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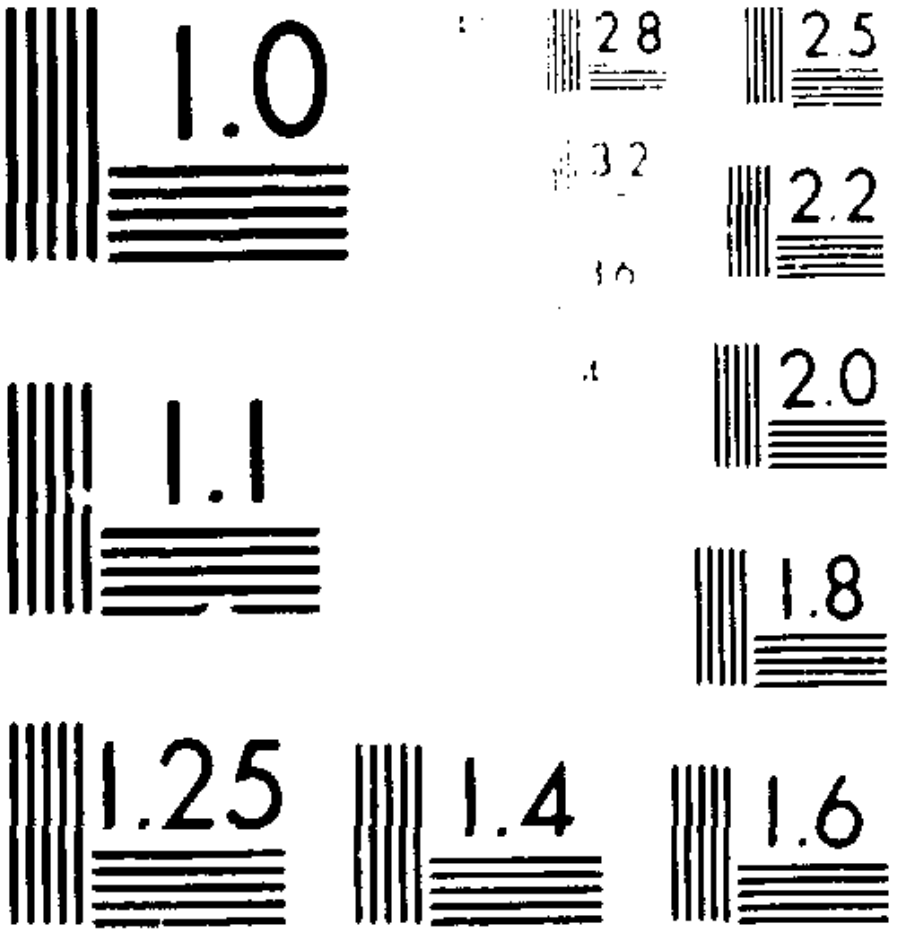
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SERVICE CENTRES FOR WOOD PROCESSING INDUSTRIES IN DEVELOPING COUNTRIES *

by

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Introduction

This lecture is referring to the establishment of a Service Centre for the promotion and development of secondary wood processing industry in the North West Frontier Province (NWFP) of Pakistan. This industry is within the Pakistan defination of small industry, i.e. enterprises with fixed assets (excluding land) not exceeding US$ 300,000. In North West Frontier Province a Small Industries Development Board (SIDB), an autonomous government organization, had been established for the promotion of small industries. The timber industry has a long tradition in NWFP. [1] Weakness of these industries arise from their small size and scale of operations, include insufficient technological knowledge, inadequate skill, antiquated equipment and hand-crafting as a predominant method of processing. The project idea emerged from a systematic analysis of demand with respect to the wood working sector which was undertaken by expatriate consultants working for SIDB.

Service Centres are considered to be one of the promotional instruments for developing of small and medium sized industries. Depending on the local objectives and conditions Service Centres can take many forms and are often given different names such as industrial service institutions, common facility centre, etc. The possible range of services provided by a Service Centre and the functions are described at annex I. Considering the existing industry and depending on the resources available at NWFP, the Service Centre for promotion of wood processing industry was planned with the following functions:

- Production

  Manufacturing of utility furniture with a demonstration effect. Introduction of modern operating methods (veneering technique), and utilization of new and/or better materials (fibreboard, chipboard, plastics).

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1) NWFP = North West Frontier Province

- Common Facility Service

  Provision of common facilities services to the local small-scale industries and craft enterprises (e.g. cutting and seasoning of wood for furniture manufacturing, pressing and finishing of veneering work, certain complicated work, repair and sharpening of tools).

- Extension Service

  Provision of technical, economic, and managerial assistance to local small and medium scale enterprises.

- Vocational Training

  Upgrading of existing skills (carpenters) and training of enterapprentices, in courses specifically designed to meet the needs of these people.
  Management training of the local counterparts.

The project is to become self-supported i.e. all current expenses shall be covered by the proceeds of furniture manufacturing.

Project investments will be jointly financed by the National Government and an European Government. The project will be implemented under the sponsorship of SIDB.

The environment and the available resources of the project are described below.

Pakistan is covering an area of 880,000 km^2 and has a population of 70 million. 43,000 km^2 are covered by forest out of which 13,000 km^2 only are considered to be productive forest land.

The North West Frontier Province, one of the 4 provinces in Pakistan, is covering an area of 75,000 km^2 and has a population of 8,4 million. The province is considered to be one of the least developed region of the country.

The main source of income of the population derives from agricultural production although due to geographical and climatic conditions (mountains, dessert, low rain fall) only 17 % of the total area in NWFP are utilized for agricultural production. Productive forest land covers an area of approximately 3,5co km^2. The main wood species in the mountainous forests are coniferes like:

Cedrus deodora (Ceder), Pinus roxburghii (Pine), Pinus excelsc (Blue Pine), and Abies pindrow (Partel).

Beside the coniferes, some small quantities of Juglandaceae (Walnut), Hippocastanaceae (Horse Chest Nut) and Platanus orientalis (Platania) can be found.

In the plains, Dalbergia sissoo (Rose Wood), Acacia arabica (Babul), Morus alba (Mulberry) and Salicaceae (Willow) are the main species grown at farmland, and at road and river sides.

Handicraft and Small Industry has a long tradition in the province. Besides leather-, textile-, and metal working, wood working plays a predominant roll.

1. Analysis of the Existing Industry

1.1 Primary Wood Processing Industry

1.1.1 Sawmills

After felling, the coniferous logs are cut in the forest by axe to square pieces to diameter of about 3o cm. Larger diameter logs get one or two length cuts by handsaw and are afterwards squared by axe. The pieces are delivered to the timber markets in the cities in a length between 2.4o m and 3.6o m.

In NWFP, there are 3 so-called sawmills operated by the timber merchants. On a vertical carpenter bandsaw with a wheel diameter of 9o cm, the battens are cut into boards. Board cutting is done on request of the customer into the required board size. Stacks of standard board dimensions are not kept. Operation of sawmills is sporadic and output insignificant.

In general, the squared log pieces are bought from the merchant and cut into sizes at the own carpenter shops. Only carpenters without machines will buy timber cut into boards.

In view of the high timber wastage in the forest and in order to change the traditional working methods of axe squaring in the forests, the government had established a modern sawmill with a capacity of approximately 8,ooo m^3 p.a.. The sawmill is equipped with a Japanese 1,2oo mm vertical log bandsaw and carriage with automatic feed, an edging circular saw, a cross cut saw, a bandsaw, and a 4-side planer and moulder.

Other supporting and servicing machines are available. Further equipment of the sawmill is a kiln dryer of 4o m^3 capacity and a wood preservation plant. The plant is not in operation due to shortage of funds, lack of know-how and non-availability of management and staff with adequate skill.

1.1.2 Panel Industries

1.1.2.1 Plywood Industry

A Veneermill comprising of one slicer with 4,5oo mm length, one slicer of 3,6oo mm length, a vertical log bandsaw, a veneer conveyer jet dryer 2 jointers and servicing machinery is established with foreign participation at the capital of the Province. It was intended to produce walnut veneer for export. Due to restrictive forest policy, tribal rivalry and administrative problems of the Forest Department, the raw material supply could not be secured. The factory is running with about 2o % of its capacity. In order to utilize the existing capacity at least to some extent, Dalbergia sissoo (Rose Wood) is sliced for the local market.

Other veneer or plywood factories are not existing in the Province.

In Pakistan 4 more plywood factories are in operation. The total installed capacity is estimated at approximately 5,ooo m^3 p.a. (one shift)

The production, however, is hardly exceeding 2,ooo m^3 p.a. The reasons are lack of know-how, inadequate factory organization, shortage of funds and problems with raw material supply. The main product of all the 4 factories is 4 mm commercial plywood sheets, 1,2oo x 2,4oo mm in size made out of imported tropical timber like Lauan.

1.1.2.2 Particle Board Industry

In NWFP, no particle board factory is in operation. In Pakistan there are 4 factories with an estimated total installed capacity of 2o,ooo m^3 19 mm particle board p.a. However, production accounted to less than 3,ooo m^3.

Factory No. 1 has an installed capacity of 8,ooo m^3 p.a. An uncontrolled mixture of pine, ceder, rose wood and acacia is used as raw material. Chips are produced in a hammer-mill.

Screening of chips is omitted. Handforming is applied. Gluing of chips is done in a rotary drum. The one layer boards produced are according to the applied technology of uneven density and properties. The production p.a. is around 1,5oo m^3. The size of boards is 2,4oo x 1,2oo mm.

Factory No. 2 has an installed capacity of 4,ooo m^3 p.a. The factory is part of one of the plywood factories. Rest rolls, veneer and timber waste are mainly used as raw material. To fill the material gaps, materials like acacia, rose wood and other local hard wood species are added to the waste from the veneer mill.

After reducing the wood to chips in a cutter block flacker, gluing is done in a slow moving drum. Forming of mat is done manually into frames. The entire production is uncontrolled. The ready one layer board has a size of 2,4oo x 1,2oo mm and is not suitable for furniture production. The total production p.a. is about 8oo m^3.

Both factories, although not within the Province, are situated in a distance of about 25o km from the provincial capital on the main road.

The 2 remaining particle board factories are far away. The distance to the provincial capital is about 1,6oo km. The installed capacity p.a. is 4,ooo m^3 each, however, the output p.a. from both the factories is less than 7oo m^3. Both work under quite similar production conditions like factory No. 1 and 2.

A modern board factory with an installed capacity of 12,ooo m^3 is under installation. The factory although outside the provincial bounderies will be established in a distance of 2oo km from the provincial capital. As raw material bagasse will be used. It is intended to produce a 3-layer quality board in size of 3,6oo x 1,2oo mm.

1.1.2.3 Hardboard Industry

In NWFP, no hardboard factory is in existance. In Pakistan only one factory produces hardboard in the size of 2,4oo x 1,2oo in a medium to low quality. The installed capacity is estimated with 2,ooo m^3 (4 mm) p.a. A second modern factory is under installation. As raw material bagasse will be used.

1.2 Secondary Wood Processing Industry

1.2.1 Carpentry and Joinery Workshops

In NWFP, carpentry and joinery work is done by traveling carpenters. For wooden building constructions, doors, windows and other interior building works, the timber is delivered in battens to the respective construction site and by the traveling carpenters, cut, planed, moulded, joint and fitted by hand tools. This method results into high wastage of timber and uneven products in quality and size. Carpentry or joinery shops are not in existance.

1.2.2 Furniture Workshops

A survey of the furniture industry in NWFP revealed that 2o9 factories in operation, employing 1,45o workers. Besides there is a large number of self-employed one man carpenter shops who have not been taken into consideration. In the factory sector 4 companies are in operation. In total 260 workers are employed. This means an average employment of 65 workers per factory. In the workshop sector 205 factories are surveyed with a total employment of 1,19o labourers or an average employment per factory of 5,8 workers. The total sales of these factories is about 2.4 million US$, which is an average of US$ 11,5oo per workshop or a turnover of US$ 1,655 per emoloyee.

The capital investment of the 2o9 factories comes to US$ 1.5 million or US$ 7,2oo per workshop. Per employee US$ 1,o35 have been invested in the average.

In Peshawar, the provincial capital, 46 factories are established, 74 factories are in operation in the district. The remaining 89 factories surveyed are distributed all over the province with slight concentration in the main cities.

2. Applied Technology

2.1 Primary Wood Processing Industry

The technology in the existing primary wood processing industry has been described under 1.1 . In conclusions, it can be said that the equipment, especially in the particle board industry, is ancient and outdated. The production process is uncontrolled and not in accordance with the known technology. The raw material used is not suitable for quality chipboard production. The boards throughout can not be utilized for furniture manufacturing but may be used for secondary building construction (partition walls, false ceylings etc). The equipment in the plywood industry, although mostly of older design and second-hand purchased, is suitable for quality plywood production. However, due to lack of know-how, inadequare factory organization and shortage of suitable raw material, quantity and quality of the products are not in accordance with the requirement of the secondary wood processing industry.

The veneer mill described under 1.1, 2.1 has an equipment of good quality and latest design. The factory organization is in accordance with European standards. However, due to shortage of walnut trees, the installed capacity can only be utilized to 2o %. In absence of an efficient, secondary industry in the modern sector, rose wood veneer produced for the local market can hardly be sold.

It is hoped that the particle board and the hardboard factory under installation will bring reflief in the supply of fibre based boards.

2.2 Secondary Wood Processing Industry

The technology applied in the secondary wood processing industry is traditional, ancient and outdated. In the 2o9 surveyed factories only 69 machines are installed.

The 4 companies in the factory sector have 34 machines, leaving 205 factories with 35 machines in the workshop sector.

The most common machine applied in the timber industry is a carpenter bandsaw of local production. Furniture made out of solid wood in medium to low quality is commonly produced. The design is not in accordance to the requirement of the material, resulting in warping and cracking of the finished products. Shelac and linseed-oil are applied as surface material . All furniture are produced in single production or on order. Work preparation and design departments are not in existance. Production planning is not done, factory organization not implemented. The skill of management and workers could be better.

Only one factory in the formal sector is producing quality furniture almost exclusively for export. Although a complete new plant with latest design and wood working machinery has been installed in a new building, with the exception of timber cutting on a hand fed horizontal bandsaw, all work is done manually. The modern machinery cannot be operated due to lack of technical know-how and none-availability of skilled machine operators.

In the average of the surveyed 2o9 factories, 6,5 m^3 timber and only o,35 m^3 board constitutes the input of materials per employee and per year.
This shows clearly the situation of the wood processing secondary industry in the North West Frontier Province of Pakistan.

The efficiency of this subsector is hampered by the following factors:

- Furniture is made exclusively out of solid wood. Materials like chipboard, hardboard, veneer, plywood, formica etc., which are used in the furniture industry in industrialized countries are not yet applied in furniture making in Pakistan.

Due to lack of know-how those engaged in the wood processing industry are not yet prepared:

- to create, develop and use modern designs to meet the requirements of materials mentioned above viz: veneer, plywood, formica, etc;

- to operate modern machinery needed for the production of modern furniture from these materials;

- to process efficiently modern materials like chipboard, etc.

Modern batch production in this particular sector is unknown.

There is an increasing demand of quality furniture in the country, but the furniture industry in the province is not in the position to cover the demand. Quality furniture is either imported or purchased from urban areas in other provinces where slightly better quality is produced. Export of furniture from NWFP to the capital of the country, the big cities, the industrialized zones with a good demand potential is hardly possible. Consequently, most of the timber coming from the province is shipped as logs to other provinces and is re-imported as furniture or handicraft products. The exploitation of timber contributed to constant unemployment in the province and non-development .

3. Establishment of a Service Centre

In order to promote and develop the traditional timber industry and to create more job opportunities and utilize the timber in the own province as well as save the timber resources by utilization of timber substitutes, SIDB [1], an autonomous government organization, decided to establish a wood-working Service Centre as a promotional instrument for the timber industry in NWFP.

Under the given circumstances a Service Centre was considered to be the most efficient instrument to develop and promote small and cottage industry and produce relatively quick results. Other measures, e.g. investment aid, tax and custom benefits, subsidized bank loans etc., were discussed, but considered only additional aids for the development of small industries. All these measures were considered to remain ineffective without being incorporated in a Service Centre programme with its complex functions. Moreover, the timber industry in the province needed in the first instance technology transfer, technical and economical know-how and properly trained technicians and skilled workers.

SIDB was of opinion that supply of know-how could best be done by extension service, practical demonstration and training at some place not too far situated from the establishment of the respective entrepreneur to be helped and developed. Since most of the establishment owners were only semi-educated, not being able to read a technical drawing and understand technical or economical abstracts, transfer of know-how direct from industrialized countries was not possible. In a Service Centre, however, through practical demonstration SIDB thought it possible to make even a complex technical procedure understandable for these entrepreneurs.

Furtheron it was considered that a Service Centre could take up functions of production as a pilot project and therefore set standards to the local market by changing the style of products and creating a demand for items not yet manufactured.

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1) SIDB = Small Industries Development Board

Moreover, some Service Centres for other industries had been established in other provinces since several years. The experience with these Centres and the good results influenced, of course, SIDB to take a decision for the establishment of a Service Centre for the timber industry.

3.1 Concept of the Service Centre and Target Group

The concept of the proposed project derived in accordance to the environment, the size and technological level of the target group (secondary wood processing industry in NWFP), the available resources and the envisaged future development of the timber industry. The concept was prepared under consideration of these important parameters and in conclusion of the result from the basic information data. The data has been collected in accordance to the forms in annex I:

1. Important Areas and Basic Information Data for the Pianning of Service Centres.
2. The Potential Range of Services of a Service Centre.
3. Information Matrix for Describing and Planning of Service Centres.

3.1.1 Selection of Target Groups

The proposed target groups are all factories utilizing timber as their raw material within the boundry of NWFP and falling under the Small Industries Factory Act. The basic criteria in this case is a capital investment excluding land, not exceeding the equivalent of US$ 3oo,ooo, provided, however, the factory owners proved to be qualified for advisory service and are willing to cooperate with the Service Centre. The secondary wood processing industry could be classified into 3 groups.

1. Factories employing 1 - 1o workers. 9o % of the subsector belong to this group.
2. Factories emlpoying 11 - 50 workers. This group is about 9,5 % of the subsector.
3. Factories above 5o employees. Less than o,5 % belong to this group.

The capital investment of the first two bigger groups is very low, since hardly any machines are installed in these factories and buildings. Buildings are rented to a great extent. Most of the work is done in open yards or direct on the roadside. Since it is not possible to advise approximately 2oo factories equally effectively, a selection according to merits and distance of the establishment from the Centre had to be made. However, selection according to the size of the factory is not proposed. Preference will be given to the entrepreneur who proved to be cooperative with the Centre and most progressive in the leadership of his enterprise.

3.1.2 Location of Project

In or around the capital 12o factories with approximately 8oo employees are working in the timber line. The infrastructure in Peshawar is better developed than the rest of the province. Power, telephone, railway and road are available and each point of the province can be reached best from there. Last not least, a small industries estate already developed was existing since serveral years in the capital, but still not settled. The decision was therefore taken to establish the Service Centre at the provincial capital on the small industries estate.

3.1.3 Function of the Project

The following functions of the Service Centre were envisaged:

- Production
- Design and work preparation
- Common facility
- Training
- Extension service.

It was suggested that the local management should consist of one project manager, four wood technologists as department leaders, and three foremen for the different sections.

Expatriate experts should train and assist the local management.

3.1.3.1 Production Department

According to the plans the production department consisted of a complete unit of a medium-sized factory equiped with all basic woodworking machinery of medium size. No automatic or semi-automatic machines are proposed. Also high quality production machines are not planned to be installed.Through production as pilot project the function of a modern medium-scale woodworking factory should be demonstrated to the entrepreneurs. Furthermore, a complete set of machines is proposed to be installed for demonstration and training purposes. The production unit is considered necessary also to facilitate the transfer of technology. The utilization of wood substitutes like chipboard, hardboard, veneer etc. can only be demonstrated when an adequate equipment is available.

The production unit is also necessary to guarantee an adequate practical training of factory owners, technicians, skilled workers and apprentices which is only possible carried out under real production conditions and the pressure of the market. It is furthermore planned that through production the operation cost of the Service Centre would be recovered partly or even completely which should help to make the project financially independent and avoid long-term governmental subsidies.

3.1 3.2 Design and Work Preparation Department

The design and work preparation department is planned to produce designs of standard furniture and supply technical drawings along with materials and technical specifications to the small-scale entrepreneur. Drawings about modern woodworking techniques should be prepared and handed over to the factories. On request, shop drawings should be produced and organization charts drawn. Furthermore, the department should demonstrate to the factory owner that an organized factory cannot run without work preparation department where each step in the production unit is predetermined.

3.1.3.3 Common Facility Section

It cannot be expected that the factories will purchase expensive production machines in the first phase of advisory service. Therefore, a common facility service especially for the execution of the following services is planned:

- cutting of logs
- seasoning of timber
- pressing and veneering of boards
- moulding, cutting and sanding of solid and veneered timber
- sharpening, repair and maintenance of woodworking machine tools
- preparation of shop drawings, blueprints and photostate copies

These services are meant to be an instrument to bring the entrepreneur to the Centre and demonstrate to him modern working methods.

3.1.3.4 Training Section

The training department for 3o apprentices is planned in order to cater for the urgent demand of the industry for skilled workers who are in the position to produce a piece of quality furniture by hand as well as to operate all basic woodworking machines, handle modern wood substitutes and read and prepare shop drawings. The period of training was proposed to run for 2 years. It was expected that the best apprentices after completion of their training would support the advisory service of the project in the private industries. It was envisaged that during the training period each apprentice should get a scholarship. The minimum qualification for acceptance of the boy for the entrance test was matriculation.

3.1.3.5 Extension Service

The extension service plays the most vital part in the Service Centre concept. The predominant objective is to attain an adequcte training of the counterparts and skilled workers and to create an atmosphere of understanding and confidence between the staff of the Centre and the small industrialists because no Service Centre could operate beneficially if these conditions were not fulfilled. The slightest mistake in the beginning when approaching the clients could create mistrust and unrepairable problems between the entrepreneurs and the staff of the Centre.

The Extension Service programme was planned to include the foilowing:

- regular visits of all factories working inthe timber line, irrespectively of size or set-up

- execution of a sector study of the timber industry

- analysis of the primary and secondary data collected

- selection of factories willing to cooperate within the project and found suitable for advisory service

- fixing of priorities in the extension service and preparation of a concept

- execution of an intensive extension service in the technical and economical field in accordance with the prepared concept.

It is proposed that the extension service will be executed to private entrepreneurs on request. Furthermore, also on-the-spot advice (ad hoc) in the establishments will be given by the staff of the Centre. The planning and desiqning of new factories and projects in the private as well as the public sector is to be one of the duties of the advisors as well as the local staff.

3.2 Aims and Objectives

3.2.1 Technological

The extension of technology transfer has to be divided into the following two groups of enterprises:

1. Objectives for Enterprises within the Traditional Sector

   Training in basic wood technology, applying of correct joints in accordance with the utilized material and design of the proposed piece to be manufactured, proper handling of solid wood, kiln drying and natural open-air seasoning of timber, functional designs and selection of the right material, application of the most economic production methods.

2. Objectives for Enterprises within the Modern Sector

   Operation and maintenance of woodworking machines, introduction of new techniques in the timber trade by utilization of wood substitutes like chip-board, hardboard, plywood and veneer, application of adhesives, nitro-cellulose laquer, modern hardware etc.

The aim of technology is to save the natural resources of timber, to produce more economically as well as to produce timber products as import substitutes, increase the production capacity of the factories and raise the quality of the products in order to make the products exportable. Further objectives were to produce standard items and to develop applied production methods in accordance with the local raw material and the present situation of the factories to be advised.

The factories of group one should be assisted to shift from the traditional sector into the modern sector.

3.2.2 Economical

The proposed project is planned to create jobs for approximately 60 technicians and workers and should train 30 apprentices in addition. Apart from the creation of these jobs, secondary job opportunities for about 100 people during the construction period of the project would be created. After completion of the project the Centre will generate further employment through local purchase, development of modern hardware, assistance in design and production of woodworking machinery and, last not least, subcontracting to the local timber industry. The main economic objectives and the target of the project are thus to promote, develop, stabilize and modernize the local industry to make the factories competitive in the regional as well as in the national and international market, to create more jobs in the timber industry and to secure the existing jobs. Only a strong small industry based on local raw material would be in the position to play a decisive role in the economic swing of NWFP in particular and the country in general.

3.2.3 Constraints

To avoid competition between the project and the private industry, no item should be produced in the Centre which was already produced or could be produced by the local industry. The Service Centre should restrict its production activities to items made out of wood substitutes only or items with such a complicated technology and high standard which for the time being could not be manufactured by the local industry. Besides development and production of standard furniture batch production orders should be accepted by the project. By subcontracting the Service Centre should then distribute orders to the local industry which would help to create job opportunities and rise the existing manufacturers to higher standards. With these orders produced under supervision of the Centre the small entrepreneur should learn new techniques and should apply these techniques in future orders accepted by him.

3.3 Implementation and Cost of the Service Centre

3.3.1 Investment Cost

The total investment cost of the project was calculated with US$ 1.35 millions. The estimation is as follows:

1. To be spent by the aid-giving country machinery, equipment, transport	US$	3oo,ooo
2. To be spent by the local government estate, buildings, local machinery, customs duty, handling and sales tax on imported machines and equipment	US$	565,ooo
working capital	US$	85,ooo
recurring cost for 5 years	US$	4oo,ooo
total grant in aid	US$	1,35o,ooo

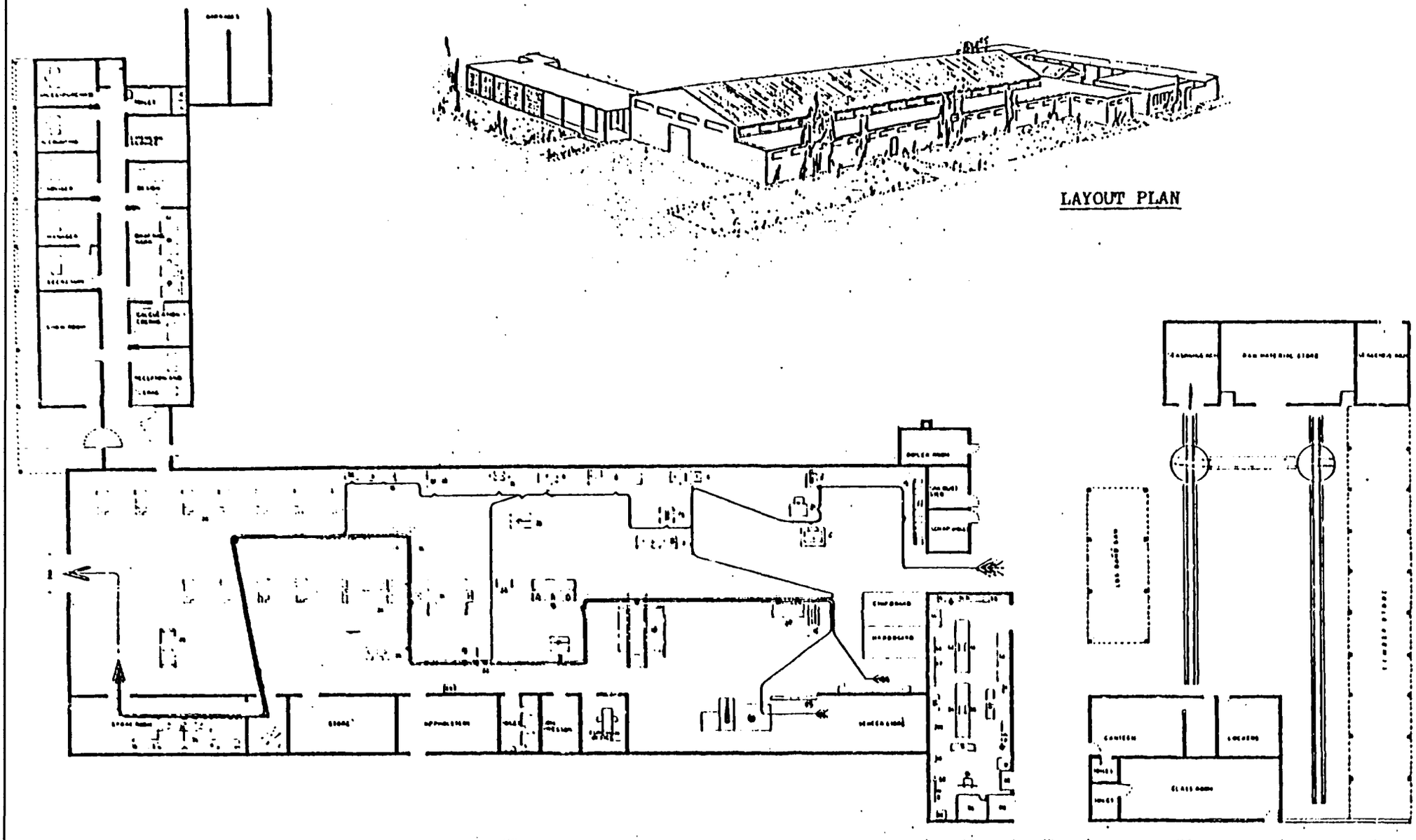
The aid giving country was further expected to bear the expenditure of four experts for a minimum period of 3 to 4 years. The possibilities of extension is planned for these services. It was further proposed that after an operational period of 4 years the concept should be revised and modified according to the need of the industry. Furthermore, the Centre was meant to try to earn in this period most of its revenue expenditure through production and become financially independent after 4 years of operation.

The production capacity was estimated for the first 4 years with US$ 325,ooo p.a which was about 5o % of the capacity installed in fact.

3.3.2 LIST OF MACHINERY AND EQUIPMENT

Item No.	Description		Local No.	Imported No.
	I. Wood Working Machinery (solid wood and panels)			
1	Log Band Saw	1,2oo mm	1	
2	Band Saw Machine	9oo mm	1	
3	Timber Seasoning Plant, inclusive Boiler, capacity 2o m^3			1
4	Multiple Rip Saw			1
5	Straight Line Cut Off Saw			1
6	Double End Cut Off Saw			1
7	Circular Saw			1
8	Planning and Jointning Machine	45o mm		1
9	Thicknessing Machine	66o mm		1
1o	4 Side Moulding Machine	16o mm		1
11	Rigid Spindle Shaper incl. Feeding Apparatus			2
12	High Speed Router			1
13	Tennoning and Slotting Machine			1
14	Chain Mortising Machine			1
15	Knot Boring and Plug Cutting Machine			1
16	Dovetail Machine			1
17	Dowel Boring Machine incl. Dowel Making Machinery			1
18	Universal Belt Sander	2,5oo mm		1
19	Semi-Automatic Belt Sander	2,5oo mm		1
2o	Double Belt Sander (Drawer Fitting Machine)			1
21	Drum Sander and Calibration Machine			1
22	Vertical Panel Cutting Saw			1
23	Wood Turning Lathe		1	
24	Portable Machinery (electric and pneumatic)			set
25	Machine Tools			set
	II. Veneer Preparation and Pressing Machinery			
1	Veneer Cutting Shear	2,5oo mm		1
2	Zig-Zag Veneer Jointing Machine			1
3	Glue Spreader			1
4	Hydraulic Press, 3 Day Light, electric heated	1,3oo x 2,5oo mm		1
5	Edge Bander			1
6	Edge Glue Spreader			1
7	Pneumatic Carcass Clamp			1

Item No.	Description	Local No.	Imported No.
	III. Surface Spreading and Varnishing Machinery		
1	Lacquer Coating Machines with one Coating Head		1
2	Spray Paint Equipment with Pressure Containers		1
	IV. Machinery and Equipment for Assembly Shop		
1	Work Benches	2o	
2	Hand Tools (set)	2o	
3	Portable Machines (electric and pneumatic)		set
	V. Tool Room and Supporting Machinery		
1	Log Band Saw Sharpening Machine		1
2	Circular and Band Saw Sharpening Machine		1
3	Knife Grinding Machine 800 mm		1
4	Cutter and Universal Tool Grinder		1
5	Double End Tool Grinder		1
6	Log Band Saw Butt Welding Apparatus		1
7	Band Saw Butt Welding Apparatus		1
8	Setting Apparatus		1
9	Log Band Saw Straightening Bench		1
1o	Drill Press		1
11	Compressor		1
12	Exhaust Equipment		1
	VI. Office and Drawing Room Equipment		
1	Furniture for Office	set	
2	Furniture for Workshop	set	
3	Typewriter		2
4	Blue Print Machine		1
5	Cycles Type Machine		1
6	Drawing Board		2
7	Photo Copying Machine		1
8	Drawing Instruments (set)		2
9	Miscellaneous		
1o	Calculating Machine		2



LAYOUT PLAN

3.3.4 SIZE OF BUILDINGS

Building:	
A: Covered Area	m^2
Machine Shop	75o
Assembling and Finishing Shop	65o
Tool's Shop	25
Boiler Room, Wood Waster, Seasoning kiln.	6o
Store for Raw Material	35
Store for Finishing Goods	65
Spray Paint Room	3o
Office Project Manager	15
Office Advisors	15
Office Technologist and Draftsman	25
Office Sales Manager	15
Office Clerks	2o
Office Typist	15
Social Room	45
Lecture and Exhibition Hall	45
Garrage	2o
Verandа	2o
Total covered Area:	1,85o
B: Sheds	
Shed for Wood Stores	19o
Shed for Log Band Saw	1oo
	2oo

3.3.5 Requirement of Staff and Qualification

In a developing country it is in general difficult to recruit Service Centre staff with the required skill. If the skill would be available, the need for establishment of a Service Centre would not arise. In the case of the wood working Service Centre in NWFP, management staff with some basic education in wood working could be found, however, the technical middlemancgement had hardly any knowledge about wood-processing industry and the so called skilled workers came straight from an agricultural society with hardly any education but some manual skill on a very low level. The list of staff along with the required qualifications is given below. It has however to be mentioned that the posts could not be filled in accordance to qualifications specified

1. Technical and Administrative Management

S. No.	Name of Post	No	Qualifications
1.	Project Manager	1	BSC, qualified as wood technologist from an international institution, worked as manager in timber industry for 5 years
2.	Production Manager	1	Matric, qualification as wood technologist, 3 years experienced in timber industry
3.	Manager Design and Work Preparation	1	Matric, interior designer or wood technologist, 3 years experience in furniture design
4.	Extension Officer	1	Matric, qualified wood technologist, 3 years experience in wood processing industry
5.	Wood Technologist (Work Preparation Department)	1	Matric, qualified wood technologist, 2 years experience in wood processing industry
6.	Manager Sales + Purchase	1	Matric, 3 years experience in marketing
7.	Chief Accountant	1	Matric, worked as accountant for 3 years in public or privat organisation
	Total Management	7	

2. Workshop Staff

S. No.	Name of Post	No.	Qualifications
1	Foremen	3	Pass primary school, worked as foreman in wood processing industry
2	Machine Operator	13	Pass primary school, worked as skilled worker in wood processing industry
3	Bench Worker	2o	Pass primary school, worked as skilled worker in wood processing industry
4	Mechanic	1	Skilled worker in mechanical engineering or fitter
5	Helper	5	-
	Total employees workshop	42	

3. Administrative Staff

S. No.	Name of Post	No.	Qualification
1	Storekeeper	1	Pass primary school, worked as storekeeper in public or private organizations for 2 years
2	Office Assistance	1	Matric, english short hand and type-writing, worked for 2 years in office of public or private conern
3	Steno-typist	1	Pass primary school, qualified in shorthand and typing
4	Watchmen	2	-
5	Office Bearer	2	-
6	Driver	1	Licens for truck driving, 5 years experience

3.4 Activities and Results of Service Centre for Wood Processing Industry

The project was sanctioned by the provincial government and the government of the aid giving country. Funds became available and in a relatively short time of 18 months readiness for operation was reached.

3.4.1 Production Unit

One of the first services extended by the Centre was the provision of organization charts and production flow sheets and working forms (models) and a simple organization system which were not only useful for the Centre itself, but could be taken over in origional or slightly modified from any private enterprise in the timber industry.

A standard programme for office furniture made out of wood substitutes so far not produced by the private industry was prepared, and the first serial of items was manufactured in the workshop. The system was absolutely new to the private industry, and the entrepreneurs could not believe that it was possible that a carpenter is not producing a complete piece of furniture from the rough timber cut to the finishing any more, but is operating only a few machines, assembling from prefabricated parts a piece of furniture,or does polishing only. Since there was a high demand for such type of quality furniture in the market, the first serial of production was sold immediately.

Due to intensive SIDB marketing efforts in the start-up period orders for production of furniture as import substitutes came from international hotel organizations, further orders were accepted from government organizations who had so far purchased their furniture in other provinces or even had them imported. Aid-giving countries and international organizations placed orders for furnishing of their institutions and offices. After 6 months of operation the Service Centre had orders amounting to 6 months of production and after 1 year the orders amounted to 9 months of production.

In order not to extend the installed capacity of the Centre and to distribute the work of the advisors equally to all departments of the Service Centre and not to give predominant importance to the production department, a temporary stop for acceptance of orders was imposed.

There had been, of course, many problems to be solved before a proper production could be organized. Wood substitutes, although produced in the country, were not available in the market. The dealers of related products were not willing to take the financial risk to start with new items in their product range. Through a widespread information campaign about the utilization of wood substitutes and visits to the factories of origin a regular supply to the Service Centre could be guaranteed. It was even possible to convince some progressive local dealers that dealing with wood substitutes might be profitable, and today these items are also available locally. The particle board factory with bagasse as raw material and as described under 1.1.2.2 had gone into production of course and delivered an acceptable quality of chipboard.

Modern hardware, glue, varnishes, lacquers for furniture were either not available or in such poor quality that an industrial production was not possible with these items. Modern hardware was designed and specified in the Service Centre, trial orders were placed with the local manufacturer, supervision of the production was carried out, and in long tests in the Centre the new products were developed. After necessary modifications in design orders were placed and the new item was introduced in the local market. In co-operation with the local lacquer manufacturer and after a series of trial operation it was possible to develop a locally manufactured nitro-cellulose spray material for the Centre in particular and for the furniture industry, in general. This lacquer is now available on the local market and is introduced in its way to the timber industry.

Locally available adhesives were tested, and it was found that the quality of all the products tested was not in accordance with the required standard and that they were not applicable in a modern furniture production. A European glue manufacturer could be convinced to start a production line of PVA adhesives in the country. Thie adhesive is now distributed by the Centre also to the private industry.

A primitive log-bandsaw was already produced in the country. This simple bansdaw was re-designed by the Centre and manufactured under the advice of the original machine producer. The machine was brought to the Centre and installed. During start-up the quality was not according to the required standard because experience for the production of such a heavy machine was not available in Pakistan. However, after having introduced modifications and changes in the design the machine could be developed to such an extent that it is now durable, and is in the meantime commonly used in the local industry.

The implementation of a smoothly running production line with new production methods and the processing of new materials like chipboard, hardboard, veneer, etc. was not easy under the condition of the developing country.

The so-called skilled labourers employed from the local market had never in their life worked on machines or handled materials like veneer. Their basic tool was the carpenter's axe. Through intensive on-the-job-training programmes and constant guidance the labourers could be trained to such an extent that today a nucleus staff of skilled workers comparable with skilled workers in the industrialized countries is available in the Centre.

The production methods and techniques applied in the timber industry in industrialized countries could not be transferred to the developing country without modifications. The foreign experts were confronted with technical problems which could not have been foreseen. Locally made chipboard pressed under normal conditions split or was compressed to such an extent that the fiber and coumpound were destroyed. Machine tools ran hot or the cutting time was reduced to a none-acceptable minimum when working with rose wood and other tropical timbers. In an endless serial of trial operations and tests under production conditions the techniques known in Europe or the USA had to be adopted to local conditions and materials, e.g. whilst veneering chipboard made out of bagasse rose wood veneer the optimum pressing time and with the adequate pressure and temperature had to be found out in practical trial operations.

The mixture and chemical contents of an adhesive of international standard had to be changed completely under the climatic conditions of 46 centigrades temperature. Cutting speeds and feeds cutting angle of machining tools had to be changed in accordance to the material conditions. However, all these problems could be solved and the production line today is running in a smooth and efficient way under a good organization and is producing standard furniture and executing orders from international and national markets.

None of the activities of the production unit, however, was done for the sake of production itself, but it was done as a process of technology transfer to the local industry. It is a strict rule in the project that nothing should be done which is not useful to the private industry or can be adopted or serves the development and promotion of the same.

As experience has shown technology transfer from Europe is only possible if known techniques adre adjusted in accordance to the condition of the developing country.

3.4.2 Common facility Service

The common facility service offered by the Service Centre to the local industry is regularly frequented. Already after 6 months of operation the demand from the private sector for cutting and seasoning timber was higher than the installed capacity of the project. The entrepreneurs soon had discovered that out of seasoned timber a more durable and higher quality product can be manufactured, and therefore in competition to their colleagues they would have better earnings for the better product. To serve the demand of the local industry for sawn and seasoned timber additional capacity should be installed, since the private industry made extensively use of the following services offered by the Centre:

- splicing of veneers into fixed sizes
- veneering of boards
- moulding, planing and sanding of solid and veneered stock
- repair, maintenance and sharpening of woodworking machining tools
- photostatic copying and blueprint works
- designing of furniture, preparation of shop drawings

- translation of technical specifications.

A nominal fee covering the Centre's expenditure only was charged for these services from the customers.

3.4.3 Subcontracting

In one year orders amounting to US$ 60,000 on an average are extended to 12 establishments in the private sector. Through these orders the entrepreneur benefits directly from the Centre. Accepting the order, production has to be in accordance to the given specifications, thus opening the door to the advisor without hesitation.

Through the direct benefits achieved by the entrepreneur through subcontracting an atmosphere of confidence has been developed between factory owners and the advisory staff. The new techniques learned on the subcontracted work are now applied to private orders as well as without the supervision of the advisory staff.

3.4.4 Extension Service

Extension service has been extended by the foreign advisors and their local counterparts from the very beginning. However, in the initial phase an extensive advisory service was not carried out because first the Centre had to be organized, techniques had to be tried and the entire factory organization had to be implemented. Furthermore, the counterparts had to be trained in practice and had to become acquainted with the Centre and its functions. Experience had to be gathered by the advisors as well as by their counterparts before advice could be given to the private industry. A wrong advice or a miscarried demonstration often does more damage to the reputation of the Service Centre and its staff than a long period of useful work can repair.

After the Centre itself was fully established, as a first step of the extension service the enterprises in and around the capital as well as in and around three major cities near to Peshawar were regularly visited by the advisors and their counterparts. During the visits problems were discussed and on-the-spot advice was given. After the contacts to the entrepreneurs had been established, confidence and understanding were created. Within the frame of the extension service short-term and evening courses have been executed on the following subjects:

- application of adhesives in the timber industry
- utilization of nitro-cellulose lacquers
- operation of wood working machinery
- handling of veneer.

The results were quite encouraging, and in the average 25 entrepreneurs participated in each course.

It became evident that an effective extension service should be complemented by financial measures. Following the recommendation of the foreign advisors a scheme for granting loans to the small industries for investment up to a maximum amount of US$ 2,500 per establishment has been implemented.

Besides the extension service to the timber industry advisory service was extended also to woodworking machine manufacturers. In good cooperation simple woodworking machines have been designed and developed in cooperation with European woodworking machine manufacturers. The prototypes were purchased by the Centre and installed in the training section. Operation of these locally made machinery is demonstrated to the entrepreneurs of the timber industry, and several machines were already ordered by the private entrepreneurs and financed by the credit programme of the Small Industries Corporation.

3.4.5 Training

3.4.5.1 Training of Counterparts

The counterparts were trained on-the-job during the starting phase of the Centre. Five of the seven technicians had already participated in a two year's upgrading training programme in Europe. Although the training on-the-job of the counterparts hampered somewhat the activity and efficiency of the Centre in the beginning, the advantage of such a training could not be overseen. All works were done in team work, and each member of the team had to prove his efficiency. On-the-job training means that losses, time delays and deficiencies are clearly visible to each member of the team. Therefore each member tried his utmost to avoid mistakes and work efficiently.

The fluctuation of counterparts, of course, could not be avoided. Out of the seven counterparts three left after completion of their training. Two of them started their own business in the timber industry, and one accepted a highly paid position in the private sector.

Although the outgoing of these three highly qualified experts was to the disadvantage of the Centre, the private industry benefited from it. The target of the Service Centre to develop the private industry was attained in this case.

3.4.5.2 Training of Skilled Workers

47 so-called skilled workers had been trained on-the-job in the Centre. Here applies the same as in the case of the technicians. Many mistakes were done by the workers in the initial phase, and the project suffered from heavy losses. However, 25 of these persons are now properly trained and do a first class job. The fluctuation of these people has also started since the private industry has partwise reached the level to absorb these highly trained carpenters. With further development of timber industry and the installation of more machines it is expected that the absence of skilled workers from the project will become a problem.

3.4.5.3 Training of Apprentices

From national and international sources training programme publications for cabinet makers and carpenters have been collected, and out of this material and adequate programme in English language for a two year's course has been designed. Now a complete syllabus with different teaching books in the English language (still official language in Pakistan) is available. The translation into the local language is partwise done.

Aptitude tests for admission were prepared and the first trainees were selcted and employed according to merits. The qualification for admission to the test is the final matriculation (1o years of schooling). A scholarship to the trainee is paid (US$.3o). The training programme is subdivided into practical work and theory which are in the relation 6o : 4o. In the first year of training the apprentices learn the work done by hand, in the second year training on machines is applied.

After completion of training the apprentice is in a position to prepare a piece of furniture entirely by hand as well as by using machines. He can read and draw a complete shop drawing, prepare timber and material lists, can make a simple cost calculation and understands the factory organization. He also has the basic knowledge about wood technology. After two years of operation in the project the first ten apprentices completed their training. There is a big demand from the private industry for skilled men. Four men accepted positions at high salaries in the timber industry. In order to strenghthen the staff position of the Service Centre and to make the boys fit for higher positions like foremen, technicians etc., an upgrading on-the-job training in the Centre has been implemented. In intervals of each three months the trainees are working in the production unit, in the work preparation and design department, in the extension service and in the training section. After completion of this training period they will become permanent employees in the project and will be promoted according to demands and merits.

3.5 Results on Services for Wood Processing Industry

The development of wood processing industry in NWFP does not depend only on the effectiveness and efficiency of the Service Centre, but on many more factors like: Government policy regarding private ownership, taxation, import policy, investment policy, availability and terms of loans as well as the policy of the Small Industries Corporation regarding development and promotion of Small Industry, availability of funds for promotional work and last not least on the general political and economic atmosphere in the North West Frontier Province of Pakistan. Availability and prices of raw materials especially timber and timber substitudes are other parameters for promotion of wood processing industry. However, already now, after 5 yeras of operation, it can be stated that the work of the project was successful and the concept proved to be correct.

An atmosphere of understanding and confidence has been created between the entrepreneurs of the factories to be served and the management of the project. More and more entrepreneurs come to the project and seek advice.

A change in the timber industry has taken place. Due to the work of the Centre chipboard and other wood substitutes are now available in the local market and are utilized by the industry. New techniques are applied in quite a number of factories and adhesives and NC-laquer are commonly known in the industry. Copying of design and technique of the project has become a sort of sport for some entrepreneurs who try to show their customers that they can do the same quality work as the Centre. The two larger-scale factories established in the province and equipped with modern machinery are now (after advice has been extended to them and their staff has been trained) using their machines which results in a much higher output; additional workers have been employed and a systematic factory organization has been adopted.

The cooperation with the govemment offices, SIDB, the Education Department of the provincial government, Forest Institute, University and Chamber of Industry and Commerce is very good and full support is given by these organizations to the Service Centre. Press, television and radio brought repeatedly articles and programmes about the development in the timber industry and the useful work of the Service Centre. Due to the initiative of the Centre various government agencies have changed their 60 years old specification of furniture and therefore make it possible for the private sector to apply new techniques and utilize new materials. However, only the progressive entrepreneurs are in a position to work in accordance with the new specification.

Widespread interest has been developed for the demonstration of new production methods, and in the discussions after the demonstration in the Centre many side-problems are discussed with the entrepreneurs and solutions are offered.

The common facility section has reached its target, and experience has proved that the demand for sawn and seasoned timber from the private sector is higher than the planned capacity of the project. The other services offered are used frequently.

The production is functionning well and has reached the target to become self-sustaining and financially independent only 2 years after start of operation. Also here the concept to demonstrate through production in a pilot project which is producing under market conditions has proved to be correct. The training effect through pilot project demonstration is much higher. The entrepreneur can see in practice new production methods and he may understand better that these methods are not only more profitable, but also produce a better quality product for which consequently a higher price can be required. Under the advice of the Centre several entrepreneurs have started to install local machinery, tested by the Centre, a few have also imported machinery after receiving advice from the Centre.

The demand from the private sector for skilled workers trained in the Centre is increasing day by day. High salaries are offered to these skilled young labourers who, trained in the Centre, are in the private industry already now earning much more than their former teachers. In this section, however, the Centre cannot fully cater for the demand of industry. Through multiplier effects as well as through the short-term courses additional training is conducted. However, in the long run the shortage of skilled workers will remain in the timber industry and the industry itself has to find means to solve this shortage in the long run.

A recent evaluation of the project by the aid giving country revealed that:

The Service Centre is considered to be a pilot project for the wood processing industries in developing countries.

The target of the project in the sections

- Production
- Common Facility Services
- Subcontracting

has been reached and the project is handed over to local management.

The high standard of work has influenced the target group effectively and created a spinn off effect. Peshawar has become known throughout the country as a Centre of quality furniture.

All promotional activity like extension service, training, common facility services and demonstration are financed by the income from production. Therefore the Service Centre has become a self financing institution for promotion and development of secondary wood processing industry.

Due to close cooperation with the enterprises of the target group, different production programme and methods, as well as catering for a different group of customers competition to the private industry did not appear. Big orders which could not be handeled by the target group have been taken over by the project and executed under participation of local industry.

Advisory service was extenaed to 19o factories. 41 factories received intensive advice.

Loans with a total amount of US$ 8o,ooo are provided to 37 factories who installed 41 machines. About 5o more machines were installed by the target group out of own sources, thus doubling the installed machinery at the target group.

In the last year 576 cases of common facility services have been executed by the Service Centre which comes to about 3 services per day.

49 apprentices completed their training and received a certificate. Diplomes in wood technology were handed over to 13 trainees.

The project has become a nucleus for skilled workers, serving the target group.

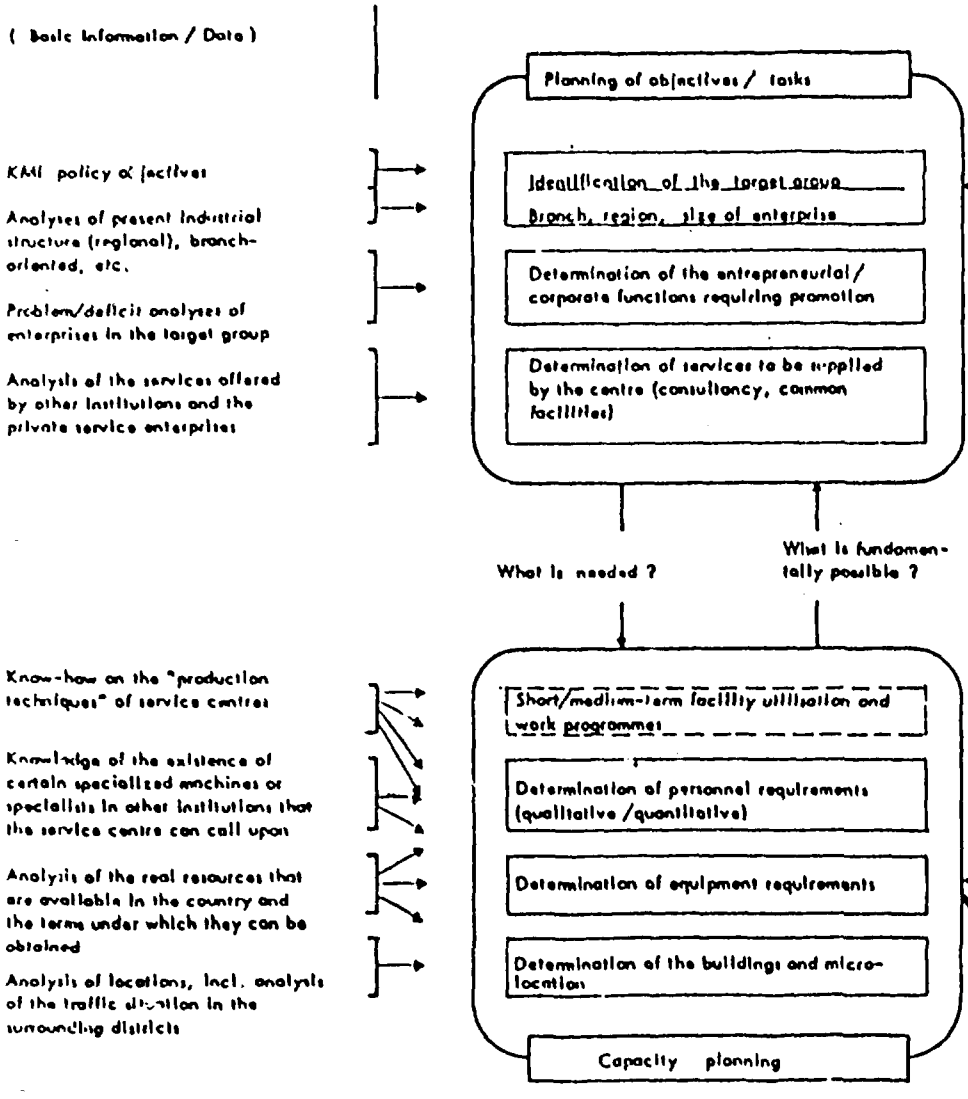
Establishment of 5 new factories was assisted by the Service Centre, productivity of workers of existing factories could be increased and modern production methods have been introduced. In conclusion it can be said that the project has a persistant economic effect on the target group and the region.

Encouraged by the success of the Service Centre for the wood processing industry, the provincial government has decided to establish 3 more Service Centres for the timber industry within the province.

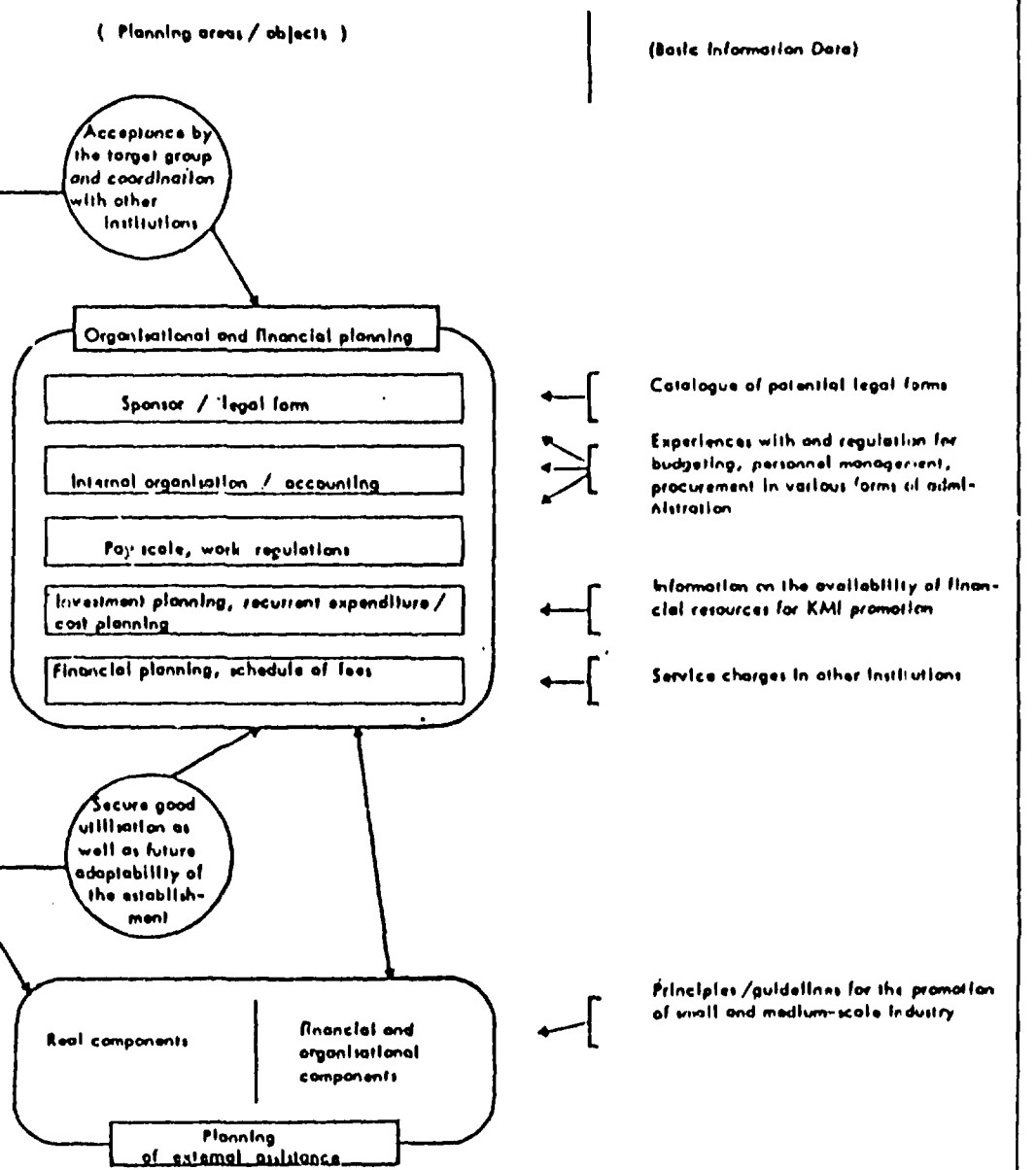
An international aid giving agency has studied the concept and decided to promote the timber industry in another province of Pakistan by establishing a Service Centre on similar outlines.

The next three pages depict planning charts for Service Centres and are all included in Annex 1.

IMPORTANT AREAS AND BASIC INFORMATION DATA FOR THE PLANNING



OF SERVICE CENTRES - ANNEX 1



The potential range of services of service centres

Nature of the service provided by a centre

(1) (Gainful production of no promotional nature)

A Services, based on technical facilities

2 Leasing of machinery, tools, equipment

3 Processing and finishing operations, testing, production (e.g. tools, jigs)

4 Basic and advanced technical training

5 Technical advisory services with demonstration at the centre

B Services, not based on technical facilities

6 Advisory services without demonstration at the centre

7 Elaboration of studies, plans, designs

8 Preparation and distribution of information material

9 Non-technical basic and advanced training

10 Non-technical centre services (e.g. joint purchase schemes, marketing)

11 Go-between services (market contacts, services of other institutions)

Function areas to which the promotional services are related

- Production
- Product development/manufacture of prototypes
- Production planning, work preparation
- Tool and jig making
- Material testing and quality control
- Maintenance and repair
- Procurement
- Storekeeping
- Marketing
- Accounting
- Finances
- Legal affairs
- Personnel management
- "Long-term planning" (buildings, plant, layout, production programmes, etc.)

Information Matrix for Describing and Planning Service Centres

(Synopsis)

Area		Group (subject matter)	Examples of features and secondary subject complexes
I Environment	A	SMI policy of the country	- Objectives - Intensity - Measures and institutions - Individual centres or network
	B	Availability of real resources in the country	- Machinery/equipment, etc. - Raw materials and auxiliary supplies - Personnel - Services - Construction techniques and materials
	C	Economic and urban structure of the region	- Prevailing industries - Agriculture and forestry - Characteristics of urban structure
	D	Location of the centre	- Size and economic basis of the town - Distances to other towns - Extension of the potential user area
II Target group	F	Target group	- Industries - New or existent enterprises - Size of establishments - Production methods, etc.
	G	Target group (persons) within the enterprises	- Entrepreneurs - Middle management - Skilled workers, etc.
	H	Entrepreneurial/internal function areas of the enterprise	- Product development - Production planning - Tool and jig making - Production - Testing/quality control - Commercial functions
III Type of service	K	Type of promotional service	- Elaboration of studies, plans, drawings - Basic and advanced training - Consultancy - Leasing of machinery, etc. - Performance of jobs/supplies - Centralised purchasing, etc.
IV Real resources	M	Buildings and land	- Site areas - Workshop areas - Classrooms, etc.
	N	Machinery and equipment	Subdivided by departments: - Production machines - Precision machines - Universal machines - Testing equipment - Accounting, office machines
	O	Vehicles and mobile facilities	- Cars and trucks - Mobile workshops, teaching equipment
	P	Personnel	- Management - Professionals - Skilled workers, etc. - Nationals/foreigners
	Q	Software	- Curricula - Work programmes
V Organisation	R	Legal form	- Legal form - Nature of relationship to sponsoring/controlling authority
	S	Internal organisation	- Areas of responsibility - Nature of the accounting system
	T	Financial data	- Investment costs - Recurrent costs - Revenues and subsidies

ANNEX II - MAP OF PAKISTAN