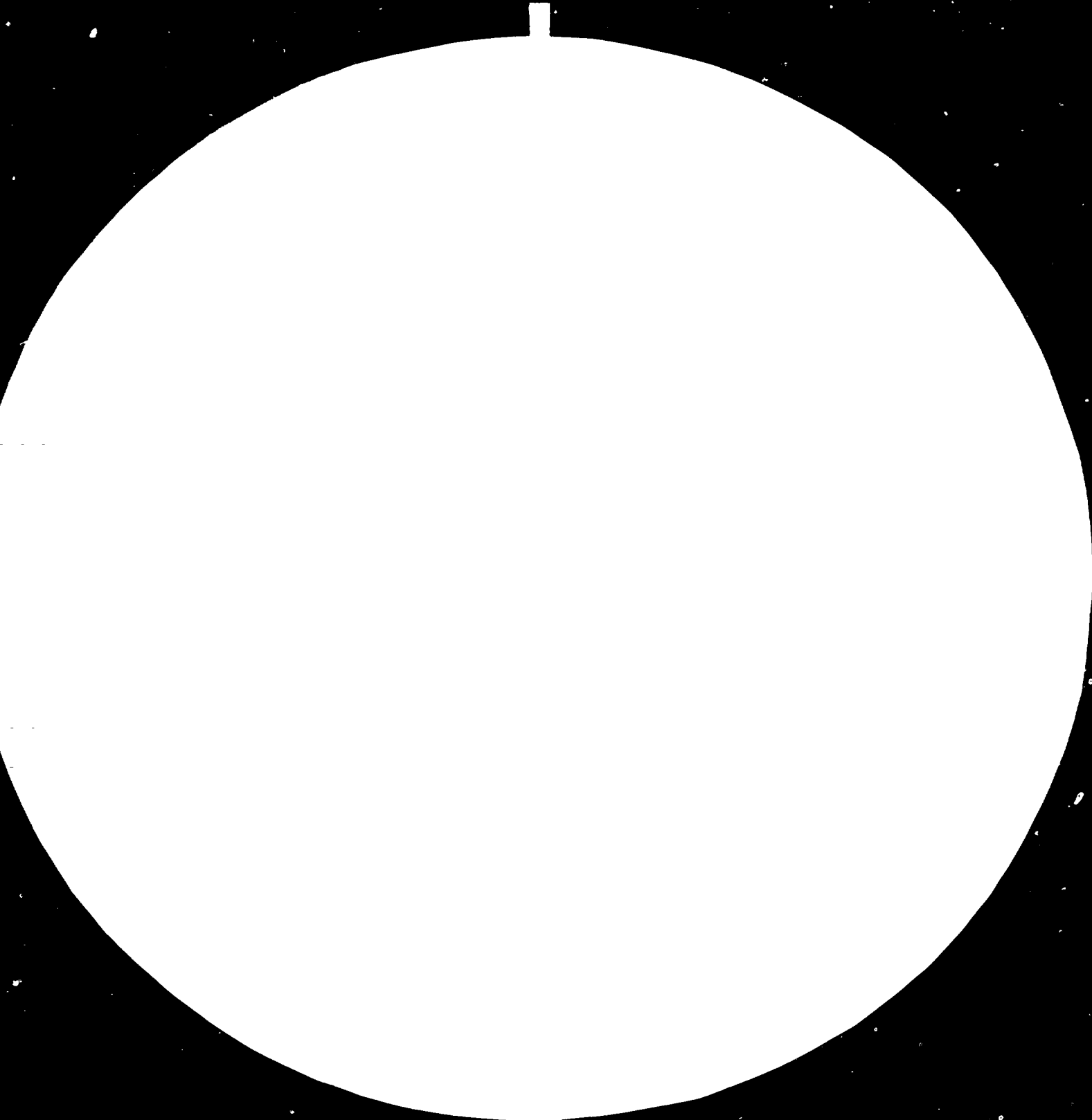
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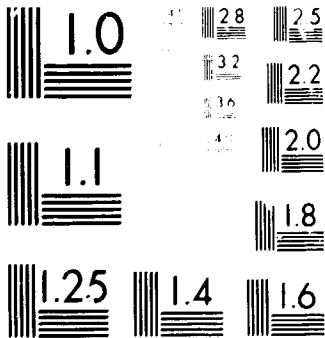
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REPORT ON THE SEMINAR ON WOOD-BASED PANELS AND JOINERY INDUSTRIES\*  
held in Beijing, China, 23 March to 7 April 1981

by

000010

Antoine V. Bassili  
Senior Industrial Development Officer  
Agro-industries Branch  
Division of Industrial Operations

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V.81-32791

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1. Purpose of the mission:

Two staff members of the Agro-industries Branch of the Division of Industrial Operations, Antoine V. Bassili, Senior Industrial Development Officer and Marie-Odile Cherklesly, Secretary, went to Beijing, People's Republic of China, from 19 March to 11 April to attend and help conduct the UNIDO Seminar on Wood-based Panels and Furniture Industries.

2. Preliminary preparations:

This seminar, the first in the field of wood processing industries that UNIDO conducted in the People's Republic of China, was organized in collaboration with the Forestry Society of China. It was financed from the voluntary contribution of the Government of China to the United Nations Industrial Development Fund.

This seminar was organized based on the decisions taken by the Chinese authorities during the author's previous stay in Beijing, from 24 March to 3 April 1980, when the concept of the seminar and the detailed programme were agreed upon.

As a result of that mission, a project proposal was drafted and submitted for approval by UNIDO's Programming Committee in May 1980. It was approved on 23 July 1980 under the following project numbers: US/INT/80/014 for an amount of US\$ 30,943 chargeable to the convertible currency portion of the Chinese pledge; UC/INT/80/014 for an amount of US\$ 27,757 in convertible currency, and UD/INT/80/014 for an amount of US\$ 149.502 in non-convertible currency.

The thirty countries (listed in Annex I) agreed upon during the preparatory meeting in March 1980 were invited by UNIDO in September and the closing date for nominations was to be end December 1980. Because the UNDP office in the South Pacific misunderstood UNIDO's cable to invite Fiji only, nominations were also received from other islands that it covers. These however did not qualify to attend.

A total of 59 names were submitted to UNIDO by the respective governments through the local UNDP offices by the time the evaluations were made. Fourteen were recommended, twenty-three were recommended with reservations and sixteen were not recommended. A further six could not be evaluated because the data submitted was insufficient. UNIDO selected twenty participants to attend the course, but two participants were unable to attend and informed UNIDO too late to enable a stand-by to take the place. Consequently, eighteen participants attended the seminar. A further 25 Chinese technicians, attending as observers, i.e. at no cost to UNIDO, also participated actively in the entire seminar. (The participants, observers, consultants and lecturers are listed in Annex II).

3. Participants:

Bearing in mind that the participants came from countries at different levels of development on the one hand, and that the seminar was to cater both for wood based panels and furniture industries on the other, they could be considered to have been a homogeneous group. In assessing their background, one was a manufacturer of particle board, three produced plywood, eleven furniture, and it could be said that a further three held positions which enabled them to benefit from the entire programme.

4. Programme of the seminar:

The seminar's programme is given in Annex III. It consisted of 53 hours (62%) of lectures; 15 hours (17%) of plant visits; 5 hours (6%) of background information, opening ceremonies and administrative matters; 7 hours (8%) of panel discussions; and 6 hours (7%) of presentation of seminar assignments. In the calculation of the time spent for the assignment work, the figure indicated above relates only to the time spent in presenting and not in preparing same.

Because of the fact that all concerned: participants, UNIDO consultants, and UNIDO staff members resided in the same hotel and that this hotel was not in the centre of the city, the participants put considerable hours in the evening to prepare for these assignments.

Four factories were visited, two being integrated complexes, one a factory producing traditional Chinese furniture, and one specializing mainly in metal furniture. Because of the late arrival of some of the participants, the Chinese authorities arranged for a second visit to one of the complexes enabling those who did not visit it to do so.

5. Documentation.

Because of unforeseen travel by staff members in the Branch, delays occurred in the processing of the documents submitted timely by the Chinese authorities. Furthermore, due to reasons beyond our control, changes had to be made at the last minute in the lectures. Those papers that could not be reproduced or issued as conference room documents were issued subsequently and distributed to all the participants and observers. The list of documents is given in Annex IV.

6. Assignment work:

At the beginning of the seminar, the participants were requested to indicate their interest in the following main fields:

- production of plywood in a developing country;
- production of particle board in a developing country;
- design of panel furniture for a hotel <sup>1/</sup>;
- serial production of panel furniture in a developing country:
  - (a) production planning;
  - (b) plant layout.

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1/ Subsequently changed to panel furniture for household use.



The first topic was selected by five participants, two chose to cover the second, three the third topic, while for the last topic each sub-group consisted of four participants. Details of the topics, objectives and methodology are given in Annex V.

A discussion leader was nominated for each group to co-ordinate the work and present the conclusions. UNIDO consultants also guided the work of the groups. Each group was allocated two hours to present its conclusions and full use was made of audio-visual facilities available. Their presentation are evaluated under section 9 of the report.

7. Administrative matters:

The Chinese organizers were extremely helpful and they through of practically everything in advance. The hotel selected (Friendship Hotel in Beijing) provided adequate rooms and excellent conference facilities. Excellent arrangements were made at the airport to ensure that participants were met at their arrival and also concerning their return home.

The leisure time activities were excellent. They consisted of: (a) a visit to the Summer Palace and the Imperial Palace on one day, (b) a visit to the Ming Tombs and the Great Wall on another day, (c) two ballet performances, (d) one performance of the acrobats' troupe, (e) tourist films of China were also shown at the hotel one evening specially for the participants. A visit to the Great Hall of the People was also arranged one morning.

The interpreters provided by the Chinese authorities were very good. They are to be commended for their in-depth knowledge of the technical aspects covered during the seminar.

The financing of this seminar was secured from the voluntary contribution of the People's Republic of China to the UNIDF (project number INT/80/014). A sum of US\$ 237,920 (including 14 percent overhead costs) was allocated to that effect. It was composed of US\$ 150,002

from the contribution of China in Yuans, US\$ 27,757 from the contribution of China in convertible currencies, and US\$ 30,943 from the general convertible pool. Project allotment documents numbers 81-0463, 81-0393 and 81-0358 respectively refer to these funds. The detailed budget of this course is given in Annex VI.<sup>1/</sup>

The participants from Mauritius complained that their tickets were handed over to them by the local UNDP office only 5 hours before boarding the plane. Others complained that the notification reached them too late.

The problems encountered in organizing this course were of a purely administrative nature. They relate to the fact that:

- a) the time-tables of the CAAC had changed since the approval of the project, obliging UNIDO to shift the course by three days (starting date 23 March instead of 20 March). This, while facilitating the travel of participants, complicated the arrangements concerning the seven consultants recruited by UNIDO.
- b) Difficulties were also encountered concerning the recruitment of the consultants. One, after accepting to attend the seminar and deliver the lecture, declined to do so at the last minute and a substitute (Mr. José Carré) had to be found at very short notice. Another was not medically cleared by UNIDO to undertake the long travel involved. He recommended a substitute (Mr. R. Vansteenkiste).
- c) Yet another administrative difficulty arose because of the changes in the special per diem rate for courses negotiated between the UNDP and the Chinese authorities had increased

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<sup>1/</sup> It should be noted that the total of these PADS (US\$ 208,702) is greater than the original budget figure of US\$ 194,778 by US\$ 13,944. This is due to: (a) increased cost of the UNIDO reception from Y 800 to Y 1600; and (b) increases in the DSA applicable in China from Y 106 to Y 130 to Y 150; and (c) increased fares from international travel of participants during the interim between budget and event, especially the convertible currency component.

during the year since the project was approved resulting in lack of funds and a need to obtain the approval of the Chinese authorities for an increase of the project's budget.

The author wishes to put on record the excellent assistance he received from the Documents Reproduction Unit of the Conference Services Division which went to great pains to make the documentation available at short notice, and from the Communications, Archives and Records Unit Chief, General Services, for having ensured that the documentation was shipped to China on time.

8. Press Coverage:

The seminar received considerable media coverage: the t.v. evening news, broadcast nationally, showed the opening ceremonies on the first day. On two occasions, the People's Daily published articles concerning the seminar. Translations of these are attached as ANNEX VII.

9. Evaluations:

UNIDO's evaluation forms for the seminar were handed out to the participants, and eighteen forms duly completed were returned at the end of the seminar. The replies were compiled and the details are given in ANNEX VIII.

By and large, the assessment by the participants was positive. They complained mainly about the shortness of the notice given to them.

The lectures were of acceptable standards, the more so bearing in mind that two were prepared at very short notice (see 7 (b) on previous page).

All the lecturers were willing to modify their texts to incorporate points raised during the discussions and these revised lectures have been issued by UNIDO subsequent to the seminar, and distributed to the participants.

The participants went to great pains to prepare their assignment work. All, except the one on plywood, were of the expected standard. The one on production planning in furniture was exceptionally good, as was the one on particle board. Regarding the last assignment, the discussion leader was obviously referring to an existing case and speaking from experience.

An informal assessment of the course was made by the Chinese Director, his deputy and the author.

10. Other matters:

(a) Discussion with the representatives of the Forestry Society of China:

The author met with the representatives of the Forestry Society of China to discuss possible assistance by UNIDO to their sector.

(b) Discussion with representatives of the Ministry of Light Industries:

The author also discussed with the representatives of the Ministry of Light Industries possible assistance of UNIDO to the furniture industry.

The gist of these discussions are reproduced in the memorandum he drafted to the Programme Development and Evaluation Section (attached as Annex IX of this report).

11. Acknowledgements:

The author hereby wishes to express his gratitude to the Chinese authorities for the assistance they have given him in conducting and organizing this seminar. The Chinese directors, technicians and staff, too numerous to be enumerated here, should read in these lines the author's gratitude for their collaboration and deep sense of devotion. Through their efforts and the considerable time and trouble they took they contributed to assure the seminar's success.

He also wishes to place on record the excellent work done by the UNIDO consultants and the UNIDO secretary during the course.

ANNEX I

LIST OF COUNTRIES INVITED

Bangladesh	Mozambique
Bhutan	Nepal
Burma	Nigeria
Congo	Pakistan
Democratic Yemen	Papua New Guinea
Fiji	Philippines
Ghana	Sierra Leone
Guyana	Singapore
Hong Kong	Sri Lanka
India	Sudan
Indonesia	Thailand
Jamaica	Uganda
Kenya	United Republic of Cameroon
Malaysia	United Republic of Tanzania
Mauritius	Zambia

ANNEX II

LIST OF PARTICIPANTS, OBSERVERS, CONSULTANTS AND LECTURERS

	<u>Function</u>	<u>Mailing Address</u>
<u>FIJI</u>		
Aisake Kaunisela KUBUABOLA	Production Manager	Fiji Forest Industries Ltd. Box 69 Labasa
<u>GHANA</u>		
James Alexander CLARKE	Managing Director	Kumasi Furniture and Joinery Company Ltd. P.O.Box 300 Kumasi
<u>HONG KONG</u>		
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<u>INDIA</u>		
Pradip Vijayaray MEHTA	Development Officer	D. G. T. D. Udyog Bhavan New Delhi - 110011
Alamdar Hussain MOOSVI	Conservator of Forests	Andhra Pradesh Forest Development Corporation Hyderabad
<u>JAMAICA</u>		
Williams Joseph WILLIAMS	Managing Director and Factory Manager	225 ½ Marcus Carvey Drive Kingston

MAURITIUS

K.L.S.L. KOO STN LIN	Manager	Meubles Laval Ltée. Tombeau bay
Kris S. SEEBOO	General Manager	Noel Furniture Co. Ltd. P.O.Box 607 Port Louis

PHILIPPINES

Alberto T. GUMARAO	Industry Development Specialist	Ministry of Industry 3rd floor BMI Bldg. Osmena Blvd. Cebu City
Bernardo P. MANALOTO	General Manager	Furniture Collections Co. 281 MacArthur Highway Mabalacat, Pampanga

SINGAPORE

Paul KENG Sin Sieng	General Manager	Singapore Handicrafts Pte.Ltd. 4 Oxley Road Singapore, 0923
---------------------	-----------------	---

SUDAN

Mubark Ahmed AWAD EL KARIM	Timber Industrial Engineer	Forest Administration P.O.Box 658 Khartoum
-------------------------------	----------------------------	--

THAILAND

Nuanwan THIRAWAT	Chief, Furniture Industry Development Centre	Industrial Service Institute Soi Kluaynamthai Rama 4 RD Bangkok II
Narindr VANGSRIVADHANAGUL	Managing Director	Modular Furniture House 165/3-4 Asoke Road Bangkok

UGANDA

Atoocoon Joseph LAKONY	Forest Officer	Wood Industries Corporation Box 927 Kampala
George William OKURUT	Government Officer	Ministry of Works Box 7174 Kampala



TANZANIA (United Rep.)

Aggrey R. DAGAA

Planning and Development  
Officer

Tanzania Wood Industries  
Corporation (TWICO)  
P.O.Box 9160  
Dar-es-Salaam

Jestus B. MAFESA

General Manager

Kilimanjaro Timber  
Utilization Company  
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Moshi

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CHINA (People's Rep.)

CHEN Din-Xin

Deputy Head Furniture  
Division

Second Bureau of Light  
Industry  
Ministry of Light Industry  
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Beijing

CHEN Zeng-bi

Engineer,

Institute of Architectural  
Designing  
Chinese Academy of Building  
Science  
Bai Wan Zhuang  
Beijing

CHEN Xiang-kang

Deputy Director

Nanjing Wooden Furniture  
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FANG Ren-bao

Chief of Section of  
Technology

Tianjin Timber Corporation  
No. 84  
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HOU De-qin

Manager

Tianjin Corporation of  
Furniture Limited  
No. 36  
Ha Mi Dou Street  
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HUA Shou-yong	Assistant Engineer	Institute of Scientific and Technological Information for Forestry The Chinese Academy of Forestry Wanshoushan Beijing
LI Bao-zhang	Engineer, Deputy Director of Qingdao Research Institute of Furniture	Qingdao Corporation of Furniture Ltd. No. 2 Jua Yang Road Qingdao
LI Kang-qui	Engineer	Shanghai Research Institute of Wood Industry No. 667 Chong Shan West Road Shanghai
LIU Da-jun	Head of Section of Technology	Yu Zhu Woodworking Plant Huang Pu Guangzhou
LIU Zhong-chuan	Associate Professor	Department of Forest Product Industries Nanjing Technological College of Forest Products Nanjing
LUO Wu-yi	Associate Professor	Central Institute of Fine Arts Tung Hwan Road Beijing
LUO Yue-qui	Engineer	The Research Institute of Wood Industry Chinese Academy of Forestry Wanshoushan Beijing
LU Ren-shu	Associate Professor Head of Pedagogic Research Division of Wood-based Panels	Department of Forest Product Industries Northeast College of Forestry He Xing Road Harbin

QIAN Hao-yun	Manager	Zhejiang Provincial Corporation of Furni- ture and Sundries Ind. No. 140 Shen Li Road Hangchow
WANG Jia-xiang	Engineer	Beijing Corporation of Wood Industries No. 12 Pei Chi Zi Beijing
XIANG Chuan-yin	Engineer	Bureau of Machinery The Ministry of Forestry He Pin Li Beijing
XIE Zhong-min	Assistant Engineer	Beijing Corporation of Wood Industries No. 12 Pei Chi Zi Beijing
XING Zhu	Engineer	Designing and Research Institute of Forest Product Industries The Ministry of Forestry No. 130 Chao Nei Street Beijing
YANG Qiang	Chief, National Science and Technology Information Section	The Ministry of Light Industry Shi Tan Nong Nanjing East Road Shanghai
YANG Guang-yi	Assistant Engineer	Hailongjiang Provincial General Bureau of Forestry No. 24 Wen Chang Street Harbin
ZHAI De-ming	Engineer	Bureau of Science and Technology The Ministry of Forestry He Pin Li Beijing

ZHANG Fu-xing	Engineer, Deputy Head	Division of Wood Industries Bureau of Forest Product Industries The Ministry of Forestry He Pin Li Beijing
ZHANG Shou-zheng	Assistant Engineer Deputy Director	Hailongjiang Provincial Research Institute of Wood Industry Har Pin Road Harbin
ZHAI Li	Lecturer, Head	Pedagogic Research Division of Wood-based Panels Department of Forest Product Industries Beijing College of Forestry Beijing
ZHOU Hong-fu	Deputy Manager	Shanghai Furniture Corp. No. 349 Jiang Xi Road (Centre) Shanghai

CONSULTANTS

Horatio P. BRION	Chairman, Consulting Board	Expertise Industrial Corp. Quezon City Metro Manila Philippines
José CARRE	Chief of Section	Station de Technologie Forestière Centre de Recherches Agronomiques Ministry of Agriculture 1 Avenue Maréchal Juin 5800 Gembloux Belgium
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Ahti TASKINEN	Interior Architect	Koskelantie 30 c 19 00610 Helsinki 61 Finland
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<u>LECTURERS</u>		
BA Ru-you	Engineer	Beijing Woodworking Plant Da Hong Men Beijing
LI Shu-cai	Engineer	Beijing Research Institute of Wood Industry Da Hong Men Beijing
WANG Feng-sheng	Director and Chief Engineer	Shanghai Research Institute of Wood Industry No. 667 Chong Shan West Road Shanghai
WANG Shi-xiang	Research fellow	Research Institute of Cul- tural Relic Preservation The State Bureau of Cul- tural Relics Beijing
WANG Ting-you	Engineer, Deputy Head	Department of Fibreboard Research Institute of Wood Industry Chinese Academy of Forestry Wanshoushan Beijing
XIA Zhiyuan	Associate Research Fellow	Research Institute of Wood Industry Chinese Academy of Forestry Wanshoushan Beijing

ANNEX III

SEMINAR ON WOOD-BASED PANELS AND FURNITURE INDUSTRIES

Beijing, People's Republic of China

23 March to 7 April 1981

WORK PROGRAMME

12, 21, 22 and 23 March 1981

Arrival of participants

23 March 1981

0900 -	Opening addresses
1000 - 1100	A Brief Account of the Development of the Wood Processing Industry in China (Mr. Chang Fuxin).
1100 - 1200	An Introduction to China's Furniture Industry (Mr. Chen Dinxin).
1330 - 1700	Visit to Beijing Woodworking Factory (particle board, fibreboard mills, panel furniture factory).
1830	Chinese reception (Peking Duck Restaurant)

24 March 1981

0900 - 1200	The Technology and Equipment for the Production of Wet Process Hard Fibreboard in Small-Scale Plants (Mr. Wang Tien Yo).
1400 - 1700	The Production of Medium Density Fibreboard (Mr. Peter Wiecke).

25 March 1981

0730 - 1200	Visit to Kwang Hwa Woodworking Factory (sliced veneer, plywood, extruded particle board, melamine laminated panel plant, sewing machine component factory).
1400 - 1700	Recent Developments in Particle Board Production (Mr. J. Carré).

Work Programme Continued

26 March 1981

- 0900 - 1200 The Manufacture of Platen Pressed Particle Boards (Mr. Ba Ru-You).  
1400 - 1700 Surface Treatment of Wood-Based Panels (Mr. R. Vansteenkiste).  
1930 - 2200 Informal talk on organization of management in Chinese industrial enterprises.

27 March 1981

- 0900 - 1200 The Process of Plywood Production (Mr. Wang Feng-Shang).  
1400 - 1700 Recent Developments in Plywood Production (Mr. G.P. Heilborn)  
1800 Cultural activity: Dance/Opera

28 March 1981

- 0900 - 1200 Mechanization and Automation Possibilities in the Wood-Based Panels Industry (Mr. H.P. Brion).  
1400 - 1700 Summing-up session: Development of Wood-Based Panel Industries for Developing Countries (Panel of Chinese and UNIDO Specialists).

29 March 1981

- Tourism Tour of Summer Palace and Imperial Palace

30 March 1981

- Tourism Tour of the Great Wall and Ming Tombs

31 March 1981

- 0730 - 1000 Visit to a factory in Beijing producing traditional Chinese style furniture.  
1000 - 1130 Visit to the Great Hall of the People.  
1330 - 1700 Visit to a furniture factory producing mainly metal furniture.  
1800 Cultural activity: Dance/Opera

1 April 1981

- 0900 - 1200 The Development of Wood-Based Panels Brings About Changes in Furniture Structure (Mr. Li Shu-Cai).  
1400 - 1700 Design Considerations for Panel Furniture - Including the Use of Fittings (Mr. A. Taskinen).

Work Programme Continued

2 April 1981

0900 - 1200 Technical Design Considerations in Technical Chinese Style Furniture (Mr. Wang Shi-Xiang).  
1400 - 1700 Industrial Production of Panel Furniture (Mr. P. Paavola).

3 April 1981

0900 - 1200 Quality Control in Panel Furniture Production (Mr. P. Paavola).  
1400 - 1700 Modern Woodworking Equipment for Industrial Production of Panel Furniture (Messrs. H. Brion, P. Paavola and A.V. Bassili).  
1800 Cultural activity: Acrobatic Troupe

4 April 1981

0900 - 1200 Automation and Mechanization in Panel Furniture Production (Mr. H.P. Brion).  
1400 - 1700 Summing up session: Development of Furniture Industries for Developing Countries (Panel of Chinese and UNIDO specialists).

5 April 1981

Free for shopping and sightseeing.

6 April 1981

0900 - 1200 Manufacture of Melamine Decorated Plastic Laminates (Mr. Xia Zhiyuan).  
1400 - 1700 Presentation of Assignment Work on Wood-Based Panels.  
1800 Cultural activity: Films on Tourist Attractions in China.

7 April 1981

0900 - 1200 Presentation of assignment work on furniture.  
1400 - 1600 Evaluation of seminar by participants.  
1600 - 1700 Closing ceremony  
Evening UNIDO reception at the Szechuan Restaurant

8. 9. 11, 12 April 1981

Departure of participants



Annex IV

LIST OF DOCUMENTS

A. DOCUMENTS PREPARED SPECIALLY FOR THE SEMINAR:

- ID/WG.335/1 Rev.1: "Chinese Conventional Furniture" by Mr. Wang Shi-Xiang
- ID/WG.335/2: "The Development of Wood-based Panels enhances the Change in Furniture Construction" by Mr. Li Shi-Cai.
- ID/WG.335/3 Rev.1: "Technology and Equipment of a Small-scale Wet-process Hard Fibreboard (hardboard) Plant" by Mr. Chian Yinglin.
- ID/WG.335/4 + Corr.1: "Mechanization and Automation Possibilities in the Wood-based Panels Industries" by Mr. Horatio P. Brion.
- ID/WG.335/5: "The Manufacture of Flat-pressed Particle Board in the Beijing Woodworking Plant" by Mr. Ba Ru-You.
- ID/WG.335/6 + Corr. 1 and Corr.2: "Decorative Laminates" by Mr. Xia Zhiyuan.
- ID/WG.335/7 Rev.1: "The Process of Plywood Manufacture" by Mr. Wang Feng-Shang.
- ID/WG.335/8 + Corr.1: "Mechanization and Automation Possibilities in the Production of Panel Furniture" by Mr. Horatio P. Brion.
- ID/WG.335/9: "Recent Developments in Plywood Production" by Mr. Gotthard P. Heilborn.
- ID/WG.335/10 Rev.1: "Surface Treatment of Wood-based Panels" by Mr. Robert Vansteenkiste.
- ID/WG.335/11: "A Brief Account of the Development of the Wood Processing Industry in China" by Mr. Chang Fuxin.
- ID/WG.335/12: "An Introduction to China's Furniture Industry" by Mr. Chen Dinxin.
- ID/WG.335/13: "List of Participants, Observers, Consultants and Lecturers."
- ID/WG.335/14: "Production of Medium-density Fibrebaord" by Mr. Peter H. Wiecek.

ID/WG.335/15: "Recent Developments in Particle Board Production" by Mr. José L. Carré.

ID/WG.335/16: "Guidelines for the Selection of Options in Establishing Wood Based Panel Industries in Developing Countries" by a panel of Chinese and UNIDO-appointed Consultants.

Conference Room Document: "Design Considerations for Panel Furniture - including Use of Fittings" by Mr. Ahti Taskinen.

E. UNIDO DOCUMENTS THAT SERVED AS BACKGROUND MATERIALS:

ID/79 Production of Panels from Agricultural Residues.  
Report of the Expert Group Meeting,  
Vienna, 14-18 December 1970.

ID/133 Selection of Woodworking Machinery.  
Report of a Technical Meeting,  
Vienna, 19-23 November 1973

ID/180 Wood Processing for Developing Countries  
Report of a Workshop,  
Vienna, 3-7 November 1975.

ID/223 Adhesives in the Wood Processing Industries.  
Report of a Workshop,  
Vienna, 31 October - 4 November 1977.

ID/108 Rev.1 + Corr.1: Furniture and Joinery Industries for Developing Countries

ID/WG.151/38 Rev.1: Selection of Woodworking Machinery  
Report of a Technical Meeting.

ID/WG.200/14 Rev.1: Wood Processing for Developing Countries  
Report of a Workshop.

ID/WG.256/26: Methodology for the Purchase of Woodworking Machines.

UNIDO/LIB/SER.D/4 Rev.1: Information Sources on the Furniture and Joinery Industry.

UNIDO/LIB/SER.D/35: Information Sources on the Utilization of Agricultural Residues  
for the Production of Panels, Pulp and Paper.

UNIDO/IOD.240 Rev.1: Portfolio of Wood Processing Technologies.  
Preliminary Compilation.

ANNEX V

TOPICS FOR SEMINAR ASSIGNMENTS

1. Production of plywood in a developing country:

Describe the measures to be taken in establishing a new plywood mill or expanding an existing one, including the following:

- determination of suitability of raw material;
- market study to determine proposed capacity and specifications of the product to be manufactured;
- selection of processing technology;
- labour and training requirements;
- process and quality control;
- marketing channels and promotion of product.

2. Production of particle board in a developing country:

Similar to above, but for particle board instead of plywood.

3. Design of panel furniture for a hotel:

Design furniture for a hotel room, using as far as possible wood based panels (plywood, particle board and/or fibreboard). Consideration should be given to a rational utilization of raw materials (minimizing waste from 4' x 8' panel), ease of production in series of 50 pieces on simple woodworking machines, and aesthetic values. The designs should comprise drawings, cutting lists and an indication of production process. Whenever suitable, the products should have a knock-down construction, and components should be inter-changeable.

4. Serial Production of panel furniture in a developing country:

(a) Production planning:

1. Plan the production for the serial production of 500 secretary desks (as per given detailed design) using the layout and equipment given, and indicate the time needed to produce them.

(b) Plant layout:

Recommend the equipment to be purchased and changes to be made to the layout given to produce 1500 similar desks if the additional investment is not to exceed \$ 25,000.

Consideration should be given to limit as far as possible the hand finishing of the furniture and assuring inter-changeable pieces.

The process and quality control systems recommended should be described.

5. Layout and equipment selection for a furniture factory:

Plan the layout and select equipment for a medium sized furniture factory to produce 4000 solid wood chairs, 1000 tables, 500 double-deck bunks for children and 165 drawing boards, stands and chairs per month.

ANNEX VI

PROJECT BUDGET

	<u>in RMB (US\$ equivalent)</u>	<u>in US\$</u>
<u>UNIDO appointed consultants:</u>		
11-01 Consultant in production of plywood (10 days + 1 week travel time)	--	3.500
11-02 Consultant in production of particle board (10 days + 1 week travel time)	--	3.500
11-03 Consultant in production of fibreboard (10 days + 1 week travel time)	--	3.500
11-04 Consultant in surface finishing of wood based panels (10 days + 1 week travel time)	--	3.500
11-05 Consultant in automation in wood processing plants (10 days + 1 week travel time)	--	3.500
11-06 Consultant in designing of furniture (10 days + 1 week travel time)	--	3.500
11-07 Consultant in production of furniture (10 days + 1 week travel time)	--	3.500
11-99 Sub-total	--	24.500
15-01 International Travel (+ 10 kgs excess baggage)		
in RMB: 7x4000=28.000	18.667	--
in US\$: 7x1000=7.000*		7.000
Per diem in RMB: 7x106x10=7420	4.947	--
Per diem for 1 week travel time: 93x7x7= 4557	--	4.557
16-01 Travel of UNIDO staff member (+ 10 kgs excess baggage)		
in RMB: 4,000	2,667	--
in US\$: 400*	--	400
Per diem in RMB: 106x22= 2332	1.555	--
16-02 Travel of UNIDO secretary: (+ 10 kgs excess baggage)		
in RMB: 4000	2,667	--
in US\$: 400*	--	400
Per diem in RMB: 106x22=2332	1.555	--
	<u>32.058</u>	<u>36.857</u>

\* estimate

34-01	Travel of 20 participants (+ 10 kgs excess baggage) in RMB: 20x4000= Y 80.000 in US\$: 20x600=\$ 12000	53.334 --	-- 12.000
34-02	Board: 20x22x21=Y 9.240 Lodging: 20x22x50= Y 22.000 Out of pocket expenses: 20x22x15=Y 6.600 Total cost of board, lodging + out of pocket expenses: Y 37.840	25.227	--
34-03	City travel: 300x17= Y 5100	3.400	--
34-04	Cost of meeting room: 520x12= Y6240	4.160	--
34-05	Translation of lectures from Chinese to English, fees for lectures, etc.: Y 4.000	2.667	--
34-06	Administrative support (prepara- tion and organization including audio visual aids) Y 6.500	4,334	--
34-07	Interpretation costs C/E 2x12x Y 400 = Y 9,600 E/C 2x12x Y 400 = ¥ 9,600 Total Y19,200	12.800	--
34-08	Transport of course material to China in RMB: Y 9,000 in US\$: 900*	6.000 --	-- 900
39-99	Component total	111.922	12.900
53-00	Sundries Y 3.000 + \$ 1.000	2.000	1.000
55-00	Hospitality Y 50x15=Y 750	500	--
59-99	Component total	2.500	1.000
99-99	Grand total	146.480	50.757

N.B.: To this sum of US\$ 197.237 (146.480 + 50.757) must be added  
US\$ 27.613 representing 14 percent overhead costs. The  
total cost of the project is therefore US\$ 227.658.

\* estimate

ANNEX VII

Article in Renmin Ribao of 4 August 1981  
COMPREHENSIVE UTILIZATION OF TIMBER IN DEVELOPING  
COUNTRIES IS PROMISING

Notes on the JNIDO Seminar on Wood Based Panels and Furniture Industries

It is bright, shiny and warm spring in April in Beijing as all willow trees begin to sprout and bud. Invited by the United Nations Industrial Development Organization, the representatives, consultants, experts and observers from thirteen developing countries and regions have come to Beijing to discuss the comprehensive utilization of timber in developing countries. Positive experience in the comprehensive utilization of timber was reported and received close attention from all the participants present.

The rapid development of comprehensive timber utilization is of significance in promoting the development of the whole national economy. This is a common conclusion drawn by the participants. During the seminar, some representatives pointed out that the comprehensive timber utilization is a consequence of the development of the timber industry. Furthermore, owing to the diminishing of woods and forests in quite a few developing countries, the development of comprehensive timber utilization, with wood based panels as a major element, and the production of more substitute timber are more urgent than ever. At present, more and more developing countries are paying high attention to the comprehensive timber utilization. The average annual increase in production capacity of particle board in the developing countries is three percent. Their products of particle board accounted for twelve percent of the world's total amount of production last year. In 1977, the exports of particle board from the Asian developing countries amounted to 60 percent of the total exports in the whole world. According to the statement by the representative of Singapore, since 1964, Singapore's artificial panel industry has been rapidly developing. Last year, the total volume of the exports of particle board reached 542,000 cubic metres, with a value of 405 million Singapore dollars. Therefore, comprehensive

utilization of timber has a significant status and function in the national economy of developing countries.

One of the features in the rapid development of comprehensive timber utilization in developing countries is adopting "intermediate technology" suitable to the practical situation in each country. So-called "intermediate technology" is a sort of technology in an intermediate state that requires less investment, but can adequately raise labour efficiency in production on the one hand and opportunity of employment on the other. For the time being, many developing countries are facing problems of lacking capital, inadequate technical personnel and an increasing demand for employment opportunities due to the rapid growth of population. According to the report by the consultant from the Philippines, most of the technical knowhow which the Philippines imported from abroad belongs to the "intermediate technology". Compared with manual labour, it has a higher productivity; while compared with automation, it requires less investment and provides more opportunities of employment. Mr. Bassili, a UNIDO official, also said "During their visit to Chinese factories and plants, participants found out that rational and intensive timber utilization could be obtained without full automation. In many aspects, the conditions in China are similar to those in other developing countries. The technological state-of-the-art in China is quite appropriate for other developing countries". The representative from India observed that "the knowhow and technology of comprehensive timber utilization in China are comparatively suitable to the practical situation in India."

To initiate new routes broadly and find out the substitute resources for timber is another feature of comprehensive timber utilization in developing countries. It has been learned from the discussion that cotton stalks, rice husks, sugar cane bagasse and the stalks of coconut and rubber trees are presently used as raw materials to substitute for timber in some developing countries, in order to produce artificial panels. The Indian representative has brought with him samples of artificial panels produced from rice husks. He said,



the furniture made from this artificial panel is solid and durable and it has the advantages of being fire-proof, resisting to humidity and attacks by fungi and termites. The processing facilities are rather simple, and its cost is lower than common plane-panels of the same kind by 25%.

Thailand is a rubber-producing country where rubber trees grow over a large area. In the past, rubber trees were materials for fine-woods and packing material. In order to utilize this resource, a few specialized research institutions have been established in Thailand. Some good results have been attained. Now they use the stalks of rubber trees processed with anti-erosion agents to produce artificial panels and furniture. The representative from Thailand believed that, as long as this resource can be fully utilized, the furniture made can fully meet the need of the people at home.

The Philippines, known as "green island country", is now facing the fact that the forest resources have been largely destroyed. For the sake of enlarging resources and of economy, the Government of the Philippines has emphasized on both comprehensive timber utilization and discovery of its substitute resources. The abundant coconut stems are now used for mass production of floor and ceiling panels.

The fourteen-day long seminar has been held in a lively and enthusiastic atmosphere. The representatives exchanged their experiences and learned a lot from each other. Mr. Bassili happily told us that with strong support from the Chinese Government, the meeting achieved the desired results. It is believed that the seminar would provide a strong impetus to the comprehensive utilization of timber in developing countries. In a word, comprehensive timber utilization in developing countries looks very promising and has a bright future.

by correspondants T.A. Chen and J. Lee

ARTICLE IN REN MIN RIBAO OF 8 APRIL 1981

UNIDO SEMINAR ON WOOD-BASED PANEL AND FURNITURE  
INDUSTRY HELD IN BEIJING

Beijing, 23 March (Xinhua News Agency):

The Seminar on Wood-Based Panel and Furniture Industry, organized jointly by the United Nations Industrial Development Organization and the Chinese Government, opened in Beijing this morning. At the invitation of UNIDO, the Seminar is being attended by participants from 13 countries and regions (Fiji, Ghana, India, Jamaica, Malaysia, Mauritius, the Philippines, Singapore, the Sudan, Tanzania, Thailand, Uganda and Hong Kong) and seven consultants. Twenty-five Chinese observers are also attending the meeting.

At this Seminar, technological problems relating to the wood-based panel and furniture industry will be discussed, technical reports will be delivered by Chinese experts and UNIDO consultants and an exchange of experience will take place among the participants. The meeting will be concluded on 7 April.

ANNEX VIII

EVALUATION - GROUP TRAINING PROGRAMMES

COMPILATION OF 18 REPLIES:

PROGRAMME: Seminar on wood based panels and furniture industries.

HOST COUNTRY: China

YEAR: 1981

I. PRE-COURSE INFORMATION:

1. How was the introductory information you received in your home country about: (please mark an x in the suitable column):

	<u>Sufficient</u>	<u>Not sufficient</u>	<u>Missing</u>
Aim of the training	<u>17</u>		<u>1</u>
Content of the programme	<u>17</u>		
Level of the programme	<u>16</u>	<u>2</u>	

What, if any, other information do you feel should have been included:

Some idea on the approach to and treatment of each topic.

2. How many weeks before the beginning of the training programme did you receive the following information:

Information about the programme:	24 weeks	<u>1</u>
	18 weeks	<u>2</u>
	16 weeks	<u>1</u>
	15 weeks	<u>1</u>
	14 weeks	<u>2</u>
	13 weeks	<u>1</u>
	12 weeks	<u>1</u>
	10 weeks	<u>4</u>
	8 weeks	<u>1</u>
	6 weeks	<u>1</u>
	4 weeks	<u>2</u>

Being accepted to the programme	6 weeks	<u>1</u>
	5 weeks	<u>2</u>
	4 weeks	<u>2</u>
	3 weeks	<u>5</u>
	2 weeks	<u>5</u>
	1 week	<u>2</u>

Comments:

- One week too short 5 two weeks minimum.
- Note to participants only handed over when I got to the capital (Philippines), should have been mailed by UNDP to home address.
- Travel arrangements made too late
- Got the ticket at 10 a.m., boarded the plane at 3 p.m. (MAR)

II. PROGRAMME CONTENT AND ORGANIZATION:

3. What is your opinion of the total duration of the course:

Too long	<u>1</u>
Just right	<u>11</u>
Too short	<u>6</u>

If not "just right", what, in your opinion, would be the most suitable duration for the course?

2 weeks	<u>1</u>
3 weeks	<u>2</u>
4 weeks	<u>1</u>
4-5 weeks	<u>2</u>
6 weeks	<u>1</u>

Please comment:

- Reduce hours/day and increase days of course.
- 3 weeks would allow more depth.
- pace of lectures too fast
- more visits, more lectures.

4. State your opinion about the daily schedule:

Too heavy	<u>6</u>
Just right	<u>11</u>
Too light	<u>1</u>

Comments:

- lectures should stop at 5 p.m.
- daily schedule OK, but more time for discussion (1 hour + 2 hours lecture)
- too intensive
- no time for studying lectures
- more time for discussion
- three lectures of two hours each instead of 2 x 3.

5. Would you suggest any changes in the general nature of the training programme?

- factory visits in the afternoons (x3 per week)
- no well planned.
- interest of group too large
- give indication where additional training can be obtained
- more audience participation
- too advanced automation not relevant to our conditions
- lectures should stop at 4 p.m.
- lectures should stop at 5 p.m.
- more practical exercises, like one handed out under LCA
- factory visits after lectures
- more stress on market orientation
- project appraisal

6. Do you feel that the training corresponded to your professional needs?

- |                        |                                     |
|------------------------|-------------------------------------|
| To a very large extent | <input checked="" type="checkbox"/> |
| To a large extent      | <input checked="" type="checkbox"/> |
| To a sufficient extent | <input checked="" type="checkbox"/> |

Please comment:

- more emphasis on economic and market development.
- I am responsible for planning and developing this sector.
- this type of training is very useful to me.
- opened new horizons.
- visits should follow production flow.
- technical aspects of panel furniture production.
- too short, got better insight in properties of panels we use.

7. Please give your opinion about the study visits (if any):

- visits great help
- visits well organized
- visits too hurried, needed more explanation at the factory
- "not bad at all"
- visits after not before corresponding lecture.
- very interesting to see labour intensive operations
- pace too speedy
- more time for visits
- quite good
- very interesting because of technology used.

Please suggest other study visits that might have been valuable:

- visit areas outside Beijing.
- visit the woodworking machinery manufacturers
- visit the glue manufacturers
- visit logging and log yards
- visit to sawmill
- visit to paper plant
- visits to specialized factories (eg. upholstery)
- visit to wood research institute.

8. What do you think of the general level of the training?

Much too high

Too high

Adequate:

17

Too low

Much too low

Comments:

Not quite relevant to conditions in my country.

Served for academic considerations.

More lectures on timber technology, management and MTM.

9. Which subjects of the programme did you find most valuable?

(please state reason, for example new subject, my speciality, relevant to my work, new information, etc):

- |  |  |
|--|--|
| - MDF  | New material<br>new information                                    |
| - Design of panel furniture                          | relevant to my work  |
| - Production control                                 | relevant to my work  |
| - Industrial production of panel furniture           | relevant to my work<br>eye opener                                  |
| - Ming style furniture                               | relevant to my work<br>know more about it                          |
| - Use of wood based panels                           | new information  |
| - Almost all subjects on furniture                   | relevant to my work  |
| - LCA  | to increase productivity<br>relevant to my work<br>new information |
| - Modern woodworking equipment                       | relevant to my work  |
| - quality control                                    | relevant to my work  |
| - production of melamine decorated plastic laminates | new information  |
| - production of plywood                              | relevant to my work  |
| - production of fibreboard                           | new material   |

- factory visits                    there is little chance of getting this information other than in China
- particle board production                    - ditto -
- surface finishing of boards                    - ditto -

10. Which subjects of the programme did you find least valuable?  
State why (for example too elementary, inadequate instruction, irrelevant to my work, etc.)

All valuable

All very valuable

Manufacture of wood based panels                    Plant and machinery are expensive, volume too high for small developing countries.

Literature provided understandable and valuable                    irrelevant to my work (but gives good ideas)

MDF lecture                    will never be able to afford an MDF plant

Manufacture of plywood

design considerations in panel furniture                    inadequate.  
LCA for panel furniture

11. Were there in your opinion any relevant subjects that were not adequately covered in the programme?

Yes                    6

No                    8

If yes, what did you miss?

Jig making and quality control (case studies)

Industrial production of panel furniture needs more time.

- Glue manufacture, formulation and application energy problems (boilers etc) for plants

Machine prices and erection prices



Production of panels from agricultural residues  
 Machine selection  
 Plant layout.  
 Use of particle board in joinery and interior decorating  
 Comparative study of small mills.  
 Market development considerations.

12. Which changes would you have preferred in the methods of instructions?

	<u>no changes</u>	<u>more</u>	<u>less</u>
a) lectures	<u>12</u>	<u>2</u>	<u>4</u>
b) group work	<u>8</u>	<u>9</u>	-
c) demonstrations	<u>6</u>	<u>10</u>	-

Comments:

Demonstrations using movies  
 Case studies given out after each lecture  
 Group work and demonstrations more useful than lectures  
 Practical workshop demonstration  
 Group work should be case studies of problems in participants countries.

13. How did you find the general standard of the instructor with respect of:

	1) <u>command of English</u>	11) <u>method of instruction</u>
Very good	<u>5</u>	<u>6</u>
Rather good	<u>10</u>	<u>6</u>
Fair	<u>1</u>	<u>4 *</u>

\* Except for MDF and furniture production which were very good.

Comments:

Command of English (UNIDO consultants and interpretation for Chinese lecturers) excellent.

Standards vary from lecture to lecture.

General standard good.

Assumed too high a standard on the part of the audience.

14. Did you have sufficient time for professional exchange of views with:

	1) the programme staff	ii) the fellow participants
Yes	<u>13</u>	<u>16</u>
No	<u>5</u>	<u>2</u>

15. How much did you benefit from these exchanges of views with:

	1) the programme staff	ii) fellow participants
A great deal	<u>6</u>	<u>7</u>
Much	<u>6</u>	<u>4</u>
Somewhat	<u>2</u>	<u>4</u>
Little	<u>1</u>	<u>1</u>
Not at all	-	-

Please comment:

Through the assignment work  
Group too heterogeneous.

III. RELEVANCE AND APPLICABILITY:

16. Did you find the contents of the programme relevant to conditions in your company (institute)?

To a very great extent	<u>5</u>
To a great extent	<u>6</u>
To a sufficient extent	<u>5</u>
Not applicable.	-

Please state why:

Contents opened a lot of new possibilities which I will apply.

A lot to be learned

Panel furniture still not common in my country.

Realized how advanced integration was in China.

Realized problems of development of furniture industry in my country (IND)

17. Do you feel that by participating in this training programme you have benefitted professionally?

To a very great extent 6

To a great extent 7

To a sufficient extent 3

Please state why:

- know more

- fresh up (refresh knowledge)

- sum up what was known before

- discussions widened my horizons

- have learnt much which I could introduce in my plant.

18. Do you think you will have an opportunity to apply your newly acquired knowledge and experience in your present job?

To a very great extent 6

To a great extent 7

To a sufficient extent 4

To a very small extent 1

What difficulties, if any, would you expect to meet?

Use of wood based panels would imply additional investments

Investment problem

Inertia from top management

Glue problems because of transport and climate conditions

Resistance to change

Scale of operations difficult

19. Will you be in a position to transfer your acquired knowledge to others in your home country?

- |                        |          |
|------------------------|----------|
| To a very great extent | <u>6</u> |
| To a great extent      | <u>4</u> |
| To a sufficient extent | <u>1</u> |
| To a small extent      | <u>2</u> |
| To a very small extent | -        |

20. How will this transfer be done?

- |   |           |
|---|-----------|
| a) in a day-to-day work to colleagues and subordinates        | <u>16</u> |
| b) in specific training activities inside present employment  | <u>6</u>  |
| c) in specific training activities outside present employment | <u>2</u>  |

What difficulties, if any, would you expect to meet?

To arrange the teaching course in technical aspects:  
Industrial production, quality control

Publish the audio-visual aids used in presenting the lecture

Methods of instruction

Human resistance to change

IV. SOCIAL ASPECTS OF THE PROGRAMME:

21. Please state your opinion about the leisure time activities organized by the programme staff:

Very good

Were appreciable

UNIDO and host country should be congratulated for excellent leisure programme and assignment

Excellent

Cultural activities and tours well organized

More in first week giving more time in second week for assignment work

Sufficient and properly arranged.

Very interesting

Well balanced

Quite good

Not bad

What additional activities would you have appreciated?

Activities like games and sports.

Visits to palace and museums accompanied by lecturer on Ming furniture and designer.

22. Please give any comments you choose on aspects not adequately covered by this questionnaire:

More time to discuss with advisors problems of my country.

More detailed courses in: furniture design (including prototype making)  
jig design (ditto)  
surface finishing

UNIDO office as well as travel agent (or airline) should be informed of travel arrangements. UNIDO office can thus help get transit visa.

Would have been useful if we got the lectures before the start.



UNIDO

ANNEX IX

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

INTEROFFICE MEMORANDUM

A.V. Bassili/rs

TO: Mr. N.N. Tandon, Head  
Programme Development and  
Evaluation Branch  
Division of Policy Co-ordination

DATE: 20 May 1981

REFERENCE: CHI

Attention: Mr. M.A. Mansur

Through: Mr. E.D. Manning, Acting Head  
Agro Industries Branch  
Division of Industrial Operations

From: A.V. Bassili  
Senior Industrial Development Officer  
Agro Industries Branch, DIO

Subject: CHINA: Possible UNIDO activities in the Wood Processing  
Industries Sector.

I refer to our recent conversation on the above subject. The People's Republic of China could be both a donor and a recipient of technical assistance in the wood processing industries sector.

Among the projects for which China could act as a donor (using its contribution to the UNIDF or part of the IPF wishes to allocate for TCDC activities), are the following (not necessarily in order of priority):

1. Seminar or Technical Course on Use of Bamboo

This topic was mentioned as a possible subject for a UNIDO/China future meeting by Mr. Wang Kai, Vice President of the Forestry Society of China during the recent Seminar.

There is no doubt that China has accrued considerable know how in this field, and, if such a course were organized we would have to call upon fewer consultants to complement the Chinese specialists. The problem lies in the difficulty of finding participants because (a) bamboo and rattan are common to a relatively smaller range of developing countries than wood, and (b) there are a number of problems to be covered (growth, harvesting, pre-processing and preservation of bamboo and rattan; its use in pulp and paper, construction, furniture, basketware and other handicrafts, water pipes, etc.).

It would be difficult to find participants from developing countries having an interest in such a wide range of topics,

and, conversely, to run the course on a more specialized basis.

2. Seminar or Technical Course on Furniture Design

This is a logical follow-up to the Seminar just completed. It would allow participants to follow lectures on design of panel and solid wood furniture, including ergonomics, properties of raw materials, production methods, quality control and testing. The course could be complemented by arranging for the participants to produce the furniture they will be called upon to design as part of their group work.

This, in turn would be assessed and criticized by the consultants and the other participants, who will all stand to benefit from the discussions. The Chinese Furniture Industry would benefit from the presence of the internationally recruited consultants, who could provide ad hoc assistance to the local plants during their stay in China.

Duration: 3 - 4 weeks

Number of participants: about 20

3. Seminar or Technical Course on Production Management in the Furniture Industry.

This too would be a logical follow-up to the Seminar just completed. It would allow participants to understand the problems facing serial production, and how they are overcome. The course, which would last 2 - 3 weeks would comprise factory visits and group work by participants in planning production in actual working conditions.

China is an excellent location for such a course because although its furniture industry uses relatively labour intensive production methods, the production planning and control as well as the process and quality control are advanced and on a par with plants far more industrialized. Here again, the Chinese industry would benefit from ad hoc advice given by the consultants. Thus management procedures and tools common in developed countries could be explained and discussed with Chinese technicians and if appropriate, introduced.

Duration: 2 - 3 weeks

Number of Participants: 20 - 30

4. Seminar or Technical Course on Wood In Rural Construction

Although China is not endowed, on a per capita basis, with large forest resources, timber has traditionally been used in rural construction of houses, sheds, etc, and continues to be used - at least in the vicinity of Beijing. In that area, timber is not used efficiently, and although it could well be that this is an exception, this is unlikely.

This situation is not uncommon to other developing countries, so that it may be useful to organize a course to train civil engineers from bodies associated with rural development in

developing countries in the design of wooden structures for rural areas.

Duration 2 - 4 weeks

Number of Participants: 20

While in Beijing I had the opportunity to discuss with officials of the Forest Society of China, the Ministry of Light Industry, and with various individuals, possible assistance by UNIDO to China. The following are my suggestions (not necessarily in order or priority), based on these discussions:

1. Development of the Furniture Industry

Traditional (Ming Style) Chinese Furniture has developed to a very high level that could serve as a model to other countries. However, the local market calls for lower cost and more utilitarian products. The development of the furniture industry is important to any developing country since furniture, together with housing, food, clothing, education and health satisfies a basic need. Developing this sector would (a) increase the volume of products put on the market, (b) improve their quality and design, (c) reduce costs and material waste and therefore lowering prices paid by the end user.

Applied research in this field has been carried out in several locations in China, and at several levels (specialized research institutions, bodies providing higher education, factories), but there seems to exist a need for a co-ordinated approach at a national level, thus minimizing the risk of duplication of effort in certain fields (i.e. translation of foreign documents and publications).

The furniture industry of developed countries has prospered through the creation of specialized institutions, to cater for the specific needs of this sector. It is my firm belief that China would stand to benefit from the creation of such a centre. Consequently, I feel that UNIDO should propose it, to be implemented in a two phase approach:

Phase I: Study tour by a group of Chinese technicians to specialized furniture research institutes in Finland, France, Denmark, Great Britain and Sweden to obtain an overall view of their work and more detailed information on their activities in the fields of testing of furniture components and materials and documentation.

Phase II: Assistance by UNIDO in providing the assistance that the Chinese authorities have indicated they need based on the study tour's findings.

2. Development of Wood Based Panels Industries from Agricultural Residues.

As indicated above, China has limited forest resources (when calculated on a per capita basis). It nevertheless has colossal quantities of non wood ligno-cellulosic material (such as rice and cereal, straw, cotton stalks, bagasse, etc.). These could be used to produce wood based panels (such as fibreboard, MDF and



particle board), which, although they would not have all the properties of conventional wood-based panels, would be of acceptable quality for most end-uses. Considerable work has been done in this field in both developed and developing countries, but, it seems, not in China.

FAO is providing assistance, through a large scale UNDP financed project to develop wood based panels. It seems that agricultural residues were not considered because the project's counterpart body is an institute attached to the Ministry of Forestry (which does not have access to the agricultural residues raw material).

I strongly recommend that consideration be given to develop and promote panels from non-wood ligno-cellulosic material, through the appropriate counterpart bodies, because: (a) China has already developed its own industry to produce the equipment for the manufacture of fibreboard and particle board; (b) The necessary binders (urea formaldehyde and phenol formaldehyde, as well as melamine resins) are all being produced locally; (c) abundant potential raw materials exist in areas that are deprived of forests and far from them.

### 3. Use of Wood in Construction

Considerable effort is being made in assuring as full a use as possible of processing wastes (wane, slabs, offcuts, etc,) in integrated wood processing plants, but, it seemed to me during my recent stay in China that traditional use of wood, in roofing trusses for example, resulted in considerable over design, hence waste. While realizing that the policy is to restrict the use of scarce wood in construction, efforts should be made to ensure that when and where used, the designs are such that no extra wood is used, consistent with reasonable safety standards.

This could be achieved by developing sound designs for end uses where wood is traditionally used (i.e. in trusses in rural constructions in the Beijing area) that would not only minimize sections, but also introduce laminated beams (glue or nail types), finger jointing, etc. This would involve development of appropriate stress grading techniques (either mechanical or visual), training of graders and quality control inspectors concerned with their fabrication.

These designs would have to be developed in a specialized institution, and then an extension programme would be developed to introduce them in the field.

I would be at your disposal to give any additional information in your forthcoming discussions with the Chinese authorities. I have also taken the liberty to copy this memorandum to Mr. Sisingh to keep him informed. Needless to say, the course just completed (on wood based panels and furniture) could be repeated at regular intervals but I would recommend that its scope be limited to one of the two main fields (either wood based panels or furniture).

